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THE EFFECT OF SEMANTIC NEIGHBORHOOD DENSITY ON VOCABULARY LEARNING IN SPANISH AS A SECOND LANGUAGE AND SPANISH AS A HERITAGE LANGUAGE

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by

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DEDICATION

Dedico esta disertación a mis padres, Rafael y Angelines, por no dejarme abandonar mis estudios durante un momento rebelde de mi adolescencia. A mis hermanos, Rafael y Macarena, por ser mis modelos a seguir y siempre enseñarme sobre la vida. También dedico esta disertación a mis cuñados, Puri y Joaquín que llevan aguantándome más de media vida, y como no, a mis preciosos cinco sobrinos que son la alegría de mi vida: Martina, Olivia, Rebeca, Rafael y Lorenzo.

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Abstract

This dissertation reviews the results from an online survey created to identify and compare how second language (L2) learners and heritage language (HL) learners of Spanish, enrolled in beginning-level coursework at the college level, acquired and built vocabulary. A total of 451 participants completed the survey. The purpose of the online survey was to serve as a baseline for pedagogical purposes, since it provided information about participants' language profiles and the way they build vocabulary based on sematic relatedness. Overall, the findings from the survey showed that HL and L2 learners differ in the way they build semantic neighborhoods and, in their meaning-making processes. HL participants produced a higher number of Spanish semantic associations for the provided Spanish categories, whereas L2 learners produced a higher number of English semantic associations for both the Spanish and English categories. Additionally, HL learners left more responses blank in both the Spanish and English categories. The findings support the idea that tailored vocabulary pedagogical practices and interventions

will benefit and enhance students' vocabulary development and learning in the Spanish language classroom.

Keywords: Semantic Neighborhoods, Heritage Language, Meaning-Making Processes, Spanish Second Language, Vocabulary Learning.

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Introduction

The present study proposes a new perspective to the study of vocabulary learning and teaching in Spanish Second Language (L2) and Heritage Language (HL) pedagogy. According to dictionary entries, vocabulary is defined as "the body of words of a particular language" (New Oxford American Dictionary). Previous research in the field of Second Language Acquisition (SLA) states that vocabulary is an essential component of language acquisition and learning due to its fundamental role in effective communication (Gass & Selinker, 2001; Laufer & Goldstein, 2004; Nation, 2013). Therefore, when students want to learn a Second or Heritage language, they need to acquire a broad knowledge of vocabulary to become proficient and communicate successfully in the language.

Given the importance of vocabulary in the L2 and HL, this study investigates how vocabulary is constructed and built by Second Language (L2) and Heritage Language (HL) learners of Spanish. It also proposes best practices for vocabulary teaching based on the implementation of a method of diagnosis, such as the *electronic* survey that was created and designed for the present research study. The following dissertation looks at the effects of semantic neighborhood density (SND) on vocabulary learning in Spanish L2 and HL learners by creating a conceptual framework through the analysis of three main approaches to explain vocabulary learning and acquisition: 1) Neighborhood Density, 2) Vygotsky's Meaning-Making Approach, and, 3) Second and Heritage Language vocabulary acquisition.

Based on the preceding section, the present study is outlined as follows:

- Chapter 1 provides an overview of experimental research on the effects of

Neighborhood Density and Semantic Neighborhood Density to gain a better understanding of semantic relatedness and word learning.

- Chapter 2 reviews theories on the difference between L2 and HL learning profiles. It examines previous research in the fields of Second Language Acquisition (SLA) and Heritage Language Acquisition (HLA) and previous research on vocabulary learning.
- Chapter 3 explores how Vygotsky's Meaning-Making approach can explain the origin and foundation of Semantic Neighborhood Density by recapitulating on the process of generalization and the formation of the system of concepts at the collective and individual level.
- Chapter 4 describes the research design, its rationale and significance, and the purpose of the present study. It describes the process of data collection and recruitment, and it reviews participants' linguistic profiles, the materials used for data collection, and the organization and coding procedures for the data analysis. It also introduces four research questions of the study that are addressed in detail in Chapters 5 and 6.
- Chapter 5 presents the findings for the first three research questions proposed in Chapter 4. These research questions examined the pre-existing structure of semantic neighborhood density of Spanish, inquired if there was a difference in vocabulary building between L2 and HL learners, and examined the nature of the meaning-making processes in vocabulary building and SND.
- Chapter 6 addresses the fourth, and last, research question proposed in

Chapter 4 and discusses how semantic relatedness and the process of meaning-making can help instructors teach Spanish to L2 and HL learners. It also suggests possible pedagogical implications and teaching interventions that can be used in the Spanish language classroom.

- Lastly, this dissertation concludes with a few final remarks, identification of certain limitations of the study, suggestions of areas for further research, and a final overarching reflection of the study.

Chapter 1
Review of Literature: Neighborhood Density

Introduction

In order to study how vocabulary is built and learned by second language (L2) and heritage language (HL) learners, we need to understand that human conversation requires comprehension of auditory input and production of spoken language. One approach to understanding language processing is neighborhood density (Storkel 2004; Mirman & Magnuson, 2006; Taler, Aron, Steinmetz & Pisoni, 2010). When a word is being processed, other words that are related to it become partially accessed or activated. This chapter offers a panoramic view of previous research on Neighborhood Density and Semantic Neighborhood Density (SND) in regard to vocabulary development. Generally speaking, neighborhood density refers to the number of words that have a similar lexical representation to other words (Goldinger, Luce, & Pisoni, 1989; Luce & Pisoni, 1998; Rodríguez- Gonzalez, 2012; Vitevitch & Luce, 1999) and SND measures how word representations are organized in our lexicon and examines the degree of semantic relationship among semantic neighbors (Buchanan, Westbury, & Burgess, 2001).

Theories on neighborhood density suggest that related neighbors can have different functions in word perception and production depending on phonology (how a word sounds), orthography (how a word is spelled), or semantics (the meaning of a word). Some of the first studies that calculated neighborhood density were focused on phonological processing. Luce and Pisoni (1998) defined neighborhood density as the number of lexical representations that are similar by adding, subtracting, or changing a phoneme to a target word (Buchanan et al., 2001; Goldinger et al., 1989; Luce & Pisoni, 1998; Rodríguez-González, 2012; Stokes, 2010; Vitevitch & Luce, 1999).

For instance, words in a neighborhood can be related in terms of one sound substitution, such as : "*sat-pat* or *sat- sit*"; one sound deletion (e.g. ,"*sat-at*"); and one sound addition (e.g., "*sat-scat*"). Thus, neighborhoods can be dense or sparse. A dense neighborhood has many similar lexical representations or neighbors, whereas a sparse neighborhood has few lexical representations associated with a target word (Buchanan et al., 2001; Rodríguez-González, 2012; Vitevitch & Luce, 1999). An example of a word in a dense neighborhood is *pan* since it has 20 phonological neighbors: *pad, pack, pal, pap, pass, pat, pang, ban, can, fan, man, ran, tan, van, span, pant, pen, pin, pun, an.* On the contrary, *cry* belongs to a sparse phonological neighborhood because it only has 6 phonological neighbors: *cried, fry, try, dry, pry, rye* (Vitevitch, 1997, p. 215).

As stated above, phonological neighborhoods are lexical representations that differ from or resemble a target word by adding, subtracting or changing one phoneme (Luce & Pisoni, 1998; McPhedran, 2014; Rodríguez-Gonzalez, 2012; Storkel, 2004; Vitevitch, 2007). For example: *scat, at, pat, cut, cap,* etc. are phonological neighbors of *cat* in English. On the other hand, an orthographic neighbor was originally defined based on the metric referred to as index *N* (Coltheart, Davelaar, Johansson, Besner, & Dornic, 1977) and, as Carreiras, Pereira, and Grainger (1997) point out, this metric consisted of: "Any word that can be created by changing one letter of the stimulus and preserving letter position (e.g., *lift*, *list*, and *print* are neighbors of *lint* in English) (Coltheart et al., 1977 as cited in Carreiras, Perea, & Grainger, 1997, p. 857). However, other studies have proposed that an orthographic neighborhood can also be measured by looking at transposition pairs which refers to: "pairs of letter strings that are identical save for the transposition of two adjacent letters, e.g. English words *trail* and *trial* (Rodríguez-

González, 2012, p. 5). As stated by Mirman and Magnuson (2006), "Orthographic and phonological neighborhoods are defined in terms of similarity over letters and phonemes respectively" (p. 1823). This means that phonological and orthographic neighborhoods are well defined and understood since their linguistic forms are more concrete. However, in the case of semantic neighborhoods, they can be examined from different lenses and they are more complex to measure.

Semantic Neighborhood Density

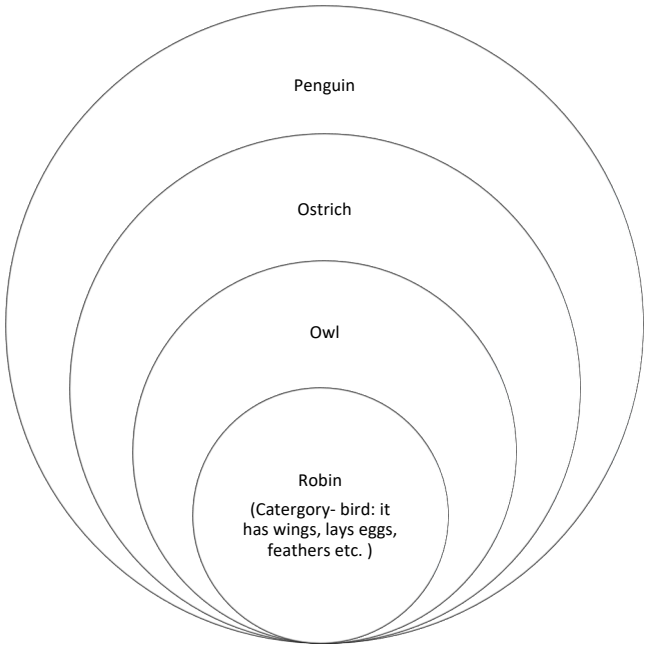
When we talk about semantic representation in symbolic terms, we are talking about how the meaning of a word is represented and stored in our memory as well as how these semantic representations are organized in a logical manner so we can access and use them in language. This helps us understand how a meaning is similar and related to other words in our lexicon. Therefore, before introducing the notion of SND, it is worth looking at theories that examine the structure and organization of mental processes that are essential to language processing and production: 1) Process of systematization of acquired knowledge (i.e., Categorization); 2) Concepts organization framework and nodes (i.e., Spreading Activation Theory); and, 3) Semantic representation: space and distance between nodes (i.e., SND).

First, Categorization can be understood from a more classical or cognitive approach. In the traditional view, Categorization establishes that categories are defined as homogeneous and bounded clusters with "clear boundaries defined by common properties" (Lakoff, 2008, p. 16). In contrast, in cognitive linguistics Categorization is defined as a mental process that groups input into cognitive categories from conceptual structures, prototypical relationships, and semantic families that establish unbounded

boundaries among categories (Cuenca & Hilferty, 2011, p. 19). Rosch (1973) developed the prototype theory that proposed a conception of categories as heterogeneous and unbounded. Her theory is based on Berlin and Kay´s color study that recognized the existence of composite categories (Berlin & Kay, 1969). The prototype theory initially explained that a prototype is defined as the most representative and distinctive exemplar of a category since it shares more common characteristics with all the members of that specific category. The meaning of a certain word is based on its resemblance to the clearest exemplar rather than its features. In other words, some members of a category are better instances than other members. When we try to retrieve a concept, individuals retrieve prototypes of a category faster than other members of the category. This theory also suggests that categories are gradual and unbounded. Thus, categories have peripheral members which are organized around a target concept and share a gradient of similarity with this prototypical element. Peripheral members have less attributes in common with the category. For example: when we think of a *bird*, for many, *robin* would be a more prototypical member than *penguin* (Rosch, 1973, as cited in Lakoff, 2008, p. 46).

Figure 1

Example of category based on the definition of Prototype theory (Rosh, 1973)

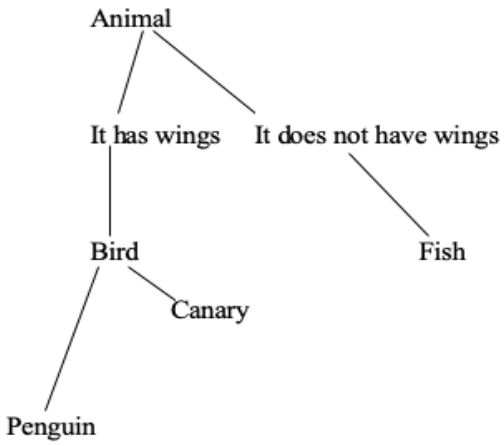


This example, as mentioned above, shows that for some individuals the best example of *bird* would be associated with birds like *robin* or *sparrow*, while other birds like *owl*, *ostrich* or *penguin* would be more peripheral.

Second, in terms of semantic network, Spreading Activation Theory of Semantics was one of the first models proposed. Quillian (1962, 1967) is one of the pioneers who proposes the idea of frame networks as a knowledge base that represents semantic relations. This model examines the hierarchical structure to which categories belong. According to this theory, concepts can be represented as nodes in a network where each node possesses certain properties. When a node is activated, other nodes are activated as well. Nodes are related to other nodes based on associative characteristics and bi-directional links, such as superordinate and subordinate categories. These relational links

present different criticalities that measure the relative importance of the association to the meaning of the target concept (Collins & Loftus, 1975, pp. 407-408). For example:

Figure 2
Example based on Collin and Loftus' (1975) explanation of Quillian's (1962, 1967) hierarchical semantic network.



In this example, concepts have a subclass to superclass relationship in which *bird* is subordinated to the general concept *animal* and to its properties, such as *it can fly* and *it has wings*. Likewise, c*anary* would be subordinate to *bird* and its properties. In this model, general categories are stored at the top of applicable concepts, and more specific properties at the bottom (Collins & Loftus, 1975, p. 418). In other words, *it has wings* is stored as a superordinate feature of birds in general. Collin and Loftus (1975) expand on Quillian's (1962, 1967) Spread Activation model and state that individuals' semantic networks develop based on experience and knowledge. Thus, links and relationships among nodes may differ among individuals. They state that nodes are connected to each other based on semantic similarity and activation strength and are not necessarily hierarchical. Therefore, they state that the greater the similarity between concepts, the

greater the relative weight (i.e., activation) and associative link (i.e., shared properties) among the nodes (Collins & Loftus, 1975).

Finally, SND proposes that a system is organized based on semantic similarity, and concepts are related to each other in a semantic space. However, this model can be challenging because semantic processing is a complex aspect of language and it can be scrutinized from many different approaches (Buchanan et al., 2001; Danguecan & Buchanan, 2016; McPhedran, 2014; Mirman & Magnuson, 2006, 2008). Words that are related to other words based on meaning depend on how knowledge is organized (e.g., hierarchically, associatively, based on frequency or co-occurrence).

According to Mirman and Magnuson (2008), there are five main theories of semantic representation that examine knowledge organization and whether concepts are related or unrelated based on this specific categorization. The five categories are: category- based hierarchical approaches, embodied cognition approaches, association-based semantic network approaches, textual co-occurrence based, and semantic microfeature-based representation (Mirman & Magnuson, 2008, p. 65). However, many studies on neighborhood density (i.e. Al Farsi, 2018; Danguecan & Buchanan, 2016; Mirman & Magnuson, 2006, 2008; Buchanan et al., 2001) agree that the main debate in SND literature centers on two main types of semantic models: 1) object-based models (i.e., feature-based and category-based models) and 2) language-based models (i.e., association norms and local/global co-occurrence). The former model classifies "related words in terms of the physical similarity of their referents" (Daguecan & Buchanan, 2016, p. 2). The latter model can measure semantic richness based on context (Adelman, Brown, & Quesada, 2006), number of associates (Nelson et al., 1998), or unrelated

meanings (Rodd, Gaskell, & Marslen-Wilson, 2002) (as cited in Danguecan & Buchanan, 2016).

Object-based theories define semantic similarity based on the properties of an object. For example, feature- or category-based models propose that concepts are organized based on physical features or attributes of a target concept; thus, concepts that share many features are semantic neighbors (Buchanan et al., 2001; Mirman & Magnuson, 2006). For instance, according to the feature-based model, *cat* and *dog* may be semantically associated because both are four-legged animals, have a tail, and have fur (Buchanan et al., 2001, p. 532; McPhedran, 2014, p. 8). From the category-based view, concepts are semantically related when they are members of the same given category. For example, *cat* and *dog* are both domestic animals (McRae Cree, Seidenberg, & Mcnorgan, 2005; McPhedran, 2014, p.8). According to Mirman and Magnuson (2006), object-based model studies are one of the best to examine the structure of semantics. However, one of the most stated limitations of this model is that some of the potential neighbors may be excluded because "the semantic neighborhood is strongly constrained to the items for which feature norms have been collected" (Mirman & Magnuson, 2008, p. 66). In other words, by using object-based models, more concrete concepts can be organized into categories based on the perceptual and functional characteristics that overlap within a category (Cree & McRae, 2003). However, it may not be the same for abstract concepts (i.e., more emotional component in meaning) or more ambiguous concepts (i.e., more than one meaning depending on context) because it is more difficult to measure their semantic similarity since their meaning may vary depending on the context or an individual (Reilly & Desai, 2017; McPhedran, 2014; Mirman & Magnuson, 2008).

On the other hand, language-based models suggest that concepts are organized according to language use. That is, *cat* and *dog* are semantically related because these two words tend to occur in the same context in samples of language use (Buchanan et al., 2001, p. 532; McPhedran, 2014, p.8). An example of language-based semantics are free association tasks. These tasks are developed by asking participants to write the first word that comes to mind when they see or hear a target word. Unlike object-based models, association tasks also consider that concepts are semantic neighbors even when they do not share any common features, i.e., *cat* and *scratch* (Nelson, McKinney, Gee, & Janczura, 1998, p. 330; Buchanan et al., 2001, pp. 532-533). After an individual completes this task, their responses are coded as semantic associations to the target word, and the number of semantic associations to a target word is used as an index of the set size of that specific word (Nelson et al., 1998; Nelson, McEvoy, & Schreiber, 2004).

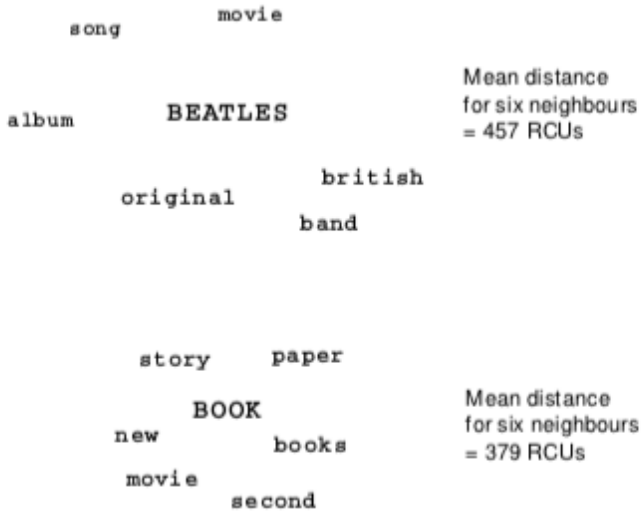
Another type of model based on language-based semantic theories are computational co-occurrence models (Lund & Burgess, 1996; Buchanan et. al., 2001). This type of model is based on computational analysis and looks at semantic space and ND through the analysis of a written corpus rather than using participants' elicitations in a free association task (Buchanan et. al, 2001; Duñabeitia, Avilés, & Carreiras, 2008; Mirman & Magnuson, 2008). According to this view, *cat* and *dog* are close neighbors because they tend to occur next to each other in everyday language (i.e., local co-occurrence; Nelson et al., 1998, as cited in McPhedran, 2014, p. 9) or they tend to occur within the same context in large samples of language (e.g. Buchanan et. al, 2001; Lund & Burgess, 1996). Computational models of semantics use vectors and word frequencies to find which words tend to be semantically related and belong to the same neighborhood.

One of the benefits of these models is that since it employs a computational system, vast quantities of information can be calculated at once (Lund & Burgess, 1996; Buchanan et. al, 2001). For instance, Lund and Burgess (1996) developed a model called Hyperspace Analogue to Language (HAL), which is calculated based on the mean difference of distance from the target word, "The distance of neighbors around any particular word varies, and this variance reflects the variance in the words' semantic density" (McPhedran, 2014, p. 10).

Co-occurrence models also calculate the distance between words and their neighbors because even when a word has the same set size (i.e., same number of neighbors), the distribution of surrounding words varies. Some concepts have closer neighbors than others (Buchanan et al., 2001). Hence, SND measures how word representations are organized in our lexicon and examines the degree of semantic relationship among semantic neighbors (Buchanan et al., 2001). This is operationalized through the average distance between the target word and its semantic neighbors. This also helps calculate the degree of semantic relationship between words and their density. Dense neighborhoods not only have more neighbors, they are also closer to the target word. On the other hand, sparse neighborhoods present few semantically similar words around the target word.

Figure 3

Example of HAL''s semantic neighborhood from Buchanan et. al. 2001, p. 534[1] .



The above example by Buchanan et al. (2001) demonstrates that SND examines the distribution of the SNs and their relationship with their neighboring concepts based on meaning. In this example, *book* is a high-density neighbor since it has closer neighbors than *Beatles*. *Beatles'* neighbors are more distant; thus, it is a SN with low density.

Semantic size and richness are other word characteristics that are often examined when looking at SND. Semantic size provides information about semantic richness and is "the number and/or proximity of neighboring representations" (Mirman & Magnuson, 2008, p. 65). Semantic richness is associated with the variance of a word's meaning, that is, words that are semantically rich contain large amounts of semantic information and will provoke more meaning-related information than words with low semantic richness (Pexman, Hargreaves, Siakaluk, Bodner, & Pope, 2008; Yap, Lim, & Pexman, 2015).

[1] **RCU (Riverside Context Units)**- a metric used to measure distance of neighbors. HAL examines concepts as vectors in a multidimensional space and they use distance metrics to verify the relationship between two points. In this case, they are using an arbitrary metric cut off of the 10 closest neighbors (immense amount of data) (Buchanan et al., 2001, p. 533)

Regarding semantic neighborhood size, words with large neighborhoods (i.e., with many neighbors) generate faster response times in lexical decision and semantic categorization tasks than words with small neighborhoods (i.e., with few neighbors; Buchanan et al., 2001; Pexman et al., 2008). On the other hand, low SND words (i.e., more distant neighbors) are processed faster than high density words (i.e., more near neighbors) on lexical decision and semantic categorization tasks (Danguecan & Buchanan, 2016; Mirman & Magnuson, 2008).

Furthermore, much of the literature has looked at number of associations to understand semantic structure (Buchanan et al., 2001; Duñabeita et al., 2008; Mirman & Magnuson, 2006, 2008; Locker, Simpson, & Yates, 2003; Yates, Locker, & Simpson, 2003). For example, Buchanan et al. (2001) found that words with higher number of associations are processed faster. Therefore, words that have a higher number of associations have richer activation than those that have a low number of associations (Duñanbeita et al., 2008; Mirman & Magnuson, 2008). Number of associations can inform ND when two or more concepts are semantically related based on context; however, it cannot inform the reason why these neighbors or associates are similar (Duñanbeita et al., 2008; Buchanan et al., 2001). Locker et al. (2003) examined SN effects on ambiguous word recognition and found that SND and number of associations can affect the processing of ambiguous words. Duñabeita et al. (2008) also agree with previous literature and state that high number of associations have a facilitative effect across the board, that is, in lexical decision tasks, reading aloud, and demasking tasks. It is important to note that *number of associations* and *SND* are not the same, but these aspects of semantic structure are closely related and tend to be examined together as well

as frequency.

Neighborhood Density Effects in Speech Recognition

Neighborhood Density Effects in Speech Recognition in English

Research in word recognition has found that multiple lexical representations are activated and compete for recognition when they are seen or heard**.** Speech recognition tasks have been used to examine individuals' responses to sentences, paragraphs, and single words (Macdonald, 2013). Two common measurements of language processing are reaction time responses and accuracy rates through different tasks. For example, in lexical decision tasks, participants are usually exposed to real words or non-words and have to decide as quickly as possible if the word is real or not. Another example of a task used in speech recognition is a semantic categorization task where participants are exposed to a group of words and have to decide if they belong to a specific category or not (i.e., category-*food*).

Several authors have explored orthographic, phonological, and semantic neighborhood density to explain what occurs when a target word is heard or read (Mirman & Magnuson, 2006). According to Luce and Pisoni (1998), "The study of human spoken word recognition concerns the structural relations among sound patterns of words in memory and the effects these relationships have on spoken word recognition" (p. 1). In other words, word recognition can be displayed as a process that simultaneously involves the activation of multiple lexical units that have the same phonological/auditory sign, the activation of other multiple candidates, and the competition among them for spoken word recognition.

Goldinger, Luce, and Pisoni (1989) conducted two auditory experiments to test NAM[2] using an auditory priming paradigm. To be correct, participants' answers had to match target words exactly or be a homophone (p. 7). These authors proved that NPR[3] occurred when they presented subjects with a priming of a phonetically related neighbor and therefore inhibited the target recognition. They also found that target words from sparse neighborhoods were identified more accurately than those belonging to dense neighborhoods. Similarly, high frequency words were identified better or more accurately than low frequency words (p. 11).

Similarly, Luce and Pisoni (1998) studied the representation and structural organization of words in the mental lexicon by using computational and experimental methods. This investigation was based on a previous experiment by Luce (1959) where the author examined the discrimination between acoustic and phonetic representations in word memory (Luce & Pisoni, 1998, p. 1). In the computational analysis they examined the transcription of 20,000 words and analyzed the semantic size, the neighborhood similarity, and the frequency of occurrence of these words. This study is one of the most quoted in the field of neighborhood density, not only because it sets NAM (Neighborhood Activation Model) as a conceptual and theoretical framework to understand spoken word recognition, representation, and access to the lexicon, which has

[2] **Neighborhood Activation Model (NAM)**- It is a model of spoken word based on NPRs. "The basic postulate of the model is that the process of word identification involves discriminating among lexical items in memory that are activated on the basis of stimulus input". That is, this model looks at the factors that facilitate or obstruct word identification during discriminating processes among sound patterns of words. (Luce & Pisoni, 1998, p. 17)

[3] **Neighborhood Probability Rule (NPR)** (Goldinger, Luce, & Pisoni, 1989)- "It is the rule that states that as activation of neighborhood increases, the probability of recognizing a given stimulus in that neighborhood will decrease" (p.11).

been an important issue in research on spoken language comprehension (p. 36; p. 44), but also because their definition of neighborhood density is frequently used as foundation in the field.

Furthermore, Luce and Pisoni´s (1998) investigation demonstrated that the number and nature of words in a similar neighborhood and frequency affect the speed and accuracy of word recognition. Words that belong to a dense neighborhood are produced slower and with more errors in auditory and visual tasks. At the end of the article, Luce and Pisoni (1998) discuss how similarity in neighborhood density also provides a deep understanding of lexicon in young children. By being able to recognize words with similar neighborhood density, children may develop recognizing strategies that could help them learn the language more holistically (p. 42). This is also an important finding for second and bilingual acquisition.

Vitevitch and Luce (1999) also explored neighborhood activation in spoken word recognition in English and confirmed results obtained in previous studies, such as Vitevitch and Luce (1998), where high probability[4] patterns were recognized faster than low probability patterns. In their study, they found that words were recognized faster in sparse neighborhoods than high-density neighborhoods because high density neighborhoods present high phonotactic probability and vice versa. This means, that when similarity of neighborhoods was activated, competitive effects among lexical representations occurred. They also reinforced the idea that information regarding phonological similarity neighborhoods influences time of spoken word recognition (p. 399).

[4] **Probabilistic phonotactic information- "**refers to the relative frequencies of segments and sequences of segments in syllables and words" (Vitevitch & Luce, 1999, p. 375).

Buchanan et al. (2001) explored the concept of semantic space and neighborhood effects on word recognition in English. The researchers found that semantic processing is key to lexical decision and naming, specifically, that lexical decision is more related to semantic processing than naming. They also found that words with denser neighborhoods are processed more rapidly because the activation of semantic units also activates orthographic units, and vice versa (pp. 535-536). These authors state that SND can be measured based on number of associations, making reference to Nelson, McEvoy, and Schreiber's (1994) where single associates to each target word were produced by a group of participants who completed a free association study (Mirman & Magnuson, 2008, p. 66).

Similarly, Locker, Simpson & Yates (2003) examined SN processing in ambiguous words and found that semantic processing can affect the processing of words with more than one meaning; they also argue that ambiguous words have a richer representation in semantic memory. Words with large neighborhoods are more prone to be richly represented at the semantic level. Thus, when a word has a richer representation, it means that the activation is stronger (i.e., many meanings compete with each other); therefore, the advantage of ambiguity will occur when the semantic activation is weaker, the semantic size is small, and there is low neighborhood connectivity.

Mirman and Magnuson's (2006) study examined the impact of neighborhood density on semantic access. In the experiment, participants had to indicate if the word they were presented with was a living thing or a nonliving thing. In the results, they found that semantic neighborhood had a greater impact on semantic access than

orthographical neighborhood. Another important finding is that not all semantic measures capture the structure of semantic neighborhood density in the same way. The authors suggested that feature-based measures capture the structure of semantic neighborhoods best (they used a corpus where words are developed by asking individuals to name common features of a target word) (p.1827). Likewise, Mirman and Magnuson's (2008) compared different semantic neighborhood measurements to inquire if there was consistency among the different models when looking at inhibitory and facilitatory effects in neighborhood density. They compared three models: 1) data from Cree, McNorgan, and McRae (2006), 2) association models from Nelson et.al. (1998), and 3) co-ocurrence models using data from COALS (Rohde, Gonnerman, & Plaut, 2004). They found inconsistent results in lexical and semantic decision tasks (living/no living and abstract/concrete). Some models correlated with inhibition effects in both tasks, and others correlated with facilitative effects. They concluded that a single measurement of semantic neighborhood is not enough to find a pattern, and that it was necessary to take into account the number of neighbors and distance as well. The results in a concrete judgement task (experiment 2) showed that distant neighbors (i.e., concepts with few semantic features) facilitated word recognition. However, near neighbors (i.e., concepts with many semantic features) inhibited word recognition (p. 76).

McPhedran's (2014) dissertation focused on the effects of SND on processing of ambiguous words. McPhedran compared his results to the ones obtained by Locker et al. (2003) which stated that ambiguous words' advantage, compared to non-ambiguous words, occurred in words with small, sparsely connected semantic neighborhoods. However, he did not find evidence in this regard, but found that ambiguous words are

sometimes processed more slowly than unambiguous words, which seems to be consistent with the findings of other authors: “near neighbors act as competitors, and having a large number of near neighbors produces an inhibitory effect on visual word recognition” (McPhedran, 2014, p. 59). The author concluded that semantics may not be as crucial to lexical decision as shown in previous research (p. 60).

Neighborhood Density Effects in Speech Recognition in Spanish

Studies in speech recognition, such as Carreiras et. al. (1997), studied orthographic neighborhood effects in Spanish native language speakers. Participants were students at the Universität de Valencia and Universidad de La Laguna in Spain. In this study, the authors performed a cross-task analysis of all experiments which used the same stimuli, but in different manners: speed identification, word/nonword classification or reading aloud animal/ non-animal classification. They found very different results depending on the task and the variables examined; consequently, they concluded that investigators should be very careful when choosing a task to investigate a specific variable in order to obtain more accurate results.

Perea and Rosa (2003) examined the effects of semantic priming in lexical decision tasks. Similarly, the study took place at the Universitat de Valéncia and included an experiment with a go/no-go lexical task where participants pushed a button when the stimuli was a word but did not press anything when the stimuli was not a real word. The results of the study showed a correlation between activated semantic features of a target word and another word that shares some semantic features with that target word, such as *jardín* (“garden”) and *vergel* (“orchard”). This experiment also showed response time (RT) and a lower percentage of error than in the yes/no lexical decision task. The authors

concluded that this study contributed to the hypothesis of facilitative effects in (non-associative) semantic tasks. Non-associative semantic tasks are defined by the authors as "fenómeno de responder a una palabra-test (e.g. vergel) más rápidamente cuando va precedida de un estímulo-señal semánticamente relacionado (e.g, jardín) que cuando el estímulo-señal es una palabra no relacionada (e.g., crisis)" (p. 115) (Tr.: phenomenon of responding to a test-word (e.g, orchard) faster when it is predicted by a semantically related sign-stimuli (e.g., garden) than when the sign-stimulus is a non-associated word (i.e., crisis).

Vitevitch and Rodríguez (2005) also carried out a speech recognition task in Spanish. They investigated the relationship among several lexical characteristics, such as familiarity ratings, frequency of occurrence, neighborhood density, and word length in a Spanish corpus with over 175,000 words (Sebastián-Galles et. al., 2000). In their results, they found that participants responded more quickly to high frequency words and that ND facilitates perception as opposed to English (Luce & Pisoni, 1998). Regarding accuracy and TR, they stated that participants responded faster and more accurately to words in dense neighborhoods than in sparse neighborhoods. The authors suggested that the reason they obtained different results from previous studies in English may be due to the fact that Spanish and English have different characteristics and orthographic systems (p. 71).

Müller, Duñabeita, and Carreiras (2010) conducted a research study at the University of la Laguna, Spain. They studied the effects of orthographic neighborhood density by looking at the number of associations and comparing this to event-related potentials (ERP) effect on the number of orthographic neighborhoods. They based their

study on previous research that states that orthographic neighborhoods activate semantic representations. They state that the representation of words is not specific to a node, but rather "a pattern of activation across nodes in a network, where single nodes would represent orthographic, phonological, or semantic features" Thus, nodes have different layers that are activated depending on the network. For example, activation can go from the orthographic layer to the semantic layer and vice versa (p. 463). Their results showed that high density words were identified faster and more accurately, and that there was "a facilitatory effect of orthographic and associative neighborhood density on lexical decisions" (p. 462)- and as reflected by the N400[5]- higher orthographic and associative neighborhoods resulted in stronger semantic activations.

Neighborhood Density Effects in Speech Recognition in Bilinguals

Not much research has addressed speech recognition in bilingual speakers. It is believed that neighborhood density increases during the identification of manipulated cross-language neighbors and that allows to test if both languages are impacted by the target language of a word (Dijkstra & Van Heuven, 2002). Many of the bilingual recognition studies focus on whether both languages are activated during a recognition task. For example, Degani and Tokowicz (2013) examined intraword sense relatedness to determine whether two meanings share a translation in a bilingual language and if that impacts language processing (Degani & Tokowicz, 2013).

Regarding the effects of neighborhood density, Van Heuven, Dijkstra, & Grainger (1998) is one of the few studies that examines bilingual word recognition. Participants of

[5] **N400-** "reflects the activation of semantic representation in long-term memory…[o]r alternatively, the integration of semantic information in a post-lexical level" (Müller et. al, 2010, p. 456).

this study were bilingual Dutch-English students. In their study, they conducted four experiments to investigate the effect of orthographic neighborhoods on target word recognition. To carry out the experiment, they manipulated orthographic neighbors in both languages from a list of English and Dutch four-letter words from a database called CELEX. As part of their results, they found opposite effects for both languages, an inhibitory effect for Dutch target words and a facilitative effect for English words. One of their conclusions as to why this may have occurred is because the lexical organization of each language may have an effect on orthographic neighborhood density. They also concluded that neighbors in both languages were activated during the demasking and lexical tasks.

Neighborhood Density in Speech Production

Neighborhood Density in Speech Production in English

Research in speech production examines retrieval of words from the lexicon and how they are produced by individuals. Neighborhood density has been found to be a factor that predicts how successful speech production is in normal and aphasic speakers (Costa, Heij, & Navarrete, 2006). As with word recognition, time response and accuracy are usual aspects that are examined through different tasks. Some of the most common tasks used to examine speech production are word naming, picture naming, tip-of-the-tongue and error elicitation. For instance, in word naming tasks, participants are presented visually with a word and are asked to produce it aloud. Similarly, in picture naming tasks, individuals are exposed to an image (in this occasion, a target picture) and are asked to produce the name of the picture aloud. In tip-of-the-tongue tasks, participants name pictures of well-known people or respond to questions where tip of the

tongue and resolutions are measured. Finally, the last common type of task used to investigate speech production are elicitation tasks which are designed to elicit speech errors or slips of the tongue by presenting participants with whole-word substitutions (i.e. “nun” for “priest”) or different speech sound errors (i.e. “barn door” for “darn bore”) (Farrell & Abrams, 2012).

Vitevitch (2002) studied the influence of phonological neighborhoods on a speech production tasks via reaction time and accuracy rates. He conducted four experiments with native English speakers from the State University of New York at Buffalo and the University of Indiana. In his study, he demonstrated facilitative effects of simultaneously activated phonologically related words on lexical access in speech production by measuring accuracy and time response (p. 745). His results showed that in speech-error elicitation tasks (i.e., word repetition or tongue twisters), more errors were produced in sparse neighborhoods, and in picture-naming tasks (see Experiments 3 and 4), words in sparse neighborhood were named more slowly. In general, in speech production tasks in English, speakers produce words more slowly and less accurately, that is, produce more errors, in sparse neighborhoods. His findings agree with other experiments in speech recognition that indicate that stimuli with denser neighborhoods are processed more rapidly than sparse neighborhoods (Luce & Pisoni, 1998; Buchanan et al., 2001).

Mirman’s (2011) study is based on Mirman and Magnuson’s (2008) study on word recognition. In this investigation, Mirman examines near and distant semantic neighbors in picture naming and word production in 62 participants with aphasia. He found that picture naming performance was facilitated by distant semantic neighborhoods, similar to the results in Mirman and Magnuson (2008).

Neighborhood Density in Production in Spanish

Vitevitch & Stamer (2006) investigated competition effects in Spanish speech production. In their experiment, they examined picture naming, and measured time response and accuracy in words in sparse neighborhoods rather than in dense neighborhoods (p. 4). They found that in Spanish, words are recognized faster and more accurately; however, neighborhoods compete in production tasks. The authors suggest that this could be due to phonological, morphological, and semantic relatedness of words in Spanish. According to Vitevitch and Stamer's (2006) study:

> Two word-forms that are phonologically similar to each other might also be morphologically and semantically similar to each other than two word-forms in English. Consider the Spanish nouns *niño* (i.e. a male child) and *niña* (i.e. a female child). Both words sound similar to each other and have similar meanings (both refer to a child but differ in the gender of the child). Now consider the English noun *cat* and *can*. Both words sound similar to each other, but they are not morphologically or semantically similar to each other (with the exception that cats and cans often sit in high shelves) (p. 5).

This investigation presented results different from the results of studies on the effect of speech production in English. This difference has allowed researchers to stress the need for more cross-linguistic research in speech production and recognition in Spanish and other languages to explore if specific language characteristics, such as the morphology of a language, may impact the facilitative and competitive effects in speech recognition and production (pp. 5-6).

Perez (2007) studied the persistence of the effect of age of acquisition as the main factor in spoken production (i.e., picture naming) when cumulative word frequency and

frequency trajectory are controlled. In his study, at Universidad de Murcia, in Spain, he analyzed many variables that could influence age of acquisition, such as word frequency, frequency trajectory, object familiarity, name agreement, image agreement, image variability, name length, and orthographic neighborhood density, on naming times. The results demonstrated that age of acquisition is an important predictor of picture naming. Regarding orthographic neighborhood density, he found similar results to Vitevitch and Sommers (2003, exp. 3) in that "the number of neighborhoods and their frequencies facilitated picture-naming latencies" (p. 40).

Baus, Costa, and Carreiras (2008) studied neighborhood density and frequency effects in speech production in Spanish by conducting three experiments. For the first experiment, they reconducted Vitevitch and Stamer's (2006) study of competition in Spanish speech production with Spanish and German native speakers. In the second experiment, they studied neighborhood density effects in Spanish speech production. Finally, in the third experiment, they investigated neighborhood effects in Spanish speech production. The results from the first two experiments suggest that "neighborhood density affects the speech production system in a qualitative similar manner in Spanish and in English, suggesting that whatever the origin of the effect, it is not subject to cross-linguistic variability" (p. 882). This finding counters Vitevitch and Stamer's (2006) hypothesis that Spanish and English have opposite competition effects due to the morphology of Spanish. They also found facilitatory effects of neighborhood frequency, that is, words with high-frequency neighborhoods were named faster than those in low-frequency neighborhoods. This finding agrees with Vitevitch (1997) and Vitevitch and Sommer's (2003) results on the effect of neighborhood frequency.

Rodríguez-González (2012) investigated the effect of phonological neighborhoods on the processing of regular and irregular Spanish verbs in the preterit. In the experiment, participants responded to a naming task where time response and accuracy were measured. The results showed differences between the speed and accuracy of responses: participants responded faster and more accurately to regular verbs than irregular verbs. Rodríguez-González also found facilitative effects in speech production in Spanish resembling the results obtained in speech production in English by Vitevitch (2002) and by Baus et al. (2008). Verbs with dense neighborhoods were produced more rapidly and accurately, as well as irregular and regular verbs ending in *-ir.* The author suggests that in the case of *-ir* verbs, this means that processing of regular and irregular verbs in -ir happens similarly.

Sadat, Martin, Costa, and Alario (2014) examined phonological retrieval and production. For their investigation, they collected a larger data set than previous studies because their goal was to compare and reanalyze the conflicting results that previous studies in speech production have obtained across languages. They collected and analyzed 31,980 trials and included other predictor variables, such as name agreement, lexical frequency, and age of acquisition, to control the effects of phonological neighborhood density. In their results, they found an inhibitory effect in phonological neighborhood density on naming latency. Moreover, they found that "phonological neighborhood density promotes form-related errors, but it helps in reducing semantic and nonword errors as well as tip-of the-tongue[6] states" (p. 54).

[6] **TOT (tip of the tongue)**: The speaker attempts to retrieve a word from the lexicon but is unable to do so (Vitevitch & Luce, 2016, p. 11).

Neighborhood Density in Production in Bilinguals

Costa, Santesteban, and Caño (2005) examined the facilitative effects of cognate words and non-cognates in bilingual speech production. The authors argued that "accessing a semantic representation that has been recently accessed (e.g. cognates) is easier than accessing a non-pre-activated representation (e.g. non-cognates)" (p. 97). They stated that "cognate translations have more similar phonological/phonetic representations than non-cognate translations" (p. 99) and discussed the relationship of neighborhood density in spoken word production (i.e., in a picture naming task). Their findings indicated that words in dense neighborhoods present higher levels of activation due to phonological factors of other related words that feed back into the target lexical node and vice versa (p. 100). Equally, words in dense neighborhoods would be more highly activated. As a result, selection of former words and spoken production occurs faster and more accurately. The results of the study also show that pictures with cognate names were produced more quickly, are more resistant to retrieval, and show language transfer. Consequently, cognates present facilitative effects that favor speech production within (i.e., many neighbors) and across (i.e., cognate translation) the two languages of a bilingual speaker due to phonological overlap (p. 100).

Otwinowska and Szewczyk (2017) agree with Costa et. al. (2005) and argue that phonology and the effect of cognates and false cognates may impact vocabulary learning in bilinguals and second language acquisition (Costa et.al., 2005; Otwinowska & Szewczyk, 2017). In their study, they explored the learnability of cognates in Polish learners of English by examining orthographic neighborhood effects and cognate and false cognate effects in word learning. One hundred and fifty Polish learners of English from the University of Warsaw, Poland were asked to translate, from English to Polish, a

list of 105 words and to rank their level of confidence of the translation on a scale from 1 to 4 (4-“I know for sure” and 1-“I am guessing”). They found that, in general, it is easier to learn cognates because of a learner’s previous experience with this word in their L1. In their article, they define cognates as words in two languages that “considerably overlap” in form and meaning; and false cognates as “interlingual homographs,” which are similar in form but differ in meaning (p. 1). In other words, cognates have similar orthographic and phonological forms and have similar meanings in both languages (i.e. *family* and “familia” are cognates from English and Spanish, respectively). In contrast, false cognates are pairs of words that are perceived as similar because of their phonology and orthography, but they have different meanings and, perhaps, no equivalent in the other language (i.e. *embarrassed* and “embarazada” are false cognates in English and Spanish, respectively).

In a more theoretical article from Costa et.al. (2006), the authors scrutinize different approaches and methods implemented in experimental research to understand the extent to which a bilingual’s two languages are activated during language production in monolingual contexts. They argue that it is difficult to conclude if both languages are activated based on experimental evidence since there are many alternative explanations and some of the methods used in the available research present shortcomings. They suggest researchers should take a step back in order to conduct new experiments that may provide a clearer answer (Costa et al., 2006, p. 148)

Neighborhood Density in Word Learning

Most of the research described above has been conducted with adult participants without hearing, speech or vision disorders. However, it is important to mention that

there is a broad area of research in children's language processing and acquisition in children with typical language development or specific language impairments. Storkel's (2001) study aimed to expand on previous word learning theories by examining preschool children's phonological knowledge on word learning; these preschool children were native speakers of English. She observed that new words that have common phonological patterns within the participant's native language are learned faster than new words with less frequent sound sequences. Similarly, Storkel's (2004) research looked at neighborhood density on lexical acquisition and word learning in children. In this study she states that neighborhood density facilitates word learning and development of detailed representations of words, which also foments a processing advantage in speech production. Children tend to learn words with rare sound sequences in dense neighborhoods (i.e., words with many similar sounding words) and high token frequency earlier and more readily than those with common sound sequences, sparse neighborhoods, or low frequency (Guo, McGregor, & Spencer, 2015; Stokes, 2010; Storkel, 2004; Storkel & Adlof, 2009; Storkel, Ambrüster, & Hogan, 2006; Storkel, Bontempo, & Pak, 2014; Storkel, Maekawa, & Hoover, 2010). Also, regarding configuration[7], dense neighborhoods have been shown to facilitate maintenance of sound sequences in working memory compared to sparse neighborhoods in child research.

Storkel (2009) examined how phonological, lexical, and semantic characteristics, such as neighborhood density and semantic set size, influence word learning.

[7] Configuration and engagement describe the lexical acquisition process in language users. It refers to the process when a word is added to lexicon progressively (mental map) (Gray, Pittman, & Weinhold, 2014)

Neighborhood density influences word learning because it indexes whole-word similarity (i.e., lexical representations). The researcher conducted a correlation and regression analysis on identified words by parents (parents reported if his or her child could produce target words) from the database *Macarthur Bates Communicative Development Inventory: Words and Sentences (CDI)*. As part of her results, she found that phonological, lexical, and semantic characteristics influenced word learning. Also, children knew more words with many lexical neighbors and few phonemes than the other way around.

In a similar manner, children also knew more words with more semantic representations and less phonemes. "Semantic characteristics also influenced word learning with more infants knowing words with many interconnected semantic neighbors and many strong target-to-neighbor bidirectional connections" (Storkel, 2009, p. 313). Her results agree with those of previous studies in adult word learning (i.e., Storkel et. al., 2006) and that frequency was not a significant predictor on word learning. She also encourages further research on the relationship between SND and word learning since there is a lack of research on the relationship between SND and word learning and existing research mainly focuses on lexical neighborhoods and word learning. Storkel suggests that the number of semantic neighborhoods influences word learning in a manner similar to that of lexical neighborhoods.

Stokes (2010) looked at neighborhood density and word frequency effects on vocabulary sizes in late-talking toddlers. In this study, children between the ages of two and four were exposed to different vocabulary sets to determine if either ND or word frequency contributed to the recognition and production of words. The author argued that

by understanding the effect of these aspects, language and vocabulary learning can be facilitated. The researcher found that neighborhood density seemed to be a stronger predictor in vocabulary sizes than word frequency, which concurs with the results of Storkel (2009).

Mainela-Arnold, Evans, and Coady (2010) studied the impact of lexical processes on children with typical development (TD) and specific language impairment (SLI) on target words. Children with SLI are those that may present difficulty learning and processing the language because of emotional neurodevelopmental disorders or hearing loss. According to previous research, these children may have an impaired or absent grammatical system (p. 1657). In this project, the participants were exposed to competing language-processing tasks (CLPT). They listened to short lists of sentences and judged if they were "real" or not, and at the same time, they had to remember the last words of each sentence. In this study, the authors looked at the correlation between word frequency and ND. The results showed no significant effects of neighborhood density on word recall or lexical representation implications on working memory tasks. However, children in both groups provided richer definitions of words from sparse neighborhoods rather than dense neighborhoods. They found that the relationship between lexical activation, maintenance, semantic representation, and working memory capacity is complex and depends on individual differences in richness of lexical representations.

Most of the studies in word learning and neighborhood density have focused primarily on children, and few studies have addressed adult vocabulary learning and acquisition in word learning (i.e. Marian & Bloomfield, 2006; Stamer & Vitevitch, 2012; Storkel et al., 2006). For instance, Marian and Blumenfeld (2006) explored phonological

neighborhood in lexical access in both native and non-native language production. In their experiment, they investigated the role of orthographic neighborhood density in bilingual language production and examined the role of phonological neighborhood density during a native and non-native picture naming experiment. They observed similar patterns among native and non-natives speakers in high-density neighborhoods where accuracy in language naming was facilitated. However, they did not find latency differences between high and low density in language naming in the native speakers.

In contrast, there were differences in response time between native speakers and non-native speakers; latency results were more marked in non-native speakers. According to the authors, this suggests that proficiency may have an impact on non-native speakers because retrieval difficulties may be more marked for them in sparse neighborhoods (p. 21). The researchers concluded that the facilitative effects on phonological neighborhood density benefit pedagogical implications for bilingual and L2 education because "the knowledge that dense neighborhoods words are associated with better performance might guide choice of words in vocabulary learning activities so as to provide additional support for low-neighborhood items" (p. 28).

Likewise, Storkel et al. (2006) examined how college students learn novel words. Their results concurred with the findings of previous word learning research in English monolingual children (Storkel, 2001, 2006). In their results, they showed that new words that share phonological neighborhoods (i.e., words that differ from the target word by a single phoneme addition, substitution or deletion) (Luce & Pisoni, 1998) are learned faster than those in sparse neighborhoods (Storkel et al., 2006). Stamer and Vitevitch (2012) studied the influence of neighborhood density in word learning in English college

students taking Spanish as an L2. The authors confirmed similar results in both the picture naming and identification tasks where participants learned Spanish words that belong to dense neighborhoods faster than those in sparse neighborhood. They also claimed that their outcomes "are consistent with the results obtained in previous studies of word-learning in infants (Hollich, Jusczyk, & Luce, 2002), toddlers (Storkel, 2009), preschool children (Storkel, 2001; 2003), college-age adults (Storkel et al., 2006), and artificial neural networks (Vitevitch & Storkel, 2013)" (p. 11).

As above mentioned, many authors have also looked at other variables, together with neighborhood density, that play an important role in speech recognition and production, such as phonotactic probability[8], frequency, age of acquisition, as well as, how these other variables influence language processing and acquisition in children and adults with typical development or specific language impairments. Children and adults with typical language development show the same patterns when learning vocabulary; both populations tend to learn words with rare sound sequences in dense neighborhoods and high token frequency sooner and more accurately than those with common sound sequences in sparse neighborhoods, or low frequency (Stokes, 2010; Storkel, 2004; Storkel et al., 2004, 2009; Guo, McGregor, & Spencer, 2015).

Conclusion

Most studies in neighborhood density investigate spoken word recognition and production of phonological, orthographical, and semantic neighborhoods. Much of this research has been focused on "understanding multiple activation of and competition

[8] Phonotactic probability refers to the possibility of a given phoneme happening in a given word position and /or a given pair of adjacent phonemes (Storkel, 2004, p. 1455-1456).

among form-based lexical representations in memory… [and the] effects of phonological neighborhoods … on a number of language processes in a variety of populations" (Vitevitch & Luce, 2016, p. 15). In this chapter, I explored several important studies conducted in speech recognition and production in English and Spanish. I presented a review of empirical research on the effects of speech recognition and production in adult Spanish, English, and bilingual speakers. I also briefly summarized some studies with children with typical and nontypical development.

I have highlighted the importance of mentioning how neighbors and neighborhood density happens in both Spanish and English, since they may differ. For example, in the case of Spanish, orthographic and phonological neighborhoods may overlap; however, this is not always the case in English. Solon (2007) states that in Spanish there are also syllabic neighbors, which share syllables such as *cama* and *camión* (p. 8). Vitevitch and Stamer (2006) argue that neighborhood density in English and Spanish is different because neighborhood density in Spanish can be phonologically, morphologically, and semantically related. However, in English, this is not necessarily the case (pp. 5-6). In contrast, other studies claim that English and Spanish are produced and processed in the same way (Baus et al., 2008; Duñabeitia et al., 2008). Therefore, further research is needed to investigate the similarities and differences in how English and Spanish are processed, as previous studies have produced inconsistent results. Furthermore, there is a dearth of research in L2, HL, and bilingual processing and neighborhood density (Costa et al., 2006; Otwinowska & Szewczyk, 2017).

For the present study, I focused mainly on semantic neighborhoods; however, I take into consideration other factors that may interfere and influence the way students

process language, namely, frequency[9], orthography, and phonology as the three of them have been identified as essential to the study of word recognition and production when comparing two languages orthographically and phonologically. According to Vitevitch (1997), "high frequency words will be recognized more quickly and more accurately than low frequency words" (p. 215). Also, as Buchanan et al., (2001) states, orthographic neighborhoods have an impact on semantic representation and vocabulary learning. Another reason why phonological and orthographical characteristics need to be analyzed is because Spanish and English words that are related in meaning may overlap in phonology and orthography. According to Solon (2007), there is a closer relationship between spelling and phonology in Spanish than in English, and in many cases orthographic and phonological neighbors overlap (p. 8). In the same manner, phonology and the effect of cognates and false cognates may impact vocabulary learning in bilinguals and SLA (Costa et al., 2005; Otwinowska & Szewczyk 2017).

For my study, I adapt a more holistic definition of semantic neighborhood which refers to the proximity of words related by meaning to a target word (Buchanan et al., 2001). Also, SND will be measured as the median degree of similarity between a target stimulus word and every other word in its semantic neighborhood. Moreover, I focus on the language-based semantic approach, specifically in association norm models of semantics because they propose that concepts can be related to each other based on statistical co-occurrence. In this way, association models recognize that two referents can be semantically related and belong to the same semantic neighbor even if they do not

[9] "In the Usage Based Model, token frequency determines degree of entrenchment of a single Word. A high token frequency for a Word corresponds to a high number of specific usage events with that word" (Croft & Cruse, 2004, p. 309).

share any features (i.e. *meow* and *cat*) (Buchanan et al., 2001, p. 532). I also adopt Nelson et al. (2004) understanding of associative norms because this approach takes into account individual lexical experience in a dynamic manner, considering that semantics are shaped or modified by current trends and individual cultural experience. For example, with the popularity of the show *Game of Thrones*, a free association response to *game* could be *kingdom*. Also, associative norms take into account experiences that deviate from the standard. According to Stacy (1997), words related to drugs and alcohol abuse will have different associative structures from the norm in substance abusers (as cited in Nelson et. al., 2004, p. 402). Words are built upon the individual repeated experiences and linked together in semantic neighborhoods.

The following section, Chapter 2, reviews prior research in the field of Second Language Acquisition (SLA) and Heritage Language Acquisition (HLA) as well as previous research on vocabulary learning and vocabulary learning strategies.

Chapter 2
Review of Literature: Second and Heritage Language Vocabulary Learning

Introduction

Given the growing Hispanic population in the United States, there is an increasing need to pay more detailed attention to the language learning and acquisition of those students whose home language is Spanish. According to the Census Bureau (2010), Hispanics constitute the nation's largest minority. Indeed, the United States has become the world's second-largest Spanish-speaking community (Fairclough, 2011). Thus, research on Heritage Language (HL) and Second Language (L2) learning strategies are needed to facilitate language development and learning (Hancock, 2002). Research on Second Language Acquisition (SLA) has mainly focused on other areas of language such as grammar or syntax (Meara, 1983; De Groot & Van Hell, 2005). However, not much attention has been paid to vocabulary learning and acquisition, especially in HL research (Laufer, 2017; Torres, 2013; Zyzik, 2016).

One of the main issues in Heritage Language Acquisition (HLA) research is that HL learners are often compared to native speakers or L2 learners (Lynch, 2003, 2008; Polinsky, 2011; Zyzik, 2016). However, HL learners exhibit characteristics that are different from monolinguals (i.e., L1 speakers) and L2 learners, and it is important to study the unique acquisition characteristics of each student population in depth to better understand their learning and acquisition processes (Beaudrie & Fairclough, 2012; Potowski & Carreira, 2004). Another important factor in HLA research that needs to be taken into account is that it can be studied from diverse scopes (Pascual & Cabo, 2016), such as from a more theoretical and formalist point of view (Montrul, 2005, 2010;

Polinsky & Kagan, 2007) or from a functionalist scope (Valdés, 2001, 2005; Correa, 2011; Wilson, 2006; Wilson and Ibarra, 2015).

Although L2 and HL learners are dominant speakers of English, both groups of learners have different ways of acquiring and developing the target language: HL learners are normally exposed to their first language (i.e., Spanish) from childhood and acquire the language at home and in their community. However, if they are raised in an English dominant social environment, eventually the hegemonic language (i.e., English) becomes their first language (Montrul, 2012; Pascual y Cabo, 2016). Gass and Selinker (2008) state that, "heritage language acquisition is a form of second language acquisition and a form of bilingualism" (as cited in Kagan & Dillon, 2008, p. 492). Montrul (2012) also agrees that a HL learner is someone who is to some degree bilingual and has already been exposed to the language either at home and/or in the community.

Likewise, Lynch (2003) states that HL learners should be compared to advanced L2 learners rather than native speakers of Spanish pointing out the importance of being aware of the heterogeneity of the HL community. He also claims that for many HL learners, English is the preferred language of communication, "HL speakers do not insist that one must speak Spanish to be considered 'Hispanic' or 'Latino'" (p. 36). Zyzik (2016) also argues that HL learners have "fairly robust implicit knowledge combined with minimal explicit knowledge" and that "is a good diagnostic for HL learners because it distinguishes them from L2 learners" (p. 28). She clarifies this statement by inserting a footnote where she explains that she does not mean that L2 learners do not have implicit knowledge, but rather L2 implicit knowledge is normally related to their proficiency in the language and goes together with a highly developed explicit knowledge of the

language. With this in mind, this chapter reviews how Spanish L2 and HL learners process, learn, and acquire vocabulary. Furthermore, I also review some linguistic and extra-linguistic factors that also influence L2 and HL learners' cognitive development of vocabulary.

Who are Heritage Language (HL) learners (HL) and Second Language (L2) learners?

To begin, it is important to realize that Second Language (L2) and Heritage Language (HL) learners are exposed to a substantial amount of vocabulary in introductory levels of L2 and HL courses. These language learners must learn and acquire new vocabulary to be able to communicate and perform different skills in the classroom (Hsiao, Lan, Kao, & Li, 2017). According to Beaudrie and Fairclough (2012), HL acquisition exhibits characteristics different from monolinguals and L2 learners. Therefore, it is important to study the diverse characteristics of each student population in depth to better understand their learning and acquisition processes. In this regard, a L2 learner is someone that has no previous exposure or very limited knowledge of the L2. Normally this learner's first language (L1) is already established and s/he is learning a L2 for pleasure or for professional advancement, and they did not grow up with exposure to the L2 (Montrul, 2012; Potowski, 2008; Saville-Troike, 2012). In contrast, a HL learner already has some previous exposure to the language. Some HL learners may be able to speak, understand, read, and write in their HL, while others may be receptive bilinguals who can understand the language but not speak it (Chin & Wigglesworth, 2007). Montrul (2012) explains that when someone learns a second language (L2), s/he has grown up in a monolingual setting at home and in school, and has a strong and dominant use of their

first language. Thus, the use of a L2 is less frequent. On the other hand, someone that learns a language as a HL learns it from birth or early childhood, and some HL learners are more bilingual than other HL learners. However, in many cases, the HL is a minority language in their community and, over time, the functional dimension of their HL shifts from being their primary language to becoming their secondary language. This change affects the individual's language fluency and competence in their HL and their HL becomes their L2 by the time these individuals reach adulthood (Montrul, 2012, pp. 4-5).

Figure 4

Comparing graphs from Montrul (2012, pp. 4-5)

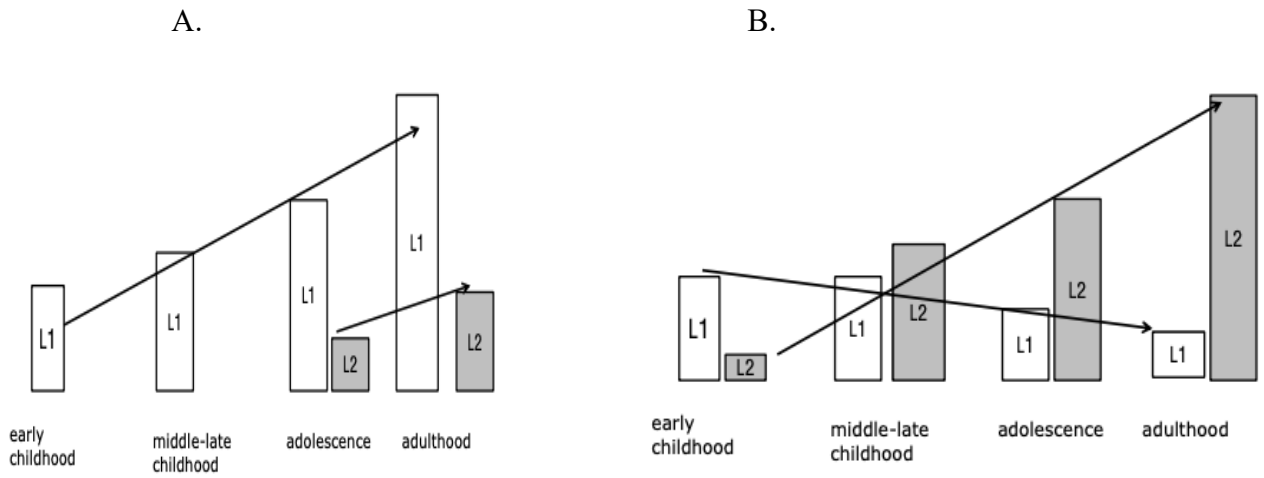


Figure 4 above shows two graphs from Montrul (2012) that compare the differences between the order of language acquisition for L2 and HL learners. Graph A indicates that the development of language acquisition for L2 learners is linear, whereas Graph B shows how the primary language for HL learners decreases over the years and becomes their secondary language. If we apply this model to Spanish HL speakers in the United States, where the hegemonic language is English, and the L2 is Spanish, then, the

heritage speaker's first language, Spanish, becomes their L2 because it is a minority language, and English, which initially was their L2, eventually becomes their primary language because it is the U.S.'s majority language.

Although Montrul (2012) provides a wide definition of *heritage speaker*, there is still a lack of consensus among researchers as to who is a HL learner and speaker in the US (Hornberger & Wang, 2008; Zyzik, 2016). Valdés (2001) provides the most often quoted definitions of HL learner, which states that a HL learner is "a language student who is raised in a home where a non-English language is spoken, who speaks or at least understands the language, and who to some degree is bilingual in that language and English" (p. 1). Her definition is widely used as a reference and commonly accepted; however, some researchers argue that it may be too broad and not specific enough.

Similarly, Fishman's (2001) and Van Deusen-Scholl's (2003) definitions take into account the personal ties HL learners have to the heritage language and culture, and refers to HL learners as those who "have been raised with a strong cultural connection to a particular language through family interaction" as learners "with a heritage motivation" (Van Deusen-Scholl, 2003, p. 222). Their definitions are rather broad and do not convey the complexity of the term beyond the household. Carreira (2004) argues that even though Van-Deusen-Scholl (2003) and Fishman (2001) provide a respectable definition of HL speakers, their definitions are disconnected from the classroom reality (p. 8).

Carreira expands on Fishman's (2001) definition of heritage speaker and highlights the importance of understanding the heterogeneity of HL learners as a group that shares "identity and linguistic needs that relate to their family background" (p. 21). Polinsky and Kagan (2007) argue that a HL learner is someone who is to some degree

proficient in the HL, but whose dominant language became English once they began to attend school. Again, the definition lacks complexity and only refers to a very specific type of HL learner without mentioning their cultural relationship to the language and only references the relationship between the language and the immediate domestic environment.

Montrul (2010) provides another definition of HL learner and states that "heritage language learners are speakers of ethnolinguistically minority languages who were exposed to the language in the family since childhood and as adults wish to learn, relearn, or improve their current level of linguistic proficiency in their family language" (p. 3). If we compile all these definitions, we can conclude that it is difficult to develop a definition of HL learners due to the complexity and diverse nature of these learners whose skills extend beyond the linguistic realm.

Furthermore, Wilson and Martinez's (2011) provide a broader definition of Spanish HL learner in New Mexico and state that these "learners seek to explore and develop their connection to the Spanish language" and that "such a connection to the language may come through community, family, or cultural heritage" (Wilson & Martinez, 2011, p. 128, as cited in Wilson & Ibarra, 2015, p. 88). It is important to note here that the profile of Spanish HL learners in New Mexico may be different from other Spanish HL learners in other areas of the US due to the linguistic and cultural history of the state. As Wilson states, "for the heritage speaker, Spanish cannot be separated from the social, historical, and political circumstances that surround it" (Wilson, 2006, p. 2). This all-encompassing definition of Spanish HL learner accurately describes the HL population of the present study. In this specific area of the southwest (i.e., New Mexico)

students have been exposed to the Spanish language since childhood within their familial and community environments.

Lastly, Zyzik (2016) proposes a prototype model that attempts to accommodate the heterogeneity and diversity of HL learners into six gradient categories: 1) proficiency (BLC)[10] in HL; 2) ethnic/cultural connection to HL; 3) dominance in language other than the HL; 4) implicit knowledge of HL; 5) bilingual; and, 6) early exposure to HL in the home (p. 27). For the present study, the operationalization of the term HL learner is supported and redefined by the results obtained in the background questionnaire from participants from two different universities in the Southwest and West Coast of the United States. The definitions of HL learners from both Wilson and Martinez's (2011) and Zyzik (2016) are used because, as previously mentioned, the former makes reference to the specific HL learner population in the southwest area of the US, and the latter takes into account the different aspects (i.e., cultural, historical, linguistic) that categorize HL learners in a scalar way and provides a guide of common characteristics among these types of learners. She states the following about the HL learner: "Although difficult to define in terms of sufficient and necessary characteristics, [they] can be understood as exhibiting cluster of attributes" (p. 28).

In the following sections of this chapter, I examine some important empirical research in language and vocabulary learning and development that can help fill in the gap of research in SLA, HLA and SND theory and better understand how L2 and HL vocabularies are acquired, built, and processed.

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[10] Basic Language Cognition- "the largely implicit, unconscious knowledge in the domains of phonetics, prosody, phonology, morphology and syntax" (Hulstijn, 2015, p.1)

Vocabulary Learning and Acquisition in SLA

Second Language Acquisition studies focus on how a second (L2) or foreign language is learned and acquired. In the 70's, as a response to the limitations of previous behaviorist models, new theories, ideas, and methods emerged to tackle and better understand foreign and L2 learning and acquisition (i.e., innatism, constructivism, generativist, the communicative method, etc.). This diversity of theories and methodologies were eventually transferred into the classroom where experimental interventions tested theoretical hypotheses of learning and teaching and examined what factors, techniques, strategies, and methods would promote or inhibit learning of a L2 or foreign language (Lightbown, 2000).

In terms of learning a language, regardless if it is our native, L2 or HL, it entails learning many aspects of that language such as phonology, grammar, syntax, and vocabulary. Vocabulary has been found to be one of the most important factors in language acquisition because if we communicate in another language, using an incorrect preposition or conjugating a verb incorrectly may not impact a conversation; however, if we use the incorrect concept or do not understand some of the words in that conversation, communication may break down (Lightbown & Spada, 2013; Gass & Selinker, 2001). Widdowson (1978) claimed "that native speakers can better understand ungrammatical utterances with accurate vocabulary than those with accurate grammar and inaccurate vocabulary'' (as cited in De Groot & Van Hell, 2005, p. 9). However, despite the status of vocabulary as one of the fundamental subsystems of language and an essential component of communication, some researchers argue that this area of language learning and teaching has received less attention in comparison to other language subsystems, such as grammar (De Groot & Van Hell, 2005; Meara, 1983). For instance, in the

1980's, Paul Meara described vocabulary learning as a "neglected aspect of language learning" (as cited in Lightbown & Spada, 2013, p. 60) and it has not been until recent years that vocabulary has revived attention in the field of second language acquisition and learning.

According to Schmitt (2019), in the last decade there has been an increasing area of research in vocabulary language learning and acquisition (p. 2). Many studies claim that vocabulary learning is related to students' general knowledge and their reading comprehension (Velásquez, 2015; Rodrigo, 2009, as cited in Chavez 2017). Other researchers state that vocabulary acquisition depends on how frequently students "encounter them in language input and how well they process these words" (Laufer & Rozovski-Roitblat, 2011, p. 391). Some researchers, such as Gass and Selinker (2001), suggest that vocabulary may be the most important piece in learning and acquisition of a L2 because lexical errors tend to affect communication more than any other grammatical structure (p. 372). Similarly, Elgort and Nation (2010), state that words are the building blocks of linguistic communication; therefore, vocabulary plays an essential role in language proficiency. Thus, vocabulary is not only vital for communication, but it also helps an individual better understand the contents of a book or text, and in general, it is a good predictor of an individual's linguistic competence in their L1, L2, HL or bilingual language (Alqahtani, 2015; Schmitt, 2000).

Lexical Knowledge

As mentioned above, the concept of lexical knowledge is important in vocabulary learning research. For instance, Henriksen (1999) proposed a lexical model to guide L2 acquisition research where lexical knowledge is understood as a continuum that ranges

from lexical recognition to lexical production. Her model is divided in three lexical dimensions: partial to precise knowledge, depth of knowledge, and receptive to productive knowledge. The first dimension refers to accuracy of pronunciation, understanding semantic fields and/or their lexical association. The second dimension, depth of knowledge, refers to the quality of knowledge and the different types of knowledge needed for a profound and rich comprehension of a word. For example, being able to understand the intricacies of meaning or polysemy of a word. The third dimension, the receptive to productive knowledge, refers to the ability to implement words in comprehensive and production tasks. Similar to Vygotsky's meaning-making approach (Mahn, 2012b), Henriksen's model understands form-meaning connections as a continuous interrelationship between lexical competence and processes of learning and use where lexical knowledge is exhibited as a continuum that ranges from the mere recognition of a lexical item to its production.

Conversely, Laufer and Goldstein (2004) highlight the definition of lexical knowledge by Nation (1990, 2001), Richards (1976), and Ringbom (1987) as, "the sum of interrelated "subknowledges" – knowledge of the spoken and written form, morphological knowledge, knowledge of word meaning, collocational and grammatical knowledge, connotative knowledge of social or other constraints to be observed in the use of a word" (p. 400). They also state that in vocabulary acquisition research it is common to distinguish between passive (i.e., receptive) and active (i.e., productive) knowledge. They state that passive knowledge is related to input comprehension and the ability to retrieve a word meaning or meanings, and active knowledge refers to being able to apply the appropriate form and meaning of a word to communicate efficiently (p. 404).

Therefore, given the importance of vocabulary in the process of learning and acquiring a language, this study focuses on exploring best practices to instruct vocabulary in the classroom. As formerly stated, vocabulary acquisition and learning need more attention since it is a key component of language development, but also, there is a need for more frequently used and real-life vocabulary in language textbooks (Davies & Face, 2006; Lee & Van Patten, 2003; Solon, 2007).

As previously mentioned, some researchers, such as Gass and Selinker (2001), emphasize the importance of vocabulary learning in order to communicate successfully. Other authors indicate that vocabulary knowledge enhances vocabulary growth and vice versa, and that without a broad vocabulary, it is difficult to perform the four linguistic skills: reading, speaking, listening and writing (Han & Chen-ling, 2010; Hsiao et al., 2017; Laufer, 1992; Paradis et al., 2011). Also, vocabulary learning and acquisition can be challenging because of the amount of words and "the complex meaning to form mappings" (Hsiao et al., 2017, p. 162). For instance, Nation (2006) and Laufer (2010) claim that to be able to comprehend English texts an individual needs a receptive knowledge of about 8,000– 9,000 word families, and about 6,000–7,000 word families when encountering spoken texts. However, according to receptive tests of vocabulary size in high school, beginning-level college courses, and L2 learners in different countries, learners ought to "know just 2,000–4,000-word families, often despite more than 1,000 hours of instruction" (as cited in Laufer, 2017, p. 5). For this reason, Laufer (2017) emphasizes the need to teach students to recognize meaning and go beyond the classic form-meaning vocabulary learning.

Other researchers in L2 vocabulary acquisition state that new words are learned based on how often students encounter them or how well they are able to process them (Laufer & Rozovski-Roitblat, 2011). Hatch and Brown (1995, p. 374) claim that vocabulary learning is divided into five phases: "encountering new words, getting the word form, getting the word meaning, consolidating word form and meaning in memory, and using the word" (as cited in Mokhtar et al., 2017, p. 142). Nation and Gu (2007, p. 85) also agree with these five stages and claim that those five stages are necessary for vocabulary learning and that they are developed over time (Kersten, 2010, p. 63).

Lee &Van Patten (2003) also encourage binding of vocabulary as a useful strategy to acquire vocabulary. According to Terrell (1986), the term *binding* conveys the "affective mental processes" that connect "a meaning to a form" (p. 214). Thus, "the concept of binding is what language teachers refer to when they insist that a new word ultimately be associated directly with its meaning and not with a translation" (as cited in Lee & Van Patten, 2003, p. 39). Terrell´s concept of *binding* agrees with Vygotsky's meaning-making approach in that both of them consider meaning to be more complex than a simple association: "Meaning is just one of the several zones in sense's dynamic, fluid, complex formation and in this way, sense predominates over meaning" (Mahn, 2018, p. 21).

Explicit Versus Implicit Learning and Teaching

According to Doughty (2004), one of the main focuses in instruction-based SLA research is finding the most effective instruction (e.g., implicit versus explicit) to help adults make form-meaning connections when learning a L2 (VanPatten, Williams, Rott, & Overstreet, 2004, p. 181). On the other hand, Sanz and Leow (2011) agree with

Vygotsky's origin of meaning making by stating that children's first language (L1) acquisition happens naturally through the engagement with their caretakers and their need to communicate. According to Sanz and Leow (2011), the fact that children are able to extract language through experience without having to be explicitly presented with language rules pushed language acquisition research and psycholinguistics to cultivate an interest in the differences between implicit and explicit knowledge and learning (p. 35). This is the reason why, over the last decade, there has been an ongoing discussion about the effects of explicit versus implicit teaching in language learning (R. Ellis, 2005; Brown, 2007) and which types of learners benefit more from each type of teaching method (Brown, 2007; Mokhtar, Rawian, Yahaya & Mohamed, 2017; Zyzik, 2016).

Rod Ellis (2005) states that "implicit learning of language occurs during fluent comprehension and production and explicit learning of language occurs in our conscious efforts to negotiate meaning and construct communication" (p. 306). SLA research argues that both types of learning have advantages and disadvantages and that we need to continue to explore best practices to teach the different aspects of language (Brown, 2007; R. Ellis, 2005; Mokhtar et al., 2017). For instance, Mokhtar et al. (2017) claim that "most recent vocabulary researchers have come to the conclusion that the most efficient and practical vocabulary learning approach involves a carefully selected combination of both explicit and implicit instruction and learning" (p. 142).

Rod Ellis (2009) discusses the differences among the following three concepts: 1) implicit/explicit learning, 2) implicit/explicit knowledge, and 3) implicit/explicit instruction. The author argues that these concepts are related but need to be differentiated. The first key concept makes reference to "the process involved in

learning" (p. 6), the second concept "concerns products of learning" (p. 6), and the third concept refers to the method used to teach content. For example, students can be aware of something that they have acquired without metalinguistic awareness (implicit learning) and "develop an explicit representation of it" (p. 6). He also states that it should not be assumed that there is a direct correlation between the terms explicit/implicit instruction and explicit/implicit learning because during the explicit instruction of a precise concept of class content (i.e., grammar point) a student can learn other linguistic features implicitly (i.e., incidental learning) at the same time.

In contrast with implicit instruction, explicit instruction consists of a more specific type of teaching that encourages students to focus on a specific aspect of language (i.e., grammar, vocabulary). It involves the student's conscious awareness and intentional learning (Brown, 2007). For example, when teaching grammar, such as the conjugation of verbs such as *ser* ("to be") in Spanish, during explicit instruction the teacher will present students with the different verb forms in the appropriate tense. For example, *yo soy, tú eres, él/ella es, nosotros somos, vosotros sois, ellos son*. Students then work on more mechanical activities, such as fill-in-the-blank activities, where they apply the linguistic aspect the teacher just introduced by accurately conjugating *ser* or using the verbs in each sentence. In explicit instruction, students consciously focus on the grammatical form of the word and their position in the sentence. In implicit instruction, the instructor provides concrete activities with a specific aspect of language they want students to learn without previous explanation. In other words, instructors propose or display situations where students can infer and work out the "rule" (i.e. grammar) for

themselves by detecting and noticing patterns; they learn by doing (R. Ellis, 2009; Lee & Van Patten, 2003).

Lee and Van Patten (2003) believe that teaching through inductive learning is more effective than explicitly exposing a specific language concept to students. According to these authors, input processing activities are meaning oriented, so students pay attention first to meaning and then form (p. 139). Instructors can teach language implicitly through activities of *Structured Input* where input "is manipulated in particular ways to push learners to become dependent on form and structure to get meaning and/or to privilege the form or structure in the input so that learners have a better chance of attending to it" (Lee & Van Patten, 2003, p. 142). An example of a structured input activity, according to Lee and Van Patten (2003), is "selective alternative" where the instructor provides different options for students to create sentences and produce a pattern.

Mokhtar et al. (2017) studied lexis and vocabulary learning in college students learning English in Malaysia. In their study, they look at best strategies for vocabulary learning and found that ESL student participants "preferred guessing and dictionary strategies the most" (p. 133). However, according to the authors these strategies only show preferences of learning a new word. The objective of vocabulary learning should go beyond and incorporate the ability to recall and apply words in different contexts (Mokhtar et al., 2017, p. 142).

Another study that looks at vocabulary learning is Laufer and Rozovski-Roitblat's (2011) work on word retention in long-term memory in native speakers of Hebrew, Arabic, and Russian learning English as a L2. Their results are based on incidental

vocabulary learning and showed that encountering words more times in a text is less effective than encountering a word once but in several exercises. This finding suggests that the type of task is more effective than the frequency of word occurrence (p. 407). They did not find that the frequency of words in a text would impact word recall or recognition. However, other studies, such as Brown, Waring, & Donkaewbua (2008), suggest that when words are encountered between 15-20 times, it benefits vocabulary learning. Similarly, Laufer and Rozovski-Roitblat (2011) concluded that a combination of type of tasks and number of word encounters have an impact on recalling and recognizing new words (p. 408).

Vocabulary Learning Strategies

Research on language learning strategies[11] shows that many of the same strategies can be used for vocabulary learning. Thus, they are identified as part of the general language strategies (O'Malley & Chamot, 1990; Schmitt, 2010). In a broad sense, vocabulary learning strategies can be defined as the stratagems and activities used by the students to find out about the meaning of unknown words, remember new words, and ways of learning those new words to be used later in and outside the classroom and develop communicative competence (Haddad, 2020). Some previous studies have focused on developing a taxonomy of vocabulary learning strategies in order to gain insights about the vocabulary learning processes and find out effective manners for vocabulary teaching and learning (e.g., Oxford, 1990; Gu & Johnson, 1996; Schmitt, 1997). However, Schmitt (1997) argues that the most studied vocabulary learning

[11] O´Malley and Chamot (1990) define learning strategies as "special thoughts or behaviors that individuals use to comprehend, learn or retain new information" (p.1)

strategies can be gathered into two main groups: *discovery strategies* and *consolidation strategies*. *Discovery strategies* encompass determination strategies and social strategies. On the other hand, *consolidation strategies* comprehend social strategies, memory strategies, cognitive strategies and metacognitive strategies. (Catalán, 2003, p.58). The following are explanations and examples of discovery and consolidation strategies:

Discovery Strategies: They are, at the same time, divided in two subgroups: determination and social strategies**.** In determination strategies, students have to discern the meaning of new words based on the context, structural knowledge and reference material. On the other hand, social strategies are where students work collaboratively in a learning group with other peers (Baskin, Iscan, Karagoz, & Birol, 2017, p. 127).

Consolidation Strategies: This group is also divided in 4 subgroups: social activities, memory, cognitive and metacognitive strategies**.** Social activities are also included as part of *consolidation strategies* because when working collaboratively students can either work on discovering the meaning of a word or putting it into practice the meaning by being exposed to opportunities to practice the language with other people (Rubin, 1987; Nation & Waring, 1997). On the other hand, memory strategies (mnemonics) use techniques of relationship and associations between ideas and also explore visual, mental, and listening skills. They involve previously known information and include mental associations, images, and sounds, using rhymes, verbal elaboration, reviewing in time intervals, self-testing, and using physical response (Thompson, 1987). Some examples of memory strategies are semantic mapping, total physical response, and grouping images among others (Oxford, 1990). Cognitive strategies are similar to memory strategies because they entail the manipulation of information; however, these

type of activities do not focus on processing. Some examples are repeating, taking notes, translating, summarizing, etc. (Oxford, 1990). Finally, metacognitive strategies can be described as the resources used by the learner to plan, monitor, and evaluate their learning. They are conscious strategies and the learner makes decisions on best ways to study (Chamot, 2009). Some examples are students journaling and self-evaluating questionnaires (Diaz, 2015).

Learning and Heritage Language Acquisition

In regard to learning and acquisition of HL learners, an increasing interest began developing in the 1970s and 1980s for Spanish HLs in the US when authors such as Ana Roca (1974), Guadalupe Valdés (1981), and Ana Celia Zentella (1978) started publishing and investigating "the overall positive value of Spanish-English bilingualism, biculturalism and biliteracy in the US" (Pascual y Cabo, 2016). Heritage Language Acquisition uses some of the principles of SLA as a foundation to understand the process of learning and acquisition of a heritage language, but it also looks at other factors that may impact language competence and performance, such as input variation or cross-linguistic influence and sociopolitical factors (Lynch, 2003).

As Zentella (2000) states, "Languages are not merely sets of rules but are flexible systems of communication that are intertwined with a speaker's identity and the communicative context" (as cited in Goldstein, 2012, p. 31). Second Language and HL learners have different ways of acquiring and developing the target language (Potowski, 2008), in spite of the fact that both are English language dominant speakers and HL learners acquire the language at home and the community from childhood. Therefore, to understand bilingual/HL acquisition, we need to be conscious of the sociocultural context

in which this language development takes place (Vygotsky, 1987; Mahn, 2012a; Goldstein, 2012). Gass and Selinker (2008) state that, "Heritage language acquisition is a form of second language acquisition and a form of bilingualism" (as cited in Kagan & Dillon, 2008, p. 492).

As stated above, a HL learner is to some degree bilingual because s/he grew up being exposed to two languages, but once s/he starts going to school, the minority language may be reduced to very specific contexts, such as the community and home:

> The NHLRC Survey confirms that after the age of five, when children start school, use of the HL language declines, though it does not disappear completely… HLLs do not benefit from full exposure to the language, because they are not fully immersed in it and, with rare exceptions, are not within an educational system where the language is used as an instrument of transmitting knowledge. (Kagan & Dillon, 2008, p. 494)

Montrul (2010, 2012) also agree with Gass and Selinker (2008) in that heritage speakers are somewhat bilingual because they have been exposed to the language since birth or early childhood. She states that some HL learners are more bilingual than others growing up, but one thing they all have in common is that by the time they reach adulthood their HL becomes their weaker language. Regarding their vocabulary repertoire, most HL learners' vocabulary is related to the home and community environment and the words to which they were exposed during childhood.

One of the first studies to propose a new approach to understand HL theory was published by Lynch (2003). In his study, he outlines a set of nine principles that should be contemplated when teaching Spanish to HL learners. He establishes a guideline for

teachers that include the following factors: language variation, implicit teaching to help them expand their lexicon/grammar repertoire in a more natural manner, promote literacy beyond the classroom, etc. He also emphasizes the importance of encouraging students to be proud of their identity and communities. Lynch claims that HL learners should be compared to advanced L2 learners rather than native speakers of Spanish, and that they will acquire the language better through purposeful opportunities. Thus, comparing HL learners to native speakers of Spanish creates unrealistic expectations for these learners (Lynch, 2003). He also points out the importance of being aware of the heterogeneity of the HL community, and states that, for many of them, English is the preferred language of communication: "HL speakers do not insist that one must speak Spanish to be considered 'Hispanic' or 'Latino'" (p. 36).

Similarly, Valdés (2005) aimed to redefine and expand previous research in SLA learning and acquisition by examining the challenges that HL learners confront in the United States. She states that, regarding classroom instruction, there is a need to address the implicit knowledge these students bring into the classroom (p. 416). She also argues that HL learners bring different bilingual knowledge into the classroom and instructors need to take into account not only the fluency of the language, but the dialectal variation and registers that the learner can produce and understand. In the same fashion as Vygotsky (1987), Valdés highlighted the importance of understanding the individual's social and cultural exposure, which are part of their bilingualism knowledge, in order to expand on language learning research:

> A discussion of specific problems and the ways they can be approached from the perspective of different areas of inquiry can lead to a better understanding of what

> it means to generate theoretical knowledge and to contribute to educational practice. (Valdés, 2005, p. 422)

Valdés concludes the article pointing out different factors that shape the acquisition of a heritage language and that researchers need to look at the different aspects that influence language acquisition, such as input, language transfer, and characteristics of the learner (p. 423).

Montrul (2010) also examined different issues in the field of HLA, such as revitalization, acquisition, and language maintenance from a generative approach. In regards of acquisition, Montrul (2010) sheds light on what previous research has been observed in heritage learning processes in different languages. The author divides the article in different linguistic areas, such as phonetics and phonology, vocabulary, morphosyntax, and syntax acquisition, and also compares language acquisition research in the first, second, and heritage language. In her article she compares L1, L2, and heritage acquisition and she argues that in the case of HL learners, they have early exposure to the language like L1 learners which is why they present similarities in phonology, some vocabulary, and linguistic structures with native speakers of the language. However, once heritage speakers start attending to school, they learn more complex structures in their dominant language, and the minority language, in many cases, is reduced to the home and community use.

Conversely, Correa (2011) compares how HL and L2 learners use subjunctive accuracy and metalinguistic knowledge, or the "combination of terminology knowledge and explicit, verbalizable knowledge of grammatical rules" (p. 128). She argues that there is a dichotomy in research on metalinguistic knowledge in acquisition. Some authors,

such as Felix (1981), Krashen (1982), Krashen and Terrell (1983), believe that explicit instruction is not beneficial for L2 learners and instruction should focus on communication and fluency. In contrast, Ellis and Laporte (1997), Lightbown (1998), and Herdina and Jessner (2000) support the idea of explicit and based in form instruction (p. 128). Correa's (2011) results showed that in terms of metalinguistic knowledge, L2 learners performed more accurately than HL learners; however, HL learners were more accurate using the subjunctive, suggesting that HL learners acquire the subjunctive implicitly rather than explicitly. These findings concur with Valdés (2005) in that HL instruction needs to foment implicit knowledge in their pedagogical interventions.

In a similar manner to Correa's (2011), Torres (2013) explored how HL and L2 learners of Spanish performed in the use of the subjunctive in adjectival clauses in different simple and complex tasks. In his results, he observed that prior language exposure and experience had an impact on knowledge and performance. He found that inhibitory control abilities did not influence learning since both populations were able to "suppress distracting information" (p. 193). However, he also found that L2 learners are more prone to focus on form, whereas HL learners are more concerned with meaning. This finding agrees with Degani and Tokowicz's (2013) article on intraword sense relatedness and whether or not two meanings share a translation in a bilingual's language where the authors also determined that less proficient speakers of a language pay more attention to form than meaning (p. 1059).

To conclude with this section, Zyzik (2016) concurs with Valdés, Correa, and Torres' claims that HL learners perform better in tasks that require them to use their implicit knowledge and suggest that activities that are designed for L2 learners may not

be as beneficial to HL learners because they are normally more focused on explicit and metalinguistic knowledge rather than implicit knowledge. Most of the studies about implicit and explicit knowledge in HL have focused on efficient ways of grammar instruction rather than vocabulary. Only a few studies (e.g., Zyzik, 2016) discuss more efficient instruction methods to teach vocabulary to HL learners. Zyzik (2016) argued that pedagogical implications for teaching grammar and vocabulary to HL learners should not be examined from the same perspective because of "the explicit nature of vocabulary knowledge" (p. 33). She supports a combination of implicit, or incidental, and explicit, or intentional, activities in order to expand vocabulary knowledge and learn it at a productive level (p. 32).

Vocabulary Learning and Acquisition in Heritage Language and Bilinguals

As we have seen in the previous section, there is not much research that focuses specifically on vocabulary learning and acquisition in the field of HLA. There is also a strong consensus that HL learners have a more general knowledge of vocabulary (i.e., a more implicit knowledge of vocabulary) even if sometimes they may experience difficulty using it in the appropriate context or placing it in a sentence (Fairclough, 2011; Zyzik, 2016). Previous research on reading acquisition shows that reading comprehension success comes from the size of vocabulary that a learner has, and vice versa, reading enhances vocabulary growth (Han & Chen-ling, 2010; Laufer, 1992; Paradis et al., 2011). According to Koda (1994), "Semantic processing is central to reading comprehension…Ultimately, it is vocabulary that largely controls semantic processing" (as cited in Han & Chen-ling, 2010, p. 242). Other studies in L2 vocabulary acquisition

indicate that new words are learned based on how often students encounter them or how well they are able to process them (Laufer & Rozovski-Roitblat, 2011).

Paradis et al. (2011) argue that research on bilingual vocabulary acquisition has shown that bilingual children have two vocabularies (i.e., separate linguistic systems) from the onset of acquisition; however, "this does not mean that the bilingual children's two languages are hermetically sealed and utterly autonomous in development" (p. 67). They also argue, "Children do not duplicate every experience in both languages" (p. 67), that is, children may learn words at their grandmother's house and not learn the equivalent in English because they mainly use it in that specific context. The authors also describe how a study by Pearson et al. (1998) examined the percentage of *singlets* (i.e. words with no equivalents in one of the languages) and how this percentage decreased as their language experience developed (p. 65). Furthermore, we must be aware that language dominance plays a role in vocabulary acquisition and that the amount of exposure that we have to each language during childhood affects how individuals process words: "Vocabulary size in each language varies directly in proportion to relative amount of exposure to each language" (Marchman, Martinez-Sussman, & Dale, 2004, as cited in Paradis et al., 2011, p. 73).

Vygotsky (1998) investigated periods of child development (Mahn, 2003) and stated that language development is influenced by critical periods and schooling. In many cases, Spanish HL learners' dominant language (i.e., Spanish) becomes their L2 once they go to school, because it influences the amount of exposure to vocabulary in Spanish, which may become reduced to the home and community contexts (Montrul, 2012). In a similar manner, Bialystok (2001) exposed how learning two languages during childhood

may affect learning development, and the way individuals develop mental representations based on their life experiences with different sounds and words in more than one language. Through different experiments and research, Bialystok (2007, 2017) argue that being bilingual alters cognitive functioning and this experience shapes their linguistic knowledge and its structural relationship to the mind.

Some important results show that bilingual children are more advanced at identifying when there is a semantic anomaly contained in a sentence, that is, bilinguals are more flexible and grasp concept formation and manipulation in different ways than monolinguals. In similar fashion, Fairclough (2011), which focuses on the lexical knowledge of HL learners, found that HL learners responded yes to more real words and pseudowords. She argued that the reason for this finding could be attributed to HL learners; exposure to Spanish early in life. They are aware of morphophonological characteristics and considered pseudowords real Spanish words "based on morphophonological restrictions" (p. 289). In other words, since HL learners have grown up in a bilingual environment, they may use their implicit knowledge to rely on what sounds "good" (i.e., a real word) to them. This is why they may be better at understanding concept formation more holistically than L2 learners.

How can Semantic Neighborhood Density Fill the Gap in Acquisition Research?

Previous literature on L1 research supports the idea that learning new vocabulary is facilitated when it can be related to previous knowledge because it is easier to connect new material to preexisting schemas (Stroller & Grabe, 1993, as cited in Wilcox & Medina, 2013, p. 1057). This idea agrees with Storkel and Adlof (2009) which argues that when a new word is perceived, other elements come to mind, such as concepts and

past experiences, and it facilitates the retrieval of words that are semantically associated to a target word (p. 307). In the same vein, cognitive linguistics establishes that language experiences create and influence cognitive representations (Langaker, 1987, 2008; Bybee, 2006). For example, exemplar theory suggests that there is not a unitary definition of a specific concept but rather one's mental representation of a concept is based on the set of exemplars (i.e., all past instances) of the encountered concept (Bybee, 2002, 2006). In other words, the mental representation of a dog is going to be based on your own previous experience with dogs. This also agrees with Rosch's prototype theory (1973) in which the mental representation of a concept retains characteristics of many particular examples, and with association-based theories in SND that take into account individual experiences in associative retrievals in speech recognition and production tasks (Nelson, McKinney, Gee, & Janczura, 1998; Nelson, McEvoy, & Schreiber, 2004).

As previously mentioned, most of the research on ND, specifically SND, has focused on recognition and production effects in the L1, but as far as this research is concerned, there is not much research in semantic neighborhood and vocabulary acquisition in Spanish as an L2, HL, and bilinguals. Only a few studies have looked at the impact of neighborhood density and its relationship with language development (Garlock, Walley, & Metsala, 2001, p. 472). Van Heuven, Djkstra, and Grainer (1998) examined orthographic ND effects in word recognition in Dutch-English bilinguals. They found that the increasing number of orthographic neighbors in English facilitated word recognition in English. Their results also agreed other studies in orthographic neighborhood density in the L1 (Muller, Duñabeita, & Carreiras, 2010).

Likewise, Marian and Blumefield (2006) looked at neighborhood density in bilinguals. In their study, they focused on examining the effects of phonological neighborhood density in native and non-native speakers of German. Their findings also agreed with other authors (e.g., Storkel, 2004; Storkel & Adlof, 2009) in that words in dense semantic neighborhoods are processed faster and neighborhood density facilitates word learning (p. 28). They concluded that the facilitative effects on phonological neighborhood density has positive pedagogical implications for bilingual and L2 education because "the knowledge that dense neighborhoods words are associated with better performance might guide choice of words in vocabulary learning activities so as to provide additional support for low-neighborhood items" (p. 28).

Likewise, Storkel, Armbrüster, and Hogan (2006) explored how college adults learn novel words. Their results showed that word learning was facilitated based on neighborhood density: once a new lexical representation with high density is activated, other lexical representations are activated stabilizing the new representation. Moreover, Stamer and Vitevitch (2012) studied the influence of ND in word learning in English college students taking Spanish as a L2. The authors confirmed similar results in both picture naming and identification tasks where participants' learning was assessed. As part of their results, they found that high density influenced word learning in production and serial recall. Mirroring Storkel et.al. (2006), their findings showed that words in dense neighborhoods will activate other lexical representations influencing the integration of new with existing lexical representations reinforcing the new lexical representation. They also claimed that their outcomes "are consistent with the results obtained in previous studies of word-learning in infants (Hollich, Jusczyk, & Luce, 2002), toddlers (Storkel,

2009), preschool children (Storkel, 2001; 2003), college-age adults (Storkel et al., 2006), and artificial neural networks (Vitevitch & Storkel, 2013)" (p. 11).

Another linguistic factor that has been taken into consideration in the literature of bilingual vocabulary acquisition is the effect of cognates on language activation and performance in bilingual speakers (Paradis et al., 2011; Costa, Santesteban, & Caño, 2005; Degani & Tokowicz, 2013). Cognates are words that share "translation pairs that are phonologically similar (e.g. "lámpara" and "lamp" in the case of Spanish and English, respectively), while non-cognates are phonologically dissimilar (e.g. "mesa" and "table", in Spanish and English, respectively) (Costa et al., p. 95). One study that examined the facilitative effects of cognate words in bilingual speech production is Costa et al. (2005). Their article is a late review of multiple research studies conducted on the effects of cognates and non-cognates in bilingual speech production. For example, the authors look at studies on cognate translations and argue that "accessing a semantic representation that has been recently accessed (e.g., cognates) is easier than accessing a non-pre-activated representation (e.g., non-cognates)" (p. 97). The authors also state that there are some semantic representations that are more related than others even if they are not morphologically related. For example, *cat* and *gato* ("cat" in Spanish) are more semantically related than *dog* and *perro* ("dog" in Spanish) and that two words can be semantically related in one language and not in the other. For instance, *caja- cajón* ("box" and "drawer" in Spanish, respectively) versus *box* and *drawer* in English. Sometimes words share stems in both language, such as *nas/nariz* ("nose" in Catalan and Spanish, respectively) and then the stem would be retrieved and some rules, such as the phonology of the word, will be retrieved. Finally, they also discussed the relationship of

neighborhood density in spoken word production (i.e., picture naming) and agree with previous research in that ND facilitates activation and spoken production for words in dense neighborhoods, and this facilitation occurs faster and more accurately (p. 100) They concluded that cognates present facilitative effects that favor speech production within and across the two languages of a bilingual speaker.

Along the same line, Ivanova and Costa (2008) examined bilingual access in speech production and compared monolingual Spanish speakers to bilingual Spanish-Catalan speakers, whose dominant language was the first acquired language, and Spanish- Catalan bilinguals, for whom Spanish was their L2, in a picture naming task. They argued that previous literature has demonstrated that bilinguals present disadvantages in lexical access in speech production. The authors argue that some of the studies in bilingual lexical retrieval that show this disadvantage for bilinguals have been conducted with bilinguals whose first language was not their dominant language, and that when conducting these types of studies the researchers should be aware of the different variables that influence language performance, such as age of acquisition and which of the languages is the participants' dominant language. As part of their results, they claimed that bilinguals presented a disadvantage in low-frequency words and with cognates and non-cognates. In the case of L2 speakers, cognates were beneficial when words were high frequency.

Furthermore, Degani and Tokowicz (2013) studied the intraword sense relatedness and whether or not two meanings share a translation in a bilingual's language, in this case, in Spanish-English bilinguals, they argue that the degree of semantic relatedness is influenced by whether or not two meanings share a translation in a

bilingual's other language. They conclude that when Spanish-English bilinguals are less proficient, they pay more attention to form instead of meaning. That is, if two words look alike, they tend to say they have the same meaning.

As we have seen above, neighborhood density, cognates have an impact on word learning. According to several authors, words that come from dense neighborhoods are accessed and learned more easily not only by children, but by adults as well (Storkel, 2004; Storkel & Adlof, 2009; Vitevitch & Stamer, 2012). Cognates also exhibit facilitatory effects on word learning because it is easier to link new words into existing phonological, lexical, and semantic representations (Costa et al., 2005; Otwinowska & Szewczyk, 2017).

Conclusion

In this chapter I reviewed the definitions of HL and L2 learners and examined crucial research in vocabulary learning and development in the fields of second language acquisition (SLA) and heritage language acquisition (HLA) in order to understand vocabulary building and learning for L2 and HL learners of Spanish. It is important to highlight that language acquisition research acknowledges that vocabulary is not a static process, we are constantly renewing and expanding our lexicon and there are many factors that contribute to the process of learning new words (Ivanova & Costa, 2008; Nation, 1990, 2001; Schmitt,1997; Vigotski, 2007; Stamer & Vitevitch, 2012). In the following chapter, I explore Vygotsky's work and his analysis of meaning-making in order to better comprehend SND and word learning and how L2 and HL learners develop their system of concepts and construct meaning from birth to adulthood.

Chapter 3
Review of Literature: Vygotsky's Meaning Making and Concept Development

Introduction

Vygotsky's theories on concept development and meaning making provide a rich conceptual framework for understanding Semantic Neighborhood Density (SND) in L2 and HL learners. Vygotsky's work has greatly impacted the fields of education, linguistics, and pedagogy. His contributions have also helped with the analysis of cognitive development and language processing and acquisition (Mahn & John-Steiner, 2002; Mahn, 2012). One of the more salient characteristics of his research is that he goes beyond cognitive motivation and takes into account the sociocultural and affective considerations that are fundamental to the understanding of human development and consciousness (Vigotski, 2007) .

For this chapter, I use Vygotsky's analysis of meaning-making processes as one of the theoretical pillars in my conceptual framework to understand the foundation of Semantic Neighborhood (SN) theory as well as to comprehend vocabulary learning and acquisition in L2 and HL learners. Similar to what Vygotsky proposed, I return to the origins of language to comprehend the internal factors that caused language to come into existence. Vygotsky argues that the essence of language acquisition comes from an understanding of the analysis of meaning-making processes (Vygotsky, 1997). He claims that in order to understand individual language development and acquisition, the concept of meaning making needs to be analyzed from three perspectives, that is: 1) its genetic origins; 2) its structure (i.e., mental development and the interrelationships of social and psychological processes); and, 3) its function (i.e., psychologically motivating factors) (Mahn, 2012b).

Furthermore, Vygotsky (1997) states the learning of another language "must be studied in all its breath and in all its depth as it affects the whole mental development of the child's personality taken as a whole" (p. 5). Consequently, in order to acknowledge the origins of vocabulary development in L2 and HL learners, I review Vygotsky's analysis of *thinking and languaging*[12] (thinking and speech) as a unit that makes reference "to the concept of internal structures and systems created in the unification of *thinking and languaging* processes leading to the development of higher psychical processes" (Mahn, 2018, p. 13). In other words, the concept of meaning as the mediating unit between the processes of *thinking and languaging* (see next section for more detail about these terms).

I also look at how Vygotsky's concept of *meaning* not only refers to the union of *thinking and languaging*, but also at how it makes reference to the linking connection between the cognitive mind and social development and how Vygotsky examines the ability to construct meaning through the practice of dialectical thinking in collective understanding, our own understanding, and the understanding of others (Mahn & Meyer, 2020). In this chapter, I examine the concept of generalization, which is intrinsically related to the mediating concept of meaning in the *thinking/languaging* system, as it is key to understanding human social interaction, the processes of thinking and communication, and the formation of the system of concepts. Finally, I explore the relationship in the formation of everyday and scientific concepts and what meaning making looks like for HL and L2 learners.

[12] In this chapter I use Mahn´s (2018) term *thinking and languaging* instead of *thinking and speech.*

Thinking/Languaging System

In a study on Vygotsky and SLA, Mahn (2012b) states that Vygotsky's analysis of children's meaning-making processes in their native languages can help educators in the fields of second language and heritage language acquisition and pedagogy examine the processes involved when learning and acquiring an L2. Although Vygotsky did not focus on L2 learning, he extensively investigated the role of "semiotic mediation in social interaction, within social, cultural and physical contexts" (Mahn, 2012a, p. 1). In other words, how humans acquire and develop the system of communication through language. Vygotsky saw a dialectical relationship between *thinking and languaging*, where existing processes influence other processes, and vice versa, to become a unified, internal mental system. By *thinking processes,* he refers to those that are "involved in perceiving, processing, organizing and storing information about the environment" which are used by human beings to guide their actions or activities (Mahn, 2012a, p. 1).

On the other hand, *languaging processes* are those "involved in using sign/symbols to make and communicate meaning in social interaction" (Mahn, 2012a, p. 1). Vygotsky's methodological approach of *meaning making* focuses on the origin of *thinking and languaging* processes for human beings. Thus, to understand how meaning came to existence, Vygotsky analyzed previous studies conducted on apes and human communities that resembled those of early humans. He examined how the birth of meaning comes from the use of tools by *Homo sapiens* gaining understanding of the development of the *thinking/languaging* system and the development of the conceptual neuronal network in the human species and the individual (Mahn & Meyer, 2020, p. 263).

One of Vygotsky's main arguments is that previous studies in psychology have examined thinking and speech as either a unified phenomenon or as two separate

phenomena, but not as independent phenomena that are closely united (Vygotsky, 1997, p. 14). He proposes a different understanding of *meaning making* and concept development. He understands *brain* and *mind* as a union, as a *thinking/languaging* system with meaning at its core. The construction of *Rechevóye Myshlénie* (i.e., *thinking and languaging* as a unit) relies on the complexity of the concept of meaning and its unit construction. *Znachinie Slova* is the internal structure created by the sign operation where all aspects of communication, reception, and production are used (Mahn, 2018; Vigotski, 2007). The sign is not only the symbol, but it represents the entire process of meaning through language use and reflects the core of the psychical internal system of the unity of thinking and speech (Mahn, 2012b, pp. 104-105). The sign also works as the mediator between the individual and the social functions in the cultural development of children, which transforms the cultural and social interactions that bring them into a newer, qualitative, and different level of making meaning of their worlds. In that transformation, the process of internalization takes place, which is the process by which the external (i.e., auditory input), social, and interpsychological function becomes internal (i.e., semantic meaning), therefore, intrapsychological:

> We can formulate the general law of cultural development as follows: every function in the cultural development of the child appears on the stage twice, in two planes, first, the social, then the psychological, first between people as an intermental [interpsychological] category, then within the child as an intramental [intrapsychological] category. This pertains equally to the voluntary attention, to logical memory, to the formation of concepts, and to the development of will. (Vygotsky, 1994, p. 106, as cited in Mahn, 1999, pp. 343-344)

In other words, the origin of the psychic processes of an individual are expressed in semiotic mediation. He understands that the sign has been artificially created by humans through their interactions with tools to overcome nature's forces, and this eventually transformed into human social formations. This constitutes a new principle of activity that delimits and specifies the human psyche by the use of *languaging* (Mahn & Meyer, 2020).

Children construct meaning based on experience which then impacts the way they build concepts:

> The word does not relate to a single object, but to an entire group or class of objects. Therefore, every word is a concealed generalization. From a psychological perspective, *znachenie slova* ["meaning through languaging"] is first and foremost a generalization (Vygotsky, 1987, p.47; Vigotski, 2007, p. 385).

As mentioned above, *znachenie slova* refers to meaning through language use and the unity of generalization and social interaction, a unity of thinking and communication (Mahn, 2012b). As such, generalization is key to the structure of meaning (Vigotski, 2007). Therefore, in order to delve into the essence of concept formation in L2 and HL learners, we first need to examine the process of generalization, meaning, and concept formation in L1 acquisition.

Vygotsky refers to this relationship of *thinking and languaging* as *Rechevóye Myshlénie* in Russian. However, Mahn (2018) argues that this term has been oversimplified to verbal thinking in previous translations of English. Thus, in order to explain the unity and the relationship between *thinking and languaging* processes, Mahn (2018) uses the more inclusive term *languaging* to refer to any language process,

including babbling and cooing, because it better encompasses what "language" means, as opposed to using the term "speaking". Additionally, as part of his definition, Mahn takes into account the internal processes that occur during language production and reception. He defines *languaging* as all the processes (i.e., physical, mental/psychical and social) involved in the reception and production of meaningful communication through the use of signs or words (pp. 12-13). According to Mahn (2018), *languaging* separates humans from other animals because after millions of years humans eventually evolved and were able to separate sensory from motor skills. Humans developed a different sense of attention that allows them to draw from memory and time, and, therefore, create awareness that allows them to regulate their activities and their thinking (personal communication based on a class discussion from Mahn's graduate seminar at the University of New Mexico, February 2019).

According to Vygotsky, meaning is developed not only based on a child's psychological development but also on his interaction with the socio-historical experiences to which he is exposed and appropriated as part of his learning. Meaning is in constant change as the child grows and goes through different levels of development and interaction in their sociocultural situation of development, which affects the learning and acquisition of a L2 or HL. The dynamic nature of meaning has its foundation in one of Vygotsky's main beliefs: to examine the relationship between thinking and speech from their origins to individual development in which "nothing is constant but change and that all phenomena are process in motion" (Mahn, 2012b, p. 103). Vygotsky states that in order to understand something historically, it has to be studied in motion. This stance is the basis for the dialectical method (Vygotsky, 1997, p. 43).

For the present study, the two populations researched are Second Language learners and Heritage Language learners of Spanish. As mentioned in Chapter 2, many Spanish HL learners in the United States were exposed to Spanish since birth or during early childhood at home and in their communities (Valdés, 2001). Whereas in the case of L2 learners, the exposure to the language comes later in life, most likely during their school years (Potowski, 2008). As previously mentioned in Chapter 2, HL learners exhibit different levels of proficiency in the heritage language, and it is difficult to determine who is a HL learner, but typically, these learners belong to an ethnolinguistic group that traditionally speaks the language or they come from a family who has historically spoken the language. When constructing meaning, L2 and HL learners' interactions with Spanish is substantially different. HL learners *meaning making* construction in Spanish is based on a unique sociocultural situation that is specific to their community and the different environments in which they speak the language (e.g., in the home, at work, or at school). Whereas, L2 learners will not have that Spanish sociocultural context because their experiences with and their exposure to the language mainly occur in the classroom setting at school.

Vigotski (2007) suggests that human learning happens to a large extent due to the interaction between the development of an individual and the culture in which they live. Vygotsky states that child development happens within a sociocultural setting, and he demonstrates that cognitive development takes place in a social and cultural context through the use of language and other sign systems. Thus, individual development cannot be understood without the sociocultural context in which individuals are immersed. *Meaning making* and the higher thinking processes of an individual, such as critical

thinking, decision making, and reasoning have their origin in social processes (Mahn, 1999; Vigotski, 2007). For this reason, in this study I examine participants' language background and exposure as a way to understand their vocabulary learning and development.

Languaging constitutes an important component of the development of the system of concepts. Through *languaging*, the individual gains an understanding of relationships among the members of a community, and the individual utilizes language to talk about these relationships and social organization which creates a mutual understanding among all members of the community which help them survive as a society. This leads to the relationship between the internal and the external, and it creates a social understanding of the organization of the specific community group in society.

A key component to this mutual understanding is the idea of generalization, which we go through individually and allows us to communicate with others who also go through this process. This generalization becomes a social generalization, which may differ from our own individual generalizations because it is collective. However, the generalization process is similar collectively and individually because both undergo a similar sort of dialectical leaps and transformations of their conceptual networks. In the next section, I explain in more detail the intricacies of this process (Mahn, 2018; Mahn & Meyer, 2020; personal communication based on a class discussion from Mahn´s graduate seminar at the University of New Mexico, February 2019).

Generalization

When Vygotsky writes about generalization, he goes back to the process of how a child's first words are acquired and how meaning and *sense*[13] are related. He describes two types of *generalizations* that are intrinsically related: collective and individual generalizations. When Vygotsky discusses generalization as a collective phenomenon, it is founded on the *languaging* system and the relationship between the internal and the external. For that, Vigotski (2007) explored how *meaning making* was born through the generalization process. This process began millions of years ago when humans created sophisticated tools to adapt to nature and developed individual words to describe these items, and, eventually, these words developed into a whole new level of abstraction by creating a concept that would encompass all those items. Thus, objects such as *arrow* and *spear* became individual words that through the process of generalization become part of a bigger concept, such as *hunting tools*, and, through more processes of *generalization,* became a larger concept, such as *tool*.

By this process of *generalization,* that is, from the identification of individual objects using distinct words, to the *generalization* of individual items to a bigger concept that encompasses all these items, to, finally, the *generalization* of the previous concept to a more overarching concept that encompasses all individual items across different areas that may fall under that same concept, the conceptual map for the individual and human species develops (Mahn & Meyer, 2020; personal communication based on a class discussion from Mahn´s graduate seminar at the University of New Mexico, February 2019). Similar to this process is what occurs at the individual level from childhood to

[13] "The aggregate of all psychological [psychical] facts that arise in our consciousness as a result of a word" (Vygotsky, 1987, pp. 275-276).

adulthood and how we build our conceptual map based on the different processes of generalization.

At the individual level of generalization, when a child associates a word with something that an adult points to, for example, a *dog*, it is not a simple association of the sound with the object. Rather, this word is an aspect of the child's entire sensory experience when interacting with and perceiving the touch of the animal's fur, its smell, his interaction with the animal, and the sounds that occur during this interaction. All those experiences together construct the "sense" of *dog* for the child who then isolates the word from a particular pet and generalizes it to include other animals. The meaningful word, in representing other similar animals, develops into the concept of *doggie* through the abstract thinking process of generalization. The external meaning of the word is then internalized and becomes part of the child's conceptual understanding, which is the core of the *thinking/languaging* system. The word belongs to both the *languaging* and the *thinking* domain because a word without meaning would just be simple sounds (Mahn, 2018).Consequently, every time the word is elicited, the child will relate it to associated concepts in their conceptual network and bring to mind other elements that can be associated with that word (Mahn, 2018, pp. 20-21).

This understanding of individual generalization and how the child starts constructing meaning agrees with previous research conducted in semantic memory and semantic knowledge. For instance, Balota and Coane (2008) argue that semantic knowledge has different dimensions. For example, when looking at the concept of *dog*, they explain what elements are part of this dimension. The concept of *dog* not only contains information about the characteristics of the animal (i.e., four legs, fur, pet, likes

chasing other animals), it also contains sensory information about the feeling of petting a dog (i.e., tactile information), the sound of its bark (i.e., auditory information), different characteristics of other dog breeds, and the emotional response created through interacting with it (as cited in Hernández Muñoz & López García, 2014, p. 193).

Vygotsky (1997) compares the concept of *generalization* to a globe, where the North Pole represents the most abstract concepts and the South Pole the most concrete concepts. As one moves up longitudinally, everyday concrete concepts transition to more academic, abstract concepts, and from a latitudinal point of view, the same concepts are now at the same level of generality with other concepts on that plane of generality (Mahn, 2012; Vygotsky, 1997). This metaphor used by Vygotsky to explain *generalization* as part of *meaning making* can be used to understand the origin of Semantic Neighborhoods. As such, when a child moves up longitudinally in generality, he or she also does so in meaning, implying that concepts are never in isolation but rather understood in relationship to other concepts. This idea ties well with Semantic Neighborhood Density in the sense that ND effects occur when a word is being processed and related words, that is, words with similar meaning, are activated or partially accessed. This idea proposes that knowledge is organized in a system based on semantic similarity, and concepts are related to each other in a semantic space (Buchanan, Westbury, & Burgess, 2001; Danguecan & Buchanan, 2016; Mirman & Magnuson, 2008, 2006). The concept of *generalization* also agrees with Nelson, McEvoy, and Schreiber's (2004) interpretation of associative norms which takes into account individual lexical experience in a dynamic manner because, as we have seen above, the process of generalization is tied to emotion and experience.

When describing the concept of generality, Vigotski (2007) argues that generality does not necessarily start at the individual word and move up to the more general concept. Vygotsky uses the example of the differences and relationships in generality among *plant*, *flower*, and *rose* to describe the development of concepts in children. He argues that the word *flower* is a generalization of all flowers representing the most basic level. Thus, when learning a concept, a child does not always follow the most logical order, that is, from the individual item to a more general idea. In the case of *flower*, the child learns earlier the more general concept (i.e., flower) and later the more specific concept or item (i.e., rose). This suggests that steps in the process of generalization may not be linear, and we can have concepts of different generality inside the same structure of generalization (pp. 386-387).

Similarly, when looking at how L2 and HL learners build semantic neighborhoods in Spanish, they may not follow a logical pattern. For instance, HL learners may incorporate, as part of their semantic neighborhood, elements of contextual co-occurrence earlier than other semantic characteristics. Hernández Muñoz and López García (2014) state that an example of contextual co-occurrence for the word *perro* ("dog" in Spanish) could be *ser fiel como un perro* ("to be loyal as a dog"). In other words, the individual, cultural, and environmental experiences and interactions that the participants had during their childhood will impact their generalization process and the way they construct meaning and build their semantic neighborhoods.

As we have seen in this section, Vygotsky (1997) studied the notion of *generalization* based on the analysis of human evolution to understand the creation of meaning making and its relationship to object identification, and how this knowledge

could be applied to the understanding of conceptual development in children. To support the above-mentioned analysis, Vygotsky also carried an experimental study on the structures of generalization by examining children's linguistic learning abilities and their development of concepts.

Structures of Generalization

Vygotsky, like Piaget (Vigotski, 2007), believed that children are actively involved in the discovery and development of new schemas of comprehension. However, contrary to Piaget's belief that the discovery is manly initiated by the child, Vygotsky emphasizes the idea that to a great extent a child's learning happens through the interaction with other children or through the verbal instructions provided by their caretakers. A child looks to understand the instructions provided by a tutor, teacher or caretaker using the instructions as a guide to regulate their own actions. Vygotsky examined conceptual development by first looking at early childhood to comprehend the origin of concept formation through each age level. However, he argues that it is during adolescence when children begin to use *thinking in concepts* and become aware of their own thinking processes. Vygotsky claims that concept formation cannot be reduced to mere associative connections and he describes three stages, or categories, of concept formation to describe the process through which a child undergoes.

> [T]he concept arises and is formed in a complex operation that is directed toward the resolution of some task... In itself, learning words and their connections with objects does not lead to the formation of concepts. The subject must be faced with a task that can only be resolved through the formation of concepts. (Vygotsky, Rieber, & Carton, 1987, p. 124)

This hierarchy of concept formation is based on an experiment with blocks of different shapes, colors, and sizes with nonsense words that contained a concept hidden under the blocks. After the participants organized the blocks into groups based on a concept they had, they looked at the words under two blocks to see if they matched; if they did not match, they started again. If all the words in a group were the same, it meant that the participant understood the concept conveyed in the nonsense words. After examining how children and adults grouped blocks, Vygotsky determined three main phases on concept formation and the structure of generalization: *syncretic, thinking in complexes,* and *thinking in concepts.*

The first phase, called the *syncretic* phase, looks at pre-concept formation where the child establishes sequences and categories arbitrarily based on their visual perception. In this stage, there are three subphases: 1) the "trial and error period" which is equivalent to a child's first attempts to communicate; 2) "special distribution," based on subjective experience; and, 3) "the representation in groups," which is a transitional stage into the next phase of *thinking in complexes* where the child is able to go beyond subjective connections among the objects and draw conclusions based on the "kind of kinship that has been established between them by the child's impressions" (Vygotsky, 1987, p. 135). This phase has also been explored in word learning and neighborhood processing by several authors who looked at lexical characteristics in the development of children's vocabulary (i.e. Storkel, 2004, 2009; Storkel et al., 2010).

The development of children's lexicon has been investigated by observing individual child patterns or corpora studies where researchers examined words known by children with the help of parents' checklist data, that is, parents reported whether their

child knew the word (Stokes, 2010; Storkel, 2004, Storkel & Adlof, 2009). Stokes (2010) agreed with previous findings that found that younger children, between 18 and 24 months, learn words that have many phonological neighbors in the ambient language earlier. According to Stokes (2010), this finding suggests that children with typical developmental language are sensitive to the frequency of phonemes and phoneme sequences in the ambient language and this sensitivity facilitates lexical learning. This finding coincides with Vygotsky's theory of concept formation and how children during the first phase create patterns based on their *sense* of the word. This initial phase of concept formation or structure of generalization constitutes the most elementary conceptualization.

The second phase, known as *thinking in complexes*, is developed by being able to associate common aspects of objects based on their objective aspects, not just on the child's subjective experiences of the object. This phase is more complex and diverges from "unconnected connectedness" to "unite homogeneous objects in a common group, to combine them in accordance with the objective connections that he finds in the things themselves" (Vygotsky, 1987, p. 136). During this stage, the child is able to extract diverse elements and characteristics and analyze which aspects of these objects differ or are similar. Vygotsky refers to this phase as *thinking in complexes* because "a complex is first and foremost a concrete unification of a group of objects based on the empirical similarity of separate objects to one another" (Vygotsky, 1987, p. 137).

The *thinking in complexes* stage is also demonstrated in language processing research on the organization of lexical representations, "When a child encounters a novel word, he or she must store a representation of the referent, a representation of the

phonological form, and an association between these two representations" (Storkel, 2004, p. 201). In other words, when the child faces a new representation, associations between new and old semantic and lexical representations occur, and the new representations are integrated with the existing ones in the child's lexicon. Semantic representations refer to the knowledge of the characteristics that the child has of the referent, while lexical representations refer to the stored form of the referent in the child's lexicon. For instance, if the child hears the term *cat*, this word has three phonological representations, /k/, /ae/, and /t/, and one lexical representation, /kat/, that is associated to the four-legged, domestic animal (Storkel, 2004; Storkel et al., 2010).

The third phase, known as *thinking in concepts,* in which the adolescent uses a higher level of abstract thinking in which two distinct concepts are held in mind so that they can be analyzed through comparison and differentiation. Vygotsky gives the example of algebra, where instead of looking at the relationship between a symbol and an object, the relationship between two abstract symbols is central. As Vygotsky (1987) argues, "concept formation came to be understood as a *complex process involving the movement of thinking through the pyramid of concepts,* a process involving constant movement from the general to the particular and from the particular to the general" (p. 162). Thus, in this phase, the concept does not only encompass the process of generalization of isolated elements but utilizes abstraction to consider all those elements individually outside of all tangible and real connections.

These three phases of the formation of concepts develop *meaning* through social interaction and produce a steadier *sense* of the word, and it is essential to the development of the conceptual neural network and their lexicon (Vigotski, 2007). This

idea of concept formation and the development of meaning in children can be applied to adults. It also supports Stamer & Vitevitch's (2012) statement that the "same mechanisms used to learn words in the native language might be used to learn words in a foreign language as well" (p. 11). When comparing these structures of generalization to the concept formation for L2 and HL learning, we can understand that the different stages involved, from the *syncretic* stage to *thinking in complexes*, constitute a first level of comprehension of a vocabulary item. From childhood, concepts are built as a personal construct used by the necessity to communicate with others, which influences the concept development of children and adults because it carries a high affective value.

On the other hand, conceptual thinking does not happen until the child is able to master the relationships of generality (Vygotsky, 1987, p. 225). In other words, when the child is able to group objects based on abstract characteristics of the word rather than a learned series of words. This ability shows that the child has gone beyond syncretic laws and *thinking in complexes* and is able to understand the relationship between concepts. During puberty and the adolescent critical periods, the individual is able to learn new vocabulary by developing *abstract thinking* (Vygotsky, 1987, p. 199). The adolescent creates "a completely new form of relationship between the abstract and the concrete aspects of the thinking process, a new form of fusion or synthesis" (Vygotsky, 1987, p. 196). Thus, as Mahn (2018) argues, Vygotsky's analysis of qualitative transformations can be applied and used as a foundation to study L2 learners, and as pertains to the present study, also HL learners (pp. 24-25). If we compare when a child goes to school to an adult learning a new language, in both of these stages the formation of new ideas (i.e., reasoning) is based on previous generalizations that were repeated dialectically while

growing up and became a baseline for future generalizations and abstractions.

In the present study, one of the essential questions operationalizes who of the participants were L2 or HL learners based on Vigotski's (2007) critical periods to understand the qualitative transformations in language exposure that the participants went through. To do this, I assumed, as suggested by Mahn (2003), that critical periods are not bounded and that they develop over time. I also modified the age ranges that would constitute each stage (i.e., infancy, early childhood, school age, puberty, and adolescence) based on the U.S. system of schooling. The results of this question would help to better understand the relationship between language exposure and the participants' vocabulary retrievals.

Everyday and Scientific Concepts

Another aspect of concept formation that Vygotsky examines is the distinction between everyday and scientific concepts as related to the individual's system of meaning and system of concepts (Mahn, 2012a, p.5)

A child receives language input, or auditory stimuli, starting from the third trimester of pregnancy (Traxler, 2011, p. 327), and they develop their first language by listening to people talk. According to Vygotsky (1997), care and nurture play a key role in the creation of meaningful *languaging*. For this reason, the role of the child's caretaker is essential on the child's psychological and conceptual development. Vygotsky refers to this as *vospitanie* in Russian. The caretaker also serves as a guide for children to understand how the world works and to make of sense of it. The caretaker's role also contributes to the first stages of concept formation and generalization. Many HL learners that grow up in the United States with a non-English language in the home are exposed to

this language by family members or caretakers (Polisky & Kagan, 2007). They are exposed to this language by one or both parents or other family members, such as *abuelitas* ("grandmas") or *hermanos mayores* ("older siblings"). This exposure to the heritage language influences their construction of meaning. In the present study, questions 11-13 (Find these questions in Appendix I) address home and community exposure that will inform me of the onset of participants' Spanish development. Since the participants in this study are college students, the instructor will take on the role of the caretaker to guide students through these first steps of concept formation. In the discussion section, we will observe how the instructor can take on this role to facilitate vocabulary learning by acknowledging the cultural knowledge HL learners bring to the classroom.

Nonetheless, conceptual thinking does not happen until the child is able to master the relationships of generality (Vygotsky, 1987, p. 225). In other words, when the child is able to group objects based on abstract characteristics of the word rather than a learned series of words, this shows that the child has gone beyond syncretic laws and *thinking in complexes* and is able to understand the relationship between concepts. By puberty and adolescence is when the child is able to understand more abstract terminology because s/he is able to synthesize and develop a new understanding based on the relationship between the concrete and abstract aspects of the thinking process (Vygotsky, 1987). By using dialectal leaps, the thinking process would consider both poles, the abstract and concrete, first simultaneously and then creating a synthesis. In other words, the original ideas can be juxtaposed to new or opposite ideas, building a new synthesis that can be deepened and improved by comparing it to the initial concrete and abstract ideas that

originated it. Thus, the development of new concept formations and more abstract thinking is based on the dialectical relationship of abstract and concrete aspects. This also ties well with the purpose of the present study since the idea is that by exploring how students build vocabulary, we can develop pedagogical strategies to strengthen their understanding and expand their lexicon.

When differentiating between everyday and scientific concepts, Vygotsky partially based this idea on the different types of concepts in Piaget's work on spontaneous and nonspontaneous concepts (Vigotski, 2007). By everyday concepts, Vygotsky refers to those concepts that were developed in the child's everyday life outside of the school setting and not as a result of explicit instruction. They are developed from "bottom to top" based on the child's generalizations and abstractions, and they become a foundation for scientific concepts: "The system emerges only with the development of the scientific concept and it is this new system that transforms the child's everyday concepts*"* (Vygotsky, 1987, p. 223). Mahn and John-Steiner (2012) mention an example of the everyday concept of *brother* to explain what Vygotsky means by everyday concept. They argue that a child may be able to recognize his brother or other people's brothers but may be unable to provide a description for that word.

On the other hand, Vygotsky (1987) argues that scientific concepts are acquired consciously and are introduced explicitly by the teacher in school. They are developed from "top to bottom," from verbal definition to everyday knowledge, with the purpose of extending meaning to everyday knowledge. Although Vygotsky emphasizes the difference between everyday and scientific concepts, he also highlights the importance of their interrelationship to understand the ways in which children construct knowledge.

When we learn vocabulary as an L2 or HL learner, we make connections shaped by our understanding of the world. Second language and HL learners increase everyday concepts spontaneously through their experience with their surroundings. In the case of learning vocabulary in Spanish, HL learners had a different sociocultural experience growing up, and they may not be conscious of how they came to learn certain concepts. Correa (2011) states that HL learners of Spanish normally demonstrate less experience with metalinguistic knowledge than their L2 learner counterparts because they learned the language in a naturalistic setting (p. 128). This difference creates a unique experience for both learners when exposed to new vocabulary taught at school because they are not necessarily absorbed from direct experience in their daily life so they must become aware of their learning.

In L2 and HL teaching, we can strengthen vocabulary learning by using these two concepts and bringing them into the language classroom where instructors can help students identify what they have learned unconsciously through their experiences and what they are currently learning consciously. By doing so, we can use the dialectal leap in which these two knowledges transform each other to make learning more powerful:

> While scientific and everyday concepts move in opposite directions in development, these processes are internally and profoundly connected with one another. The development of everyday concepts must reach a certain level for the child to learn scientific/academic concepts and gain conscious awareness of them. The child must reach a threshold of the development of spontaneous/everyday concepts a threshold beyond which conscious awareness becomes possible. (Vygotsky, 1987, p. 219)

The scientific or academic concepts and the awareness that is associated with their learning causes the learner to reexamine what they already know and become more aware of the construction of meaning and allows them to understand it in a more academic way. In the same manner, the experiences that students bring into the classroom can be used to deepen their understanding and build connections. This is why using a survey to elicit and document students' retrievals can inform teachers of students' lexical knowledge, and this data can be used as a baseline to introduce new vocabulary into the classroom. As instructors we can have a positive impact on our students' educational experiences if we take into account students' language development and language variation to build and design activities based on the relationship between their everyday knowledge and what is introduced in the classroom.

Meaning Making in L2 and HL Learning

Mahn (2012a) argues that Vygotsky's study on the interrelationship between thinking processes and his application of the dialectical method, utilized to study how language and symbol/sign language influenced the origin and development of how individuals learn and develop their system of meaning, can provide a foundation to second and heritage language acquisition (p. 1). According to Vygotsky's *meaning-making* approach, language is key to the process of thinking, and words are used as a medium. In order to apply this approach to foreign and heritage language learning, I have studied the interconnectedness of the process of acquiring a first language and developing the systems concepts and meaning from childhood to adulthood by means of asking participants about their home language exposure, the ages at which they were exposed to Spanish, the quantity of exposure during those critical periods, and to whom they speak

Spanish and/or English on a regular basis. Also, I examined the different concepts and language variation in their vocabulary retrieval to better understand their process of *meaning making*. As we can observe through the above-mentioned sections, the child develops elementary concepts into higher psychical concepts through qualitative and dialectal leaps, and, as mentioned above, these stages provide a foundation to how Semantic Neighborhoods (SN) are formed in the individual. When building their conceptual network and developing their system of concepts, the child starts generalizing by first detecting objects based on perception, and then on subjective judgments:

> Objects that are unified without sufficient internal foundation and without sufficient internal kinship or relationships, presupposes a diffuse, undirected, extension of word meaning (or of the sign that substitutes for the meaning of the word) to a series of elements that are externally connected in the impression they have had on the child but not unified internally among themselves. (Vygotsky, 1997, p. 134)

After this initial stage, the child starts thinking in complexes based on the things that are connected to the object: "words have become family names… when the child says a word, he indicates a family of things that are connected one to another by the most varied lines of kinship" (Vygotsky, 1997, p. 138). If we think about SNs, connections can be created based on common characteristics, semantic field, or frequency of co-occurrence (McPhedran, 2014). In the last stage, the actual concept formation occurs based on thinking in concepts and the ability to think abstractly. This takes place during adolescence when the child is finally able to associate, pay attention, judge, represent, and determine tendencies and patterns; therefore, through the individual's use of words

and signs, they are able to master and subordinate the rationalization and understanding of their own mental operations (Vygotsky, 1997, p. 131). This is an important aspect in the development of the system of concepts because it shows that it is during adolescence when the individual assimilates the ability to process the development of concept for the first time. This becomes a significant transition in the individual's own thinking in concepts because it leads to a higher mental and intellectual function that allows logical thinking and the expression of new knowledge such as the one learned through scientific concepts.

One key step to understanding the meaning-making process for L2 and HL learners is examining the interrelation between everyday and scientific concepts. Vygotsky (1987) argues that concepts relate and connect to other concepts, and that there is a dialectal relationship between spontaneous and scientific concepts. According to Mahn (2012a), Vygotsky draws an analogy between the process involved in learning a second/foreign language and the process of acquiring scientific concepts. As above mentioned, *scientific concepts* are marked by school instruction and learned based on the development of the child's everyday concepts which were learned unconsciously and are related to the child's environment. "The development of scientific concepts begins in the domain of conscious awareness and volition. It grows downward into the domain of the concrete, into the domain of personal experience" (Vygotsky, 1987, p. 220). Both concepts relate to the child's experience but in a distinctive way "in that they have a different relationship to the object that they represent, and in that they follow a different path from birth to final formation" (Vygotsky, 1997, p. 178). According to Mahn (2012a), "The stage that individuals have reached in the development of systems of

meaning will influence their SLA and development" (p. 3). As previously discussed, the development of meaning is constructed by the use of sign which happens first in the interpsychological plane and then in the intrapsychological plane, and this will impact the second or heritage language development:

> Meaning is not the sum of all the psychological operations which stand behind the word. Meaning is something more specific—it is the internal structure of the sign operation. It is what is lying between the thought and the word. Meaning is not equal to the word, not equal to the thought. (Vygotsky, 1997, p. 133)

According to Vygotsky (1987), the acquisition and improvement of a child's native language helps him or her learn a second/ foreign language, and as applies to this study, a HL as well, because it should not interfere in the process of development of this second or heritage language. When both languages, first and second, have affective values, cultural and social components, children build their learning and develop daily comprehension. They can use these abilities in the classroom where they interact and interchange experiences and decisions. The resolution of cognitive development comes from the interrelation between the student and their thinking.

Heritage language and L2 learners of Spanish have gone through different experiences when developing their system of concepts. These differences in their language exposure may create structural differences between their everyday concepts and scientific concepts constituting a complex stage in their learning when academic vocabulary is learned based on everyday experience. When this happens, the everyday concepts are introduced to a new system of generality relationships in which they will modify their everyday meaning. The interaction between everyday and scientific

concepts are key for teaching. Thus, L2 and HL instructors should apply this interrelationship between everyday and scientific concepts to expand on language vocabulary. According to Vygotsky (1987), this opens a new opportunity for the learner to move from their actual level of development to a higher one. He calls this possibility *Zone of Proximal Development* (ZPD):

> Therefore, a central feature for the psychological study of instruction is the analysis of the child's potential to raise himself to a higher intellectual level of development through collaboration, to move from what he has to what he does not have through imitation. This is the significance of instruction for development. It is also is the content of the concept of the zone of proximal development. (Vygotsky, 1987, p. 210)

The instructor can use the possibility opened for the learners by ZPD to rise to a higher level of conceptual development by using learners' previous knowledge and scaffold into the next level. Mahn & John-Steiner (2002) emphasize the idea of using students' prior experiences to construct students' knowledge because it stimulates students' self-efficacies and, by extension, their competence. Their idea is that instructors should help students become "life-long learners" (p. 1). They also highlight the importance of how to better implement ZPD by examining the role of affective factors in learning, especially for second language learners "who face cognitive and emotional challenges as their learning involves both a new language and a new culture " (p. 2). This relates closely to the present study since its purpose is to use participants' prior knowledge and experience to help them learn new vocabulary in the Spanish classroom.

Conclusion

In conclusion, this chapter provided a general overview of Vygotsky's work by means of reviewing his analysis of meaning making through the origins of language formation in humans and children to comprehend the internal and external factors involved in the *thinking*/ *languaging* system and how meaning originated as a mediating unit between these two processes. I also described the processes of generalization at the collective and individual level, as well as the different structures of generalization that occur in the formation of concepts during childhood. Finally, I reviewed the dialectal interrelationship between scientific and everyday concepts and what meaning making consists of for HL and L2 learners to better understand L2 and HL semantic neighborhoods and vocabulary learning.

Chapter 4
Methodology

Introduction: The Present Study

The present study builds on previous findings of three theoretically-grounded approaches: Semantic Neighborhood Density (SND), Vygotsky's Meaning Making, and L2 and HL vocabulary acquisition, to understand language learners' knowledge of Spanish lexicon and how this knowledge can be used to the instructor's advantage in the classroom when teaching vocabulary. This chapter overviews the research design, rationale and significance, and purpose of the study. It also offers a detailed narrative of the data collection, as it provides a description of the recruitment process, the language profiles of the participants, the materials used in this study, and it explains the organization and coding procedures of the data analysis. Additionally, it provides a brief summary of the pilot study that was carried out which helped refine the final version of the survey used in the present study.

Methodological Framework

The present study utilizes a quantitative approach to research because it uses empirical data to analyze and understand how Spanish second language (L2) and heritage learners (HL) build (and maybe acquire, store, etc.) vocabulary. According to Mirman and Magnuson (2006), "Semantic association norms is based on human participant generation of single associates to each target word" (Buchanan et al., 2001, as cited in Mirman & Magnuson, 2006, p. 1823). In order to do this, I focused on language-based models to observe SND and semantic space. Specifically, I adapted my methodology from Associative Norms Models, which utilizes participants' elicitations in a free

association task and takes into account individual and cultural experiences (Nelson et al., 2004).

Acquiring a second or heritage language is a complex process of learning that requires storing and accessing vocabulary. To do this, we use a mental space called the lexicon. Different methods in linguistics and psycholinguistics have explored how the mental lexicon is organized. One of these methods is Associative Norms. Associative Norms, or free associations, are part of language-based semantics which propose that concepts are organized based on language use (Buchanan et al., 2001; Mirman & Magnuson, 2006, 2008, see Chapter 1). It is also a method that has been utilized to explain semantic memory functions, such as episodic memory (Nelson, Schreiber, & McEvoy, 1992), and it has been used to examine measurements of proximity in high dimensional semantic space (Nelson, McKinney, & Gee, 1998; Steyvers, Shiffrin, & Nelson, 2005). In this regard, a high dimensional *semantic space* is a *space* with a *large* number of *dimensions* in which words or concepts are represented by nodes; the position of each node along each axis is somehow related to the *meaning* of the word (Osgood, Suci, & Tannenbaum, 1957). Additionally, Associative Norms methodology predicts ranges of semantic similarity by scrutinizing the answers in free-recall and cue-recall tasks (Steyvers et al., 2005). One of the reasons I used this model to assess vocabulary in L2 and HL learners is because free association norms "have been said to exemplify basic laws of association of ideas, unconscious thought, the structure of meaning and the linguistic structure of a transformational, generative grammar" (K. Nelson, 1977, p. 93). For instance, K. Nelson (1977) analyzed children's semantic organization by asking children to produce a single or several answers after hearing a

verbal cue with the purpose of obtaining insight into automatic semantic processing rather than measuring the time response of the task. By doing this, she states that word association shows "what children have learned or not learned about language or the world" (p. 109). In the present study, I also utilized word associations to inform me of participants' L2 or HL Spanish vocabulary repertoire (instead of focusing on measuring time response) in order to know how many words participants already know as related to others when learning languages.

Likewise, as mentioned in Chapter 1, this ties well with spreading activation theory (Collins & Loftus, 1975) which explores how concepts are represented in a semantic network and how the semantic meanings of these concepts are connected to each other by nodes, as well as the relationship between the concepts in the network measured by the distance between the nodes. Similarly, free association is a procedure that measures connections among words that are placed in a high dimensional semantic space. Thus, words with similar meanings are located closer and in similar areas of the high dimensional semantic space of the target word (Steyvers, Shiffrin, & Nelson, 2005).

The reason I mention this relationship is because psycholinguistic theories that examine the structure and organization of the lexicon have already been used as a methodological framework to investigate how learners construct meaning through prior knowledge and implement it into vocabulary instruction (Moody, Hu, Kuo, Jouhar, Xu, & Lee, 2018). However, to my knowledge, there is no previous research that focuses on Semantic Neighborhood Density using free association to analyze the relation and construction of vocabulary in L2 and HL learners of Spanish and vocabulary instruction.

Another reason I utilized free association as part of my methodological framework to study semantic neighborhood density and vocabulary construction is because it is a method in which concepts are part of the same semantic neighborhood regardless of shared features (Nelson et al., 1998; Buchanan et al., 2001). Also, another factor that is key for using this methodological approach is that it takes into account the speaker's experiences and how this influences the way participants process language. As Dover & Moore (2020) state, free associations establish "the network of word associations is a representation of the 'landscape' of the encoded memory and, therefore, is closely related to the individual's day-to-day decision making and behavior"(p. 1) This also agrees with previous studies on free association norms that look at the different associative structures in substance abusers (Stacy, 1977), and the impact of culture and personal experience in semantic neighbors (Nelson et al., 2004, p. 42). For example, in New Mexico, a semantic neighbor of *Christmas* may be *chile.* The reason why is because in the New Mexican culture *chile* is a key ingredient of their agriculture and cuisine. There are two main types of *chile* in New Mexico: green and red, and when people want both types of *chile* in their food, they ask for "Christmas".

Additionally, this methodological framework agrees with Vigotski's (2007) theories of concept development and meaning making because it considers the affective and sociocultural aspects as part of a person's language development and vocabulary formation. In summary, in this study, I investigated the structures of conceptual networks by looking at participants' collected responses to a target word in a quantitative way and I used this information to understand participants' vocabulary inventory. However, instead of using word association databases, as other studies that explore semantic neighborhood

density have done (e.g., Buchanan et Al., 2001; Mirman & Magnuson, 2006), I created a survey and used participants' own retrievals to examine semantic neighborhood density, token and type frequency, and lexical variation.

The study is designed to investigate the following overarching research questions: 1) How do learners build vocabulary in Spanish, 2) is there a difference between HL and L2 learners when building and learning vocabulary via semantic neighborhoods and meaning-making processes, and 3) what pedagogical strategies can be used to teach new vocabulary to these populations. As mentioned above, this study is structured based on three different theoretical approaches: 1) Semantic Neighborhood Density, 2) Vygotsky's Meaning-Making Approach, and 3) Second and Heritage Language Acquisition. A background questionnaire was used to identify which participants were L2 learners and which were HL learners, a semantic association questionnaire was implemented to understand what vocabulary participants know and to determine if there is a difference between both groups of participants when associating or building vocabulary at the beginning levels of Spanish.

Rationale and Significance of the Present Study

Much of the research on Semantic Neighborhood Density (SND) has mainly focused on how Semantic Neighborhoods (SNs) are activated in the L1 (e.g., McPhedran, 2014; Mirman & Magnuson, 2006, 2008; Buchanan et al., 2001). Few studies of SND have focused on L2, HL or bilingual processing (e.g., Otwinowska & Szewczyk, 2017). Previous research has documented how Neighborhood Density (ND) affects word activation and recognition research in a way that ND effects can be applied to understand word learning. To the best of my knowledge, there are only a few studies that have

focused on the effects of ND in L2 adult word learning but at the phonological level (e.g., Storkel et al., 2006; Vitevich & Stamer, 2012). Much of the literature that has been published on word learning on ND has mainly focused on the L1 English of children (e.g., Hollich, Jusczyk, & Luce, 2002; Storkel, 2001, 2003, 2004).

Moreover, there is an ongoing discussion about the different ND effects found depending on the language being studied. Some studies argue that the processing in English and Spanish is different because ND in Spanish can be phonologically, morphologically, and semantically related (Vitevitch & Stamer, 2006, p. 5). There is a general agreement that English lexical representations are recognized more slowly and less accurately during perception tasks (i.e., auditory and visual tasks) because of competitive effects (Luce & Pisoni, 1998; Rodríguez-González, 2012; Vitevitch, 1997, 2002; Vitevitch & Luce, 2016; Vitevitch & Rodríguez, 2005). In English production tasks, words are activated faster due to facilitation effects that allow a lexical representation to be recognized more quickly and accurately.

On the other hand, there are competing hypotheses regarding the obtained results on competitive and facilitative effects in Spanish speech recognition and production. Vitevitch & Stamer (2006) found that there is a facilitative effect in perception, that is, words in dense neighborhoods are recognized faster and more accurately. However, words with dense neighborhoods compete in speech production because the competing effects activate multiple words. Other researchers refute this argument and contend that English and Spanish are produced and processed in the same way (Baus et al., 2008; Duñabeita et al., 2008). Given that previous studies have produced different results, additional research is needed to investigate the similarities and differences in how

English and Spanish are processed. Furthermore, more research should be conducted on SND and word recognition by looking at different semantic measures such as, SNs, Number of Associations (NoA), and semantic distance (McPhedran, 2014; Duñabeita, 2008; Mirman & Magnuson, 2008).

In addition to documenting research on SND in L2 and HL language processing, further research also needs to be conducted on vocabulary learning and acquisition. In this regard, application of effective practices to teach vocabulary to L2 and HL learners has been recently identified as an area of research that deserves consideration (Zyzik, 2016). As such, more research needs to be done in order to see which instructional method (i.e., explicit or implicit instruction) can be beneficial to learning vocabulary and if L2 or HL learners learn and acquire novel words better through implicit and/or explicit activities (Zyzik, 2016; Schmitt, 2008). Oftentimes, vocabulary is presented in textbooks in a canonical way by presenting lists based on lineal semantic characteristics organized in anchored categories. That is, elements in vocabulary lists are related to each other successively and are presented in the same established categories (e.g., family – grandfather, grandmother, mother, father, brother, sister).

However, it is a possibility that participants can master novel words and learn vocabulary faster if words are presented in a diverse manner and if their previous exposure to the language is taken into consideration. For instance, presenting elements based on context or frequency (e.g. hospital, – nurse, blood, medicine) (see Gonzales & Gonzales de Tucker, 2009). Beaudrie and Fairclough (2012), in agreement with Vigotski (2007), claim that there is a gap in research on how internal and external factors contribute to an individual's language development. According to these authors, most of

the literature in linguistics and psycholinguistics focuses on identifying possible gaps in HL development by comparing it to native speakers of a standard dialect or to L2 learners, rather than trying to understand the individual's internal and external factors in language formation (p. 112).

On a similar vein, Mahn (2012a) states that "the system of meaning has not been widely explored in second language research" (p. 1). Likewise, it seems that no previous research in HL acquisition has implemented Vygotsky's meaning-making methodological approach to analyze the process of meaning making in HL learners. Textbooks or instructors in the classroom can also incorporate Vygotsky's meaning-making approach by including activities in which learners reflect on how they learned their first words as children. For example, activities where learners need to interview their caretakers about their first communicative interactions and compare them with their first communicative interactions in their L2 or HL. Likewise, self-efficacy evaluations can aid learners not only to become aware of their own learning, but also to reflect on best individual strategies to learn vocabulary (e.g., Pajares, 2003)

Purpose and Scope of the Present Study

The purpose of the present research study is to contribute to research on vocabulary learning and acquisition in the fields of Second Language Acquisition (SLA) and Heritage Language Acquisition (HLA). As previously mentioned, not much research has examined the impact of ND on vocabulary learning in adults nor on the influence of methods of instruction on vocabulary learning for L2 and HL learners. Also, there are few L2 or HL studies that have implemented Vygotsky's meaning-making theoretical approach as a foundation to analyze the process of vocabulary learning and acquisition in

college participants or to explore the origin of SN. As such, this study looks at how English speakers learn and acquire Spanish vocabulary as a foreign or heritage language. This study also examines the effect of certain lexical characteristics on word learning, such as SND processing and word frequency, in a semantic relatedness task. This project will also consider internal factors, such as an individual's previous experience with the language, in order to draw conclusions on learners' lexical access by implementing Vygotsky's meaning-making approach.

Finally, conclusions are drawn on alternative methods to teach vocabulary to L2 and HL learners based on the results obtained in the semantic relatedness questionnaire. For this reason, the present study identifies vocabulary-learning activities to introduce new vocabulary based on participants' language experience and how they relate words to other words. In the same vein, this investigation bridges gaps of research in the fields of HLA and SLA. Thus, the current study expands on and contributes to previous research in HLA and SLA through: 1) the implementation of Vygotsky's analysis to meaning-making and the development of his theory beyond his focus on child language formation (Mahn, 2018, p. 24); 2) additional testing on the effects of SND on word learning in theories of word recognition in L2 and HL adults (Stamer & Vitevitch, 2012); and, 3) diverse pedagogical implementations for learning and acquiring new vocabulary in the classroom (Ellis, 2005; Schmitt, 2008; Torres, 2013; Zyzik, 2016).

Research Questions

RQ #1: What is the pre-existing structure of the semantic neighborhoods of Spanish Language Learners? How do Spanish Language Learners process Spanish vocabulary in terms of semantic relatedness?

RQ #2: How do Spanish Language Learners build vocabulary in Spanish?

a. Is there a difference between the semantic networks in Spanish Second Language (L2) Learners and Spanish Heritage Language (HL) Learners? If so, how does semantic neighborhood density differ across these two groups?

RQ #3: What is the nature of the meaning-making process when building vocabulary when learning a Heritage Language and a Second Language?

a. How does Vygotsky's meaning-making approach contribute to understanding and analyzing the formation of semantic neighborhoods (SN) in Spanish L2 and HL populations?

RQ #4: How can semantic relatedness and meaning-making processing help us teach Spanish as both a L2 and a HL?

a. What pedagogical strategies could, or should, be used when teaching how to expand current vocabulary size in language learning?

Description of the Present Study

Participants

The targeted population of this study consisted of undergraduate participants enrolled in beginning-level Spanish courses (i.e., the first semester of study of Spanish language in a college setting, a 3-credit hour course). These participants were enrolled in two different universities in the U.S.: a university in the West Coast and a university in

the Southwest. All participants are speakers of English and were enrolled in a beginning-level Spanish class (i.e., 1110, 1111, 1102, 1112 or its respective course number equivalent for beginning-level Spanish as specified by the institution). Forty-four participants were excluded from this study because they were younger than 18 years old at the time of data collection or spoke a Romance language similar to Spanish (e.g., Italian or Portuguese). Participants who were native speakers of Spanish or beyond the beginning level of Spanish were excluded as well. Finally, participants who left all questions blank were not taken into account.

Table 1
Original number of participants that filled out the questionnaire

Types of Participants	***Number of Participants***
Advanced Bilingual/ Native Speaker	3
SSL speaks Italian	1
Younger than 18	5
SHL/ SSL NA (Blank responses)	35
SSL	356
SHL	95
TOTAL	495

A total of 495 participants completed the online survey via *Opinio*. Of these 495 participants, 44 were excluded (see Table 1 above), leaving a total of 451 participants whose data were analyzed for this study. Of the 451 participants, 186 identified as male, 261 as female, 2 as other, and 2 opted to leave the response blank and not identify themselves with any of the options provided for gender. Participants' age ranged between 18 and 57 years of age, with an average age of 20.5. The survey was sent to 12 universities across the United States with the objective of obtaining a large sample that

would represent Spanish L2 and HL participants nationwide. However, the majority of the participants were enrolled in a Southwest university (76.95%), the second largest amount of participants were enrolled in a West Coast university (21.73%), and a small percentage were from other universities in the Southeast (0.22%), Midwest (0.22%), or the university was not specified in the questionnaire (1.11%).

In questions 9-18, participants responded to questions related to their language background, such as self-language perception in Spanish and English (i.e., how well they feel they can speak Spanish) and language exposure and experience (i.e., when, with whom, where, and how frequently they speak Spanish). In regard to their Spanish exposure, 81.4% of the participants responded that most of their schooling was primarily in English and 14.4% of the participants indicated they received dual bilingual Spanish-English education, whereas 1.3 % responded "Other" (e.g., they took Spanish in elementary school or in high school but not in a bilingual program) and 2.9% did not respond to the question.

For the home and community language exposure questions (questions 11-15 from the survey, see Appendix I), most of the participants (76.9%) indicated that their mothers spoke primarily English to them during their upbringing and 10.4% indicated their mothers spoke both English and Spanish to them during their childhood. Less than one percent (0.9%) stated that their mothers' main language was Spanish and 6.7% of participants stated their mothers' main language was another language (e.g., Gujarati). Five percent (5.1%) of the participants preferred not to indicate their mothers' primary language use either by responding "Not applicable" ("N/A") (4.21 %) or by not responding to the question and leaving it blank (0.9%).

By contrast, in the case of their fathers' language use, participants indicated that most of their fathers spoke English (56.1%) or spoke English and Spanish (22.6%) as their primary language(s) during their childhood. About three percent (3.1 %) of the participants indicated that the main language their fathers used was Spanish and 7.8% indicated that their fathers' primary/first language was a language other than English and Spanish (e.g., Arabic). The same as with other questions, some participants opted for responding "Not applicable", or "N/A", (7.32%), and 1.3% did not respond to the question and left the question blank.

When asked about their fluency in Spanish, most of the participants responded that they "only know some words" (44.4%) or "are confident in basic conversation" (47.9%) in Spanish. Few of the participants did not respond and left the question blank (0.9%), and the remaining participants felt "fairly confident in extended conversations" (5.1%), "confident in extended conversations" (1.3%) or "very confident in extended conversations" (0.4%). This was an expected range of answers since this survey was designed for beginning-level Spanish participants.

It is important to mention that 37 participants responded that they were fluent in other languages. Due to the high lexical (vocabulary/semantic) similarity among Romance languages that derive from Latin, the present study excluded participants that spoke other Romance languages in addition to Spanish. For example, one participant who spoke Italian was excluded from the study. In the table below are listed all the other languages participants were fluent in, with the exception of Italian:

Table 2

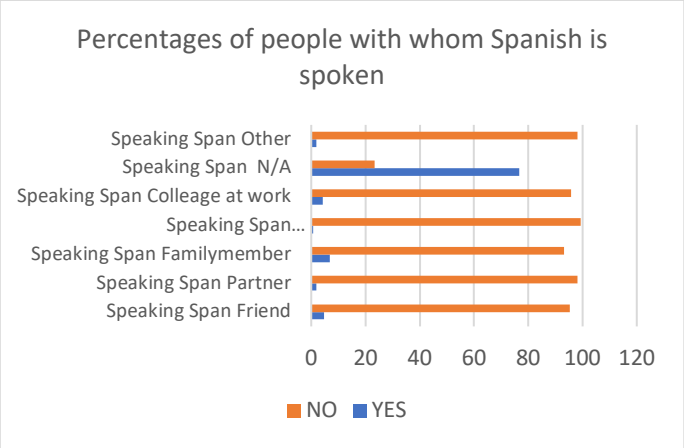
Other languages and number of participants that indicated fluency in those languages

Fluency in other languages	***Number of participants***
Arabic	3
Bisaya, Tagalog, Surgaonon	1
Dutch	2
English and Danish	1
English and German	1
English and Lakota	1
English and Loatian	1
English and Polish	1
English and Tagalog	4
English and Vietnamese	7
Farsi	1
Filipino	2
Gujarati	1
Hungarian and German	1
Ishan	1
Japanese	2
Keres	1
Korean	1
Malayalam	1
Persian	1
Russian	1
Visayan	1
Total	36

Moreover, as part of the questionnaire, participants were asked to indicate with whom they normally speak Spanish and/or English. Graphs 1 and 2 below show the overall responses:

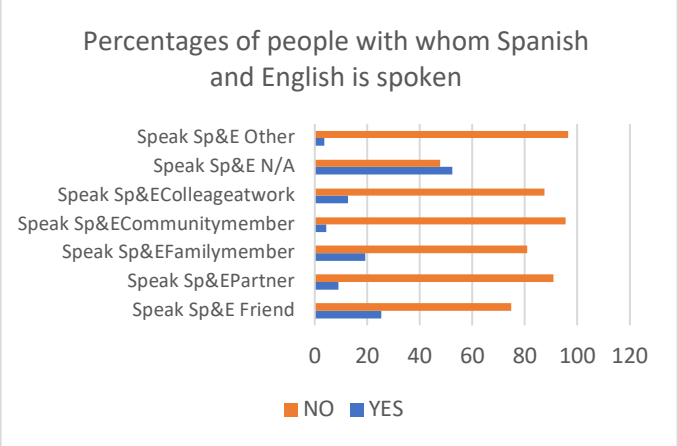
Graph 1

Overall Participants' Percentages of the People with whom Spanish is Spoken



Graph 2

Overall Participants' Percentages of the People with whom Spanish and English is Spoken



If we compare these charts, we observe that participants tend to speak more using both languages than only Spanish. Only 7% of the participants indicated that they speak Spanish with a family member and 5% with a friend. Most of the participants indicated "Not applicable", or "N/A", when asked about with whom they speak Spanish. Some other answers found under "Other" made references to speaking Spanish in school and/or

classroom. When asked about with whom they speak both languages (i.e., English and Spanish), participants indicated that they mostly speak both languages with friends (25%) and family members (19%). Although the same as the other chart, most of the participants clicked "N/A" (52%) when asked about the people with whom they speak both languages.

Overall, the language profile of the participants who took part in the present study exhibited the following characteristics: the average age of the participants was around 20 years old and most participants have received most of their schooling in English. Around 21% of the participants had some previous exposure to Spanish at home or in their community, and the participants that spoke both languages on a daily basis do it more often with friends or family members.

Materials

An online survey distributed electronically via *Opinio* Software was used in the present study. *Opinio* is a software tool widely utilized to create polls and different types of surveys.

The designed online survey consisted of two sections: a background questionnaire adapted from three different sources (Parafita Couto, Munarriz, Epelde, Deuchal, & Oyharçabal, 2016; Torres, 2013; Mahn, 2003) and a semantic relatedness section. The background questionnaire had some general demographic questions, such as age, gender, educational background, and language self-perception and exposure. These demographic data were gathered in order to obtain information that would inform me about participants' language profile. Each question presented different options for participants

to select. Example 1 below provides a sample of one of the demographic questions participants were presented with (see Appendix I for more information):

Example 1
Question in the background section of the survey

> *Which language(s) did any other guardian or caregiver (i.e. grandmother, grandfather, aunt, cousins, siblings) speak to you while you were growing up (if applicable)?*
>
> □ *Spanish*
> □ *English*
> □ *Spanish & English*
> □ *Other (Please specify)* ……
> □ *N/A*

The purpose of this section was to collect data that would inform me of participants' language background and who of these participants were Spanish L2 learners and who were Spanish HL learners. The questions in the background section were organized as presented in the table below:

Table 3
Background Questionnaire Outline

Questionnaire Questions	***Type of Information***
Questions 1-6	General background information: age, gender, years in the US
Questions 7-8	Schooling influence
Questions 9-10	Self-language perceptions of speaking proficiency in both languages
Questions 11-13	Home/community exposure
Questions 14-15	Language exposure in school
Question 16	Amount of language exposure per critical period (adapted from Vygotsky 1998; Mahn 2003)

Questions 17-18	Everyday language use
Questions 19-21	Information about their university setting

As presented in Table 3 above, in the background section of the survey, participants were asked about their experience with the Spanish language in their daily lives (i.e., when, with whom, where, and how frequently they used Spanish). These questions helped me operationalize the terms Spanish L2 and Spanish HL for the current study (see coding section for more information).

The second section of the survey, a semantic relatedness activity, was performed in both Spanish and English, and for this activity, participants wrote as many items that came to mind that they associated with a target word. Thirty questions were part of this section (15 in Spanish and 15 in English). The questions and target words in Spanish and English were the same but appeared in a randomized order so each student would be presented with the same set of questions in a different order. The same questions were used in both languages with the purpose of comparing the semantic density between both languages for each population.

Although English data were collected, given that the purpose of the present study is to examine how Spanish L2 and HL learners build and learn vocabulary, I mostly focus on participants' responses in the Spanish semantic relatedness section. The semantic relatedness section helped operationalize and identify the type of SN (i.e., dense versus sparse) and their semantic associations (in Spanish, English, and number of associations

per category) for five distinct superordinate[14] categories (e.g., *familia*) and ten subcategories (e.g., *cuchara*). As shown in Example 2 below, participants were asked to write the first five words that came to mind when presented with a target word (see Appendix I for a complete list of the stimuli used in the semantic relatedness section of the survey):

Example 2
Question in the semantic relatedness section of the survey

Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: CAMISA (English: Please, write the first five words that come to your mind related to the word: SHIRT)

1. _____
2. _____
3. _____
4. _____
5. _____

Since participants must learn vocabulary from all parts of speech, the cue words in the semantic questionnaire consisted of vocabulary from different open word classes, such as nouns (67%), verbs (27%), and adjectives (7%). These categories were chosen from two current textbooks used in a Southwest university – one Spanish as a L2 textbook, and the other, a Spanish as a HL textbook. The word categories selected are frequent words in the Spanish classroom and textbook settings and are taught in other similar beginning-level Spanish textbooks. Once participants completed the survey, I obtained a list of items associated to each category and subcategory. The survey was

[14] Based on Collin and Loftus' (1975) explanation of Quillian´s (1962,1967) hierarchical semantic network, a superordinate category is placed at the top of a concept classification where there is a subclass to superclass relationship. For example, animal is a superordinate category of cat. Superordinate categories are more general than subcategories.

administered online via a web link and took participants about 15 to 30 minutes to complete the whole survey.

Procedure

Recruitment. The *Opinio* survey was distributed via email to several universities with the intention of compiling a large data sample from Spanish L2 and HL learners in universities across the United States. In order to recruit participants, I visited and checked the websites of different Departments of Spanish and Departments of Modern Languages of universities across the U.S. (i.e., East Coast, Southeast, Midwest, Southwest, West Coast) where they offer beginning-level Spanish courses. If the department website provided the contact information of the coordinator of Beginning-level Spanish courses, they were contacted via email asking them to share the (*Opinio*) survey link with the L2 or HL instructors teaching beginning-level Spanish that semester. In the same manner, these instructors were asked if they could share the survey link with their participants via e-mail. Data collection took place in the Fall of 2018, from September 2018 to December 2018. Although 12 universities were initially contacted for recruitment purposes, most of the participants' responses came from two universities: one in the Southwest and another in the West Coast.

Pilot Study. I conducted a pilot study using four different versions of the original questionnaire in four Beginning-level Spanish classrooms at a university in the Southwest during the spring semester of 2018. The purpose of this pilot was to redefine my original questions and see which questions were targeting what I was looking for. From the feedback and data that were collected, I rewrote some of the background questions (e.g., I added a question adapted from Vygotsky's critical period, see chapter 3) and erased

irrelevant questions for the purpose of this study.

Originally there were 10 superordinate categories to be presented as cue words to participants: *Familia* / *Comida* / *Universidad* / *Casa* / *Deportes* / *Salud* / *Viajes* / *Ropa* / *Tradiciones/ Identidad* (English: Family/ Food/ University/ House/ Sports / Health / Traveling/ Clothes/ Traditions/ Identity). However, the pilot study showed that it was better to have superordinate categories (e.g., *familia*), and subordinate categories (e.g., *cuchara*) as well as different grammatical categories (e.g., verbs, adjectives, and nouns) since participants are exposed to all types of vocabulary from day one. As mentioned above, the categories utilized for the semantic questionnaire came from two current textbooks utilized in the beginning-level Spanish L2 and HL courses at a university in the Southwest.

After feedback was received, it was discovered that the initial list of target words was too advanced for beginning-level Spanish students (i.e., contained advanced terminology and too many abstract words). For this reason, the initial list of target words was modified to include less advanced target words. The present study finalized the list of words by combining concrete (e.g., *cuchara*) and abstract (e.g., *feliz)* target words. Another modification was to present instructions only once and in both languages, instead of presenting the instructions monolingually at the beginning of the English or Spanish questionnaire. Especially since the questions were modified to appear in a randomized order to limit priming and instructions would not match a specific language. Another change in the creation of the questionnaire was to include the examples in the instructions rather than in each category to avoid priming participants' responses. Also, the final questionnaire was shortened to take participants between 15-30 minutes to

complete.

Finally, another important change to the instructions was including a statement that explicitly stated that spelling was not important. Much of the research in HL claims that HL learners have few opportunities to develop literacy skills in their HL; therefore, in many cases these participants struggle with reading and writing (Pascual & Cabo, 2016; Burgo, 2015; Valdés, 2005). I believe that implementing this change to the instructions encouraged participants to write without having to worry about orthography.

Coding process. From Spring 2019 to the beginning of Spring 2020, I organized the data and coded the different responses that were downloaded in an Excel file from the Opinio software. As Wickham (2014) states, 80% of the data analysis resides in "data tidying" (p. 1). In other words, cleaning and organizing your data well is essential in order to make the analysis process easier and more accurate. Thus, in order to analyze my data properly, I spent much time organizing and reorganizing the data multiple times based on the variables I wanted to examine. In the following section I explain, how the coding process took place for each research question.

Language Profile of the Spanish Language learner: L2 and HL learner. The first part of the coding process was to identify which of these participants were Spanish HL learners and which participants were Spanish L2 learners. Given that HL learners are a heterogenous group of learners with diverse language proficiencies (Montrul, 2010; Zyzik, 2016), I focused on identifying the L2 learners first, and then, on identifying the HL learners. To do this, I looked at participants' responses on the language exposure section of the background questionnaire (see Appendix 1, Question 16 based on Vygotsky, 1998; Mahn, 2003).This question helped me as it indicated participants'

amount of exposure to Spanish (i.e., "very few words," "sometimes," "half of the time," "very often" or "most of the time") at certain age intervals of their life (i.e., 0-3 years old, 4-5 years old, 6-10 years old, 10-13 years old, 14-18 years old, or above 18 years old).

In the present study, participants were considered to be Spanish L2learners if they indicated 1) that they were exposed to very few words at all the age intervals, 2) if they replied N/A (Not applicable) for all age intervals, or 3) if they responded very few words before schooling (i.e., at and before age 5) and their exposure to the language slowly increased over the school years. Also, they were coded as L2 learners if they responded that none of their close relatives (e.g. mother and/or father) spoke Spanish or they only spoke Spanish in the classroom setting or with a friend (questions 11 to 13). Based on this, out of the total 465 participants, 356 participants were operationalized as Spanish L2 learners (adding excluding participants would be 396)

Participants were coded as Spanish HL learners if 1) they responded to question 16 (based on Vygotsky, 1998) as having 25 % (sometimes or above) exposure at all age levels, or if 2) they started with a higher percentage of exposure during childhood which declined during school years until college (e.g., 25% of Spanish exposure before age 5 but 10% of exposure of Spanish during school years until above 18 years old). They were also coded as Spanish HL learners if they indicated that their exposure was above 25%, 50% or 75% at all age intervals. Additionally, they were coded as HL learners of Spanish if they responded that their family members' or community members' (e.g., parents, cousins, siblings) first language was Spanish. They were considered HL learners if they responded that their father, mother or both spoke Spanish or both Spanish and English as their primary language/ languages. Lastly, if they stated that they currently speak Spanish

with friends and other community members, they were considered HL as well. Based on this, 99 participants were operationalized as HL learners for this study. However, the data of only 95 participants were taken into account, as four were excluded because they were bilingual/native speakers and their proficiency and fluency in Spanish was above the Beginning level.

Metric of Semantic Neighborhood (Dense and Sparse). In order to set up a threshold and categorize whether participants SNs were dense or sparse for the target words on the semantic task. I calculated the mean and median of the participants' responses for each category to set a representative value and split the data into two categories labelled as dense and sparse. As mentioned in the materials section, participants were asked to write down the first five words that came to mind when presented with a cue word. In their responses, participants could use either language to write another word or they could leave it blank if they could not think of any other words or if they did not know any other words. The cue word could be in Spanish or English, but as previously stated, I specifically focused on their retrievals for the cue words in Spanish since the present study analyzes the semantic neighborhoods of the Spanish categories.

As part of this coding process, it was important to identify how many words were provided in Spanish versus English when presented with a Spanish target word. For example, if many participants were able to respond 5 semantic associations in Spanish, this indicated that for them that category was a (highly) dense category. Blanks were considered indicators of not knowing or not being able to come up with more responses for that category. For example, if many participants left four (or even five) blank spaces

for a specific target word, this indicated that to these participants this category (word in question) may still be sparse in their L2 or HL, even if it is not sparse in their L1 (cf. *saludable* [English "healthy"]).

Thus, based on the mean and median of participants responses, a word was considered dense if 1) participants responded with 5 semantic associations in Spanish (total of 17% found), or responded with 4 (3%) or with 3 semantic associations in Spanish (4%); 2) participants were able to come up with 5 associations for the target word either in English or Spanish (total of 44% found); and 3) participants did not leave any space blank (total of 48%). Conversely, words in which less than 44% of the participants had less than 5 associations and less than 27% of them were responded in English or more than 35% of the participants left the 5 possible associations blank, these words were considered to belong to a sparse neighborhood. A blank space was taken as an indication that participants did not know more words associated to this category, therefore, this is a sparse word.

Other criteria that were taken into account to identify sparse versus dense for this current project was semantic size[15] and semantic richness[16]. For this project, semantic size was measured by the number of neighboring representations that participants were able to produce, in Spanish, to a Spanish cue word. I used the mean and median of

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[15] Buchanan et al. (2001) define semantic size as the measurement of the number of items in an associative list to a target word.

[16] Pexman et. al (2008) state that semantic richness is the amount of semantic information a word's meaning contains (e.g., number of semantic neighbors, number of features, contextual dispersion)

participant responses for each category to set a value and split the data: large versus small semantic size. Those categories that had a larger semantic size were identified as dense.

Regarding semantic richness, the variability and amount of semantic information for each category was measured based on lemmas. A lemma is the base form of a word, and all the retrievals that encompassed the same conceptual idea were categorized as part of the same lemma (i,e: *mama, mamá, madre, mami,* etc., were considered to be part of the same lemma = *madre*). Analyzing semantic richness in this way, not only informed me of the nature of the semantic representation but also allowed me to understand the meaning-making process of L2 and HL learners for each category. I measured semantic richness based on lemmas because there is extensive variability among the participants' responses (spelling was not important in the survey), and semantic concepts can be represented in a variety of ways that I may ignore otherwise. This type of analysis also allowed me to delve deeper into participants' responses and examine the linguistic variation among populations. Additionally, I examined the correlation between the number of blanks and semantic associations in Spanish for the given Spanish categories. I calculated the median and mean for both the number of semantic tokens and the number of blanks for each category to establish which of those categories were perceive as dense or sparse.

Table 4 below summarizes the different criteria taken into account to differentiate between dense and sparse neighborhoods for the present study:

Table 4
Coding criteria for Semantic Neighborhood Density

Criteria	*Dense*	*Sparse*
Number of Associations (NoA)	3,4,5 words produced to given category	0,1,2 words produced to given category
NoA in the Target Language (Spanish)	3,4,5 words produced to given category in Spanish	0,1,2 words produced to given category in Spanish
Blank Spaces	0,1,2 left for given category	3,4,5 left for given category
Semantic size	Large (1,313 responses or above across all participants)	Small (Fewer than 1,313 responses provided across all participants)
Semantic Richness	High number of Lemmas in Spanish	Low Number of Lemmas in Spanish

Meaning-making Process (Clouds)

Finally, as part of the coding process, I analyzed the participants' responses in a more qualitative manner in order to understand their meaning-making process and their language variation (coding of lemmas). To do that, I organized the word frequency of each category holistically and by each population. Then I carried out a more detailed analysis and coded the responses to each category and classified them based on lemmas per language (*i.e. tenedor, tinidor, el tenedor* are part of the same language lemma: *tenedor*). After doing this, I created word clouds to examine patterns that could inform me of the nature of meaning-making and concept formation in Spanish L2 and HL populations. This relates to Vygotsky's (1987) argument on the development of the

system of concepts and the relationship between everyday concepts and scientific concepts and the process of acquiring vocabulary knowledge (pp. 172-173)

Conclusion

This chapter presented the methodology of the present research study that examined how L2 and HL adult participants built and learned vocabulary in Beginning level Spanish courses at the College level. As mentioned at the beginning of this chapter on methodology, this chapter presented the context and rationale for the present study, a restatement of the problem, research questions, and a description of the participants. It also provided information on the data collection procedures, materials, data organization and analysis, as well as a summary of the pilot study. The following chapter, Chapter 5, will provide details on the results obtained through descriptive and inferential statistics as well as a more qualitative analysis of participants responses to the *Opinio* Survey.

Chapter 5
Findings

Introduction

The present study investigates beginning-level Spanish Second Language (L2) and Spanish Heritage Language (HL) learners' vocabulary building and learning. This chapter focuses on the results obtained from the *Opinio* questionnaire participants completed. To organize the results of my analysis, I first restate each research question and then explain the results found based on previously mentioned coding in the Methodology chapter (see Chapter 4 for more information) and the different types of statistical analysis. It is important to mention that the results presented in this chapter are mostly participants' retrievals in Spanish to the Spanish categories from the *Opinio* survey. The English section of the survey was merely added for comparison purposes and for possible future studies. The reason I exclusively focus on the Spanish section is because the purpose of the present study is to learn from participants' vocabulary repertoires in their second or heritage language and identify teaching interventions for learners of Spanish when enhancing existing and building new vocabulary.

Research Questions

Research Question #1-Building of Semantic Neighborhoods

RQ #1: What is the pre-existing structure of the semantic neighborhoods of Spanish Language Learners? How do Spanish Language learners process Spanish vocabulary in terms of semantic relatedness?

In order to examine the pre-existing structure of semantic neighborhood and how Spanish language learners process Spanish vocabulary in terms of semantic relatedness, I analyzed data distribution based on three main parameters: 1) descriptive statistics (i.e., mean and median) of numbers of semantic associations[17] (NoA), number of associations in Spanish, and number of responses left blank; 2) semantic size based on token frequency; and, 3) semantic richness based on type frequency in Spanish. The results indicated that the three parameters provide corroborating evidence of the semantic neighborhood density of the target words included in the study.

Using the first parameter, descriptive statistics, I calculated the mean and median of the overall participants for each category, as well as per population. Based on the total number of semantic associations (NoA) in both languages, number of associations in each of the languages (Spanish and English), and blank spaces, the results showed that both L2 and HL learners perceived the same Spanish categories as dense and sparse.

Table 5

Overall % of responses for each Spanish category (dense vs. sparse) based on 451 participants (for comparison purposes)

Spanish Categories (Questionnaire)	Nd (Dense/Sparse)	Spanish (5)	Spanish (4)	Spanish (3)	NoA (5)	Blanks (5)	English (5)
Familia	Dense	33	2	4	64	26	27
Feliz	Dense	17	5	6	45	25	24
Universidad	Dense	28	3	4	58	28	29
Camisa	Dense	20	2	4	42	35	24
Hospital	Dense	16	2	4	53	30	36
Casa	Dense	25	4	4	56	28	31
Tradición	Dense	17	4	3	44	32	28

[17] NoA- takes into account all semantic associations, in English and Spanish, for a target word. For example: *deport* is a phonological association to *deportes* (English "sports") rather than semantic so it was not taken into account as a NoA.

Deportes	Dense	23	4	6	53	28	31
Saludable	Sparse	16	3	3	36	47	23
Competir	Sparse	16	1	3	41	40	25
Viajes	Sparse	17	2	3	42	45	26
Amable	Sparse	15	3	4	37	43	24
Aventura	Sparse	16	1	2	45	37	29
Cuchara	Sparse	15	2	2	30	46	23
Moderna	Sparse	15	2	4	39	35	27
Average	N/A	19	3	4	46	35	27
Median	N/A	17	2	4	44	35	27

Table 5 shows summary descriptive statistics for the target words as well as the determination of dense or sparse semantic neighborhood on the basis of these statistics. This table shows a snapshot of the results and displays the percentages of participants' responses for each Spanish category (see Appendix 2 for all results): 5 responses in Spanish (Spanish 5), 4 responses in Spanish (Spanish 4), 3 responses in Spanish (Spanish 3), 5 semantic associations in either English, Spanish or both (NoA 5), left no responses blank (Blank 0), left all answers blank (Blank 5), and 5 responses in English (English 5).

As is shown in Table 5 and, as previously mentioned in the methodology chapter (Chapter 4), categories were considered to be dense if the average and median value fell under one of the following criteria: 1) participants responded with 5 semantic associations in Spanish (total of 17% found), or responded with 4 (3%) or with 3 semantic associations in Spanish (4%); 2) participants were able to come up with 5 associations for the target word either in English or Spanish (total of 44% found); and 3) participants did not leave any space blank (total of 48%). Conversely, words were considered to belong to a sparse neighborhood if less than 44% of the participants had less than 5 associations, if less than 27% of them were responded in English, or if more than 35% of the participants left the 5 possible associations blank. Those categories that

were unclear were based on the number of items matched: either all the possible specifications of the criteria were accomplished or missed a maximum of 3.

For example, the category *hospital* is considered to be dense because it matches all possible specifications except for three (less than 17% in 5 associations in Spanish, less than 3 % in 4 association in Spanish, and more than 27% associations in English). Other categories, such as *viajes* (English "traveling"), is considered to be sparse because it does not match five of the possible criteria: less than 3% in 4 associations in Spanish, less than 4% in 3 associations in Spanish, less than 44% for in associated items in either language, more than 27% provided five responses in English or below 47% participants did not leave all answers in blank.

As we can observe from the results, some categories were more dense than others. For example, *casa* was identified as a highly dense neighborhood in Spanish because it attained nearly all the possible scenarios: 1) 25% of the participants produced 5 Spanish items (above 17%), 4% of the participants responded 4 answers in Spanish (above 3%), 4% of the participants responded 3 answers in Spanish (matched the 4%); 2) 56% of the participants produced 5 associations (in English or Spanish) which is above the 44% that was established as a threshold, and 58% of the participants did not leave all categories blank, which is also above the threshold; and 3) in this category only 28% (less than 47%) left five possible answers blank. The only aspect that did not match the threshold was the criteria in English since more than 27% of the participants provided 5 responses in English for this category. These results are taken as an indication that this category is also a high dense category in English.

Other categories as *hospital* were difficult to categorize as dense because they did not fulfill most of the possible criteria: 1) 16% of the participants produced 5 Spanish items (below 17%), 2% of the participants responded 4 answers in Spanish (below 3%), 4% of the participants responded 3 answers in Spanish (matched the 4%); 2) 53% of the participants produced 5 semantic associations in either English or Spanish, which is above the 44% that was set as a threshold, as well as, 55% of the participants did not leave all 5 responses in blank which it is also above the threshold; and, 3) in this category only 30% (less than 47%) left five possible answers blank. However, 36% provided 5 associations in English to this category, which is above the 27% that was set as a threshold. As above mentioned, for those categories that were unclear, I looked at how many items from the criteria table they matched (see methodology chapter for criteria table). If they matched all the criteria except for one, two, or three specifications, those categories were considered to be dense. Otherwise, categories that missed more than 3 elements from the criteria list were considered to be sparse.

Finally, categories such as *aventura* (English "adventure") were categorized as sparse because: 1) 16% of the participants responded with 5 associations in Spanish (less than 17%), 1% responded with 4 associations in Spanish (less than 3%), and 2% responded with 3 associations in Spanish (less than 4%); 2) more than 44% (45%) responded with less than 5 associations; and, 3) more than 35% left all possible answers for this category blank and more than 27% responded with 5 associations in English.

In order to determine if these categories were identified as dense and sparse equally in both languages, I also examined the responses of all participants for the same categories in English. A summary of the most relevant results is represented in Table 6.

Table 6

Overall % of responses for each English category (dense and sparse) based on 451 participants (for comparison purposes)

English Categories (questionnaire)	Nd (Dense/Sparse)	Spanish (5)	NoA (5)	Blanks (0)	English (5)	Blanks (5)
Family	Dense	5	73	73	67	21
Spoon	Dense	2	66	67	65	22
Happy	Sparse	2	63	65	62	22
University	Dense	4	73	74	69	20
Shirt	Sparse	1	64	65	63	22
Hospital	Dense	1	67	68	66	22
House	Dense	3	68	69	64	21
Tradition	Sparse	1	59	59	57	23
Modern	Sparse	1	58	59	57	24
Sports	Dense	1	73	74	73	21
Healthy	Dense	2	67	67	65	21
To Compete	Sparse	0	61	62	61	24
Traveling	Dense	1	68	68	67	23
Kind	Sparse	1	60	60	58	23
Adventure	Sparse	1	63	63	62	24
Average	N/A	2	65	66	64	22
Median	N/A	1	66	66	64	22

Table 6 shows the percentage of participants' responses for each category and the number of responses they produced for this category: 5 responses in Spanish (Spanish 5), 5 semantic associations in either English, Spanish or both (NoA 5), left no responses blank (Blank 0), 5 responses in English (English 5), or left all answers blank (Blank 5).

In order to identify which categories are more dense or sparse in English, I used the average and median value to set a threshold and split the data into two categories: dense and sparse. The reason I did not have such extensive criteria to identify the density of the proposed categories in English as I did in Spanish is because the results for the

English dataset seem to be more uniform because it is the first language for both populations. Thus, by looking at the median and mean values, I was able to gather a holistic idea of the density for each category based on the participants' responses. Table 6 provides a snapshot of the results provided for the English categories (see Appendix 3 all of the results). As demonstrated in Tables 5 and 6, the same categories in English and Spanish did not always have the same density, that is, some categories were sparse in one language, while dense in the other. For example, *cuchara* (English "spoon") is a sparse category in Spanish, whereas *spoon* in English is a dense category.

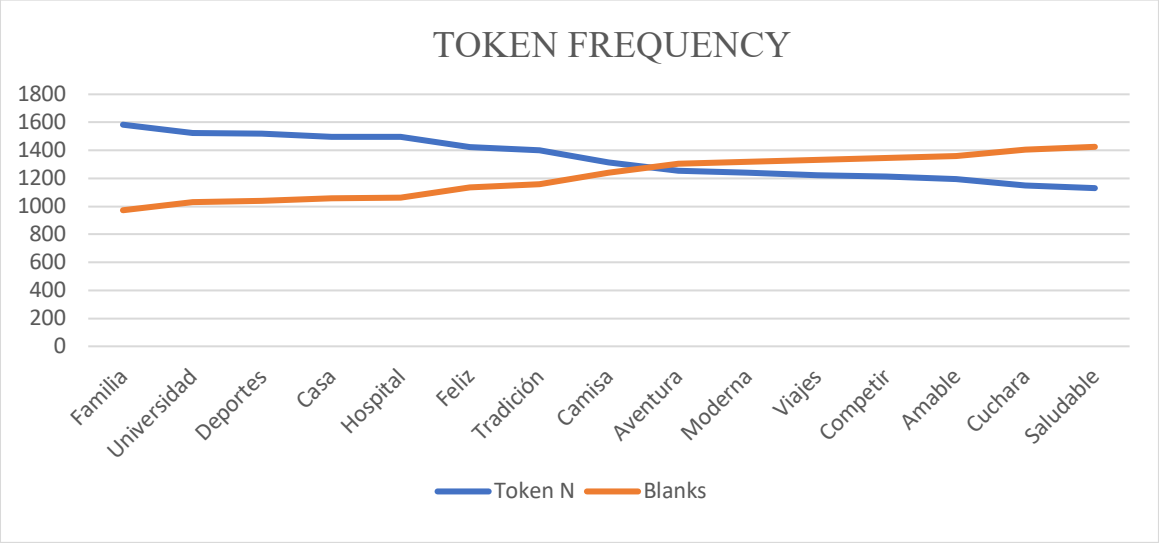
Based on the results presented in Table 5 and Table 6, the Spanish words identified as dense are more semantically robust than those identified as sparse in the learner lexicon. This mean that the students know this word well and the instructor can guide students to create relationships to other words or contexts by helping them deepen their understanding of the word and adding new vocabulary. The results indicate that words that are perceived as dense or sparse in the L2 and HL language, may not necessarily be sparse and dense in their first language. That is to say, those words that appear to be sparse are an indicator that they still need to be learned or strengthened so they are able to relate them to other words in Spanish because they are still sparse in the learner's L2 or HL language.

The second parameter utilized to observe dense and sparse semantic neighborhoods was semantic size. When analyzing semantic size, the total number of words, in English and Spanish, produced by participant for a category was taken into account. Based on the mean and median of the possible responses produced and the possible responses left blank, I established the split between dense and sparse. Those

categories that had a large semantic size, that is, more than 1,313 retrievals for that specific category, were considered to be perceived by participants as dense. Those categories in which participants left more responses blank (over 1,242, cf. Graph 3), and were therefore smaller, were consider sparse.

Graph 3

Categories organized by semantic size based on NoA by participants.



Graph 3 shows Spanish categories organized by total number of associative items in Spanish and English for each of the provided Spanish categories and the number of answers left blank for those categories. For example, for the category *deportes*, participants produced 1,517 number of associations in English and Spanish and left 1,038 possible answers in blank. When measuring the semantic size, I took into account words in both languages because even if responses were in English, it showed that participants are familiar with, or may roughly know, the meaning of the target word and it is somehow part of their existing vocabulary repertoire. For example, one participant responded *socks* to the category *camisa* (English "shirt"), which indicates that this student recognizes the word *camisa* and is aware that it is semantically related to items of

clothing; however, s/he may not know how to say *calcetines* (English "socks") yet. In terms of teaching, the instructor could create a speaking activity (e.g., Bingo) in which students could make explicit relations to the items of clothing that students have in class by combining dense and sparse vocabulary items to contribute to their lexical expansion.

As shown in Graph 3, there is a correlation between the number of individual words that participants were able to produce for a category and the number of answers left blank. Those words that were categorized as dense presented a higher number of semantic tokens per category than the number of spaces left in blank. Thus, a category, such as *familia* (English "family"), was considered to be dense because participants produced 1,583 tokens in Spanish and English and left 972 answers blank, whereas for a category, such as *amable* (English "kind"), was considered to be sparse because participants produced 1,195 semantic tokens and left 1,360 answers blank (cf. Graph 3 above).

Additionally, Graph 3 shows where there is a split between those categories considered to be dense versus those considered to be sparse. The categories *camisa* and *aventura* fell in the middle of the split. In order to confirm if those categories were to be considered either dense or sparse, I calculated the median and average for both the number of semantic tokens and the number of blanks. Additionally, I examined the correlation between those two numbers, that is, if the number of blanks was higher than the number of semantic associations, I considered that category to be perceived as sparse. Thus, in the case of *camisa* (English "camisa"), not only did this category match the threshold value of semantic associations and blank spaces, the number of semantic tokens (1,313) was higher than the number of blank answers (1,242), and for this reason,

it was considered to be dense. On the contrary, *aventura* fell below the threshold value and had a higher number of blanks (1,302) than semantic associations (1,253) and was considered to be sparse.

Based on the results in Graph 3, and in agreement with Samuelson and Smith (2000), words with large semantic size might benefit word learning because the integration of the newly formed semantic representation with the already known semantic representations may enrich the semantic representation of a novel word. When considering how this information can be used for teaching purposes, instructors can use this to their benefit by building on and emphasizing the contextual diversity of the word and how it could be applied to different situations.

Finally, the third parameter observed as part of the coding to differentiate between dense and sparse was the number of lemmas in Spanish for each of the categories. Regarding the third parameter, semantic richness, the variability and amount of semantic information for each category was measured based on the type frequency of entries in Spanish (plus entries left blank, that is, when no word was inserted) and lemmas. Lemmas display the robustness of the concepts and the degree of language variation inside the lemma. They also contribute to the understanding of how semantically rich each of those categories are (Hay & Baayen, 2005; Traxler, 2011, pp. 23-24).

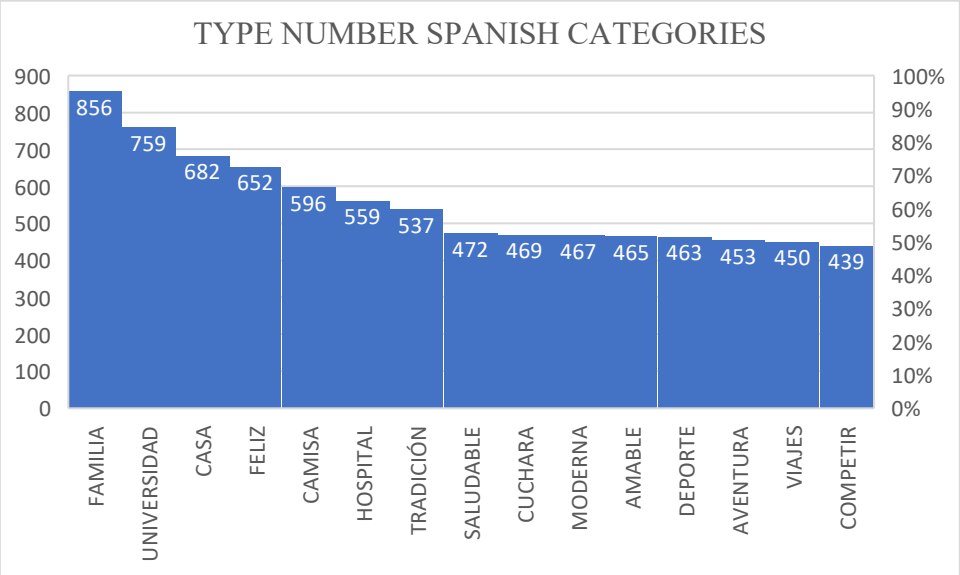
Type Frequency in Spanish.

Semantic richness reflects the variability of information within the meaning of a concept. Words that are semantically rich contain high degrees of semantic information and this elicits more meaning related associations (Pexman, Hargreaves, Siakaluk, Bodner, & Pope, 2008; Yap, Lim, & Pexman, 2015). Furthermore, semantic richness can

be defined in many ways. As such, previous studies such as Yap, Pexman, Wellsby, Hargreaves, and Huff (2012) argued that there are six dimensions by which semantic richness can be explored: the number of features, semantic density, the number of senses (i.e., number of meanings), the number of distinct first associates, the imageability (i.e., to what point this word evokes the image of other objects or events), and the body-object interaction (i.e., to what point the human body can interact with that object). In other words, semantic richness measures the robustness of a concept. For this study, based on the above-mentioned dimensions, I have examined the semantic richness of the categories provided in Spanish by identifying the type-token ratios in Spanish. That is, I observed the unique word forms produced by all participants, and the number of lemmas (i.e., *comes*, *comer*, *comiendo* (English "eats, to eat, eating," respectively) are forms considered to be part of the same lexeme) in which those type-token ratios could be part of the same concept.

Graph 4

Measures of Semantic Richness: Type Frequency in Spanish



Graph 4 shows Spanish categories ranked from the highest number of type frequency to the lowest. The numbers in each bar indicate the total number of type frequency for that category. For instance, for the category *feliz* (English "happy") participants produced 652 type counts whereas for *competir* (English "to compete"), they produced 439 type counts. Thus, *feliz* is considered to be semantically richer than *competir*.

Furthermore, the results in Graph 4 also show that, based on type frequency in Spanish, the following categories were perceived as dense by both the L2 and HL populations: *familia, universidad, casa, feliz, camisa, hospital,* and *tradición* (English "family, university, house, happy, shirt, hospital, and tradition," respectively). The only category that was sparse and did not match the results in parameters 1 and 2 was *deportes* (English "sports"). In parameter 1, *deportes* was identified as a highly dense neighborhood in Spanish because it achieved nearly all the possible situations/criteria

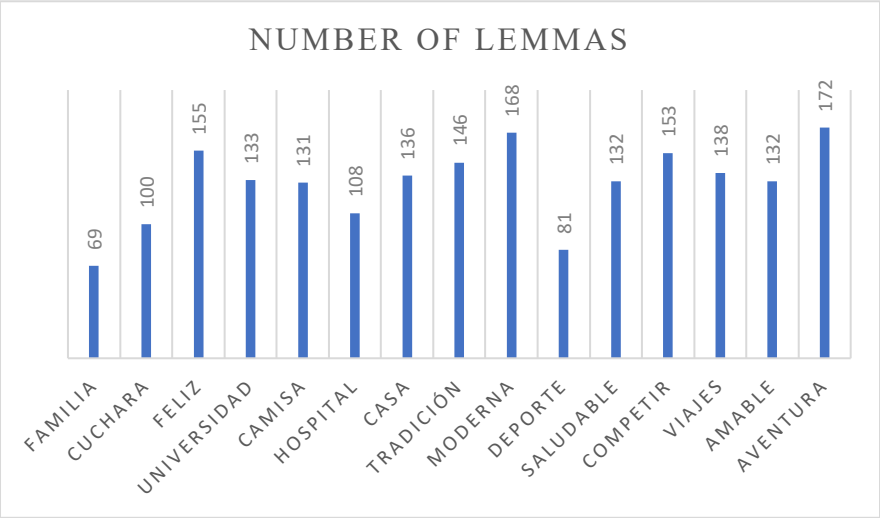
except for one: 1) 23% of the participants produced 5 Spanish items (above 17%), 4% of the participants responded 4 answers in Spanish (above 3%), 6% of the participants responded 3 answers in Spanish (above 4%); 2) 53% of the participants produced 5 associations (in English or Spanish) which is above the 44% threshold, and 57% of the participants did not leave all categories blank; and, 3) in this category only 28% (less than 47%) left the five possible answers blank. The only aspect that did not match the threshold was the criteria in English because more than 27% of the participants (i.e., 31%) provided 5 responses in English for this category. In parameter 2, it was also found to be dense because participants produced 1,517 tokens (above the threshold of 1,313 tokens) and left 1,038 possible responses blank (below the threshold of 1,242 tokens). A possible explanation as to why *deportes* was identified as sparse in parameter 3 is because, when analyzing type frequency and lemmas, any of the words that were the same in English and Spanish were not taken into account. Thus, for the category *deporte*, participants produced several items that were the same in Spanish and English, such as "golf".

Lemmas in Spanish

As previously noted, the third parameter, semantic richness, was measured by two aspects: 1) type frequency in Spanish and possible answers left blank and 2) the inspection of lemmas. The following paragraphs review the analysis of lemmas encountered based on participants' answers to the Spanish categories.

Graph 5

Lemmas encountered in Spanish Categories.



Graph 5 shows the number of lemmas identified for each category. The results show great variability and it is difficult to argue the relationship between lemmas and density. However, one key aspect Graph 5 shows is that semantically dense categories may display a smaller number of lemmas. For example, *familia* (English "family") had the highest number of type frequency reported in Spanish (856) and the lowest number of lemmas (69). One of the possible reasons is because the category *familia* contains emotional meaning and it is more dense than other categories because participants are able to produce many associations and many of those associations contain the same lemma (e.g. *el hermano, hermano, mi hermano, hermana* etc. (English "the brother," "brother," "my brother," "sister," respectively). Emotion plays a significant role in attention, learning, memory, and the development of concepts. Consequently, words that contain emotional meaning, whether positive or negative, are recalled earlier than those which are neutral (Altarriba & Bauer 2004; Vigotski, 2007)

However, as observed in Graph 5 above, *moderna* (English "modern") had 467 type tokens and 168 lemmas. This may indicate that this category is perceived in the L2

and HL language as less semantically rich as well as less semantically dense because there is a low number of items produced in Spanish for this category. It may also indicate that all the semantic retrieved items may be spread around the neighborhood in very small lemmas. One aspect I believe lemmas can show is the distance inside of the category and which retrievals are more prototypical and which ones are more peripheral. Prototypical items will probably be closer to the neighborhood and non-prototypical items will possibly be further from the neighborhood. In terms of learnability, this may mean that, as previous research has claimed, adults learn novel word with similar semantic instances faster than those with diverse semantic instances (Hahn, Bailey, & Elvin, 2005).

In sum, in order to study the pre-existing structure of semantic neighborhoods and how Spanish language learners process Spanish vocabulary in terms of semantic relatedness, I analyzed data distribution based on three main parameters: 1) descriptive statistics (i.e., mean and median) of numbers of semantic associations (NoA) for both Spanish and English, number of associations in Spanish, and number of responses left blank; 2) semantic size based on number of tokens; 3) semantic richness based on number of types in Spanish. I examined neighborhood density through these three different parameters in order to deliver high reliability and consistent results (Cozby & Bates, 2012). As seen above, these parameters concur and indicate variation in semantic density in vocabulary words introduced in L2 and HL classrooms. The following research question explores L2 and HL vocabulary building via semantic relatedness in Spanish by looking at participants' retrievals and explores if these two populations retrievals differ or not.

Research Question #2- Semantic Relatedness in the L2 and HL learners

RQ #2: How do Spanish language learners build vocabulary in Spanish?

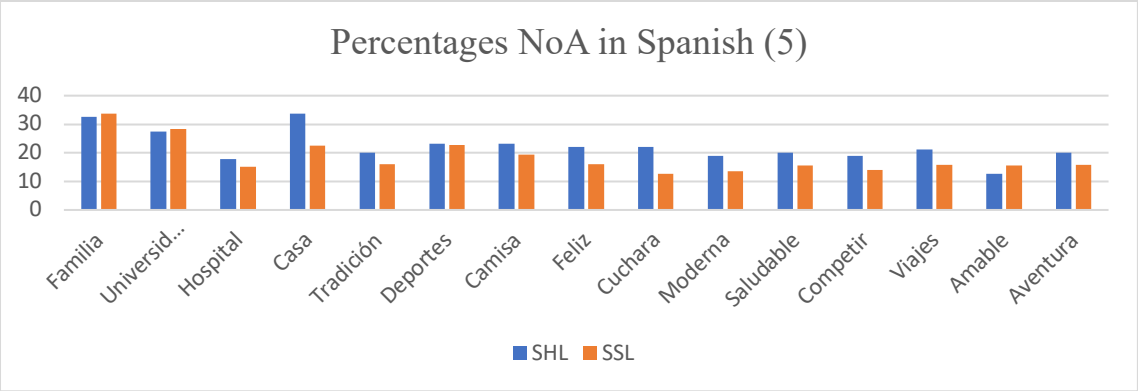
a. Is there a difference between the semantic networks in Spanish Second Language (L2) Learners and Spanish Heritage Language (SHL) Learners? If so, how does semantic neighborhood density differ across these two groups?

Before addressing the response to Research Question 2, I will first review the unique characteristics of Spanish L2 and Spanish HL learners. As mentioned in Chapter 2, L2 and HL learners have different ways of acquiring and developing the language, even though both are English dominant speakers. For many HL learners, the language they grow up with and learn in the home, in this case Spanish, is different from the hegemonic language used in their environment (Valdés, 2001). Gass and Selinker (2008) claimed that heritage language acquisition is a mixture between second language and bilingual language acquisition (Kagan & Dillon, 2008). Therefore, HL learners are a heterogenous group of learners with an array of diverse linguistic experiences. Conversely, L2 learners acquire the second language after their first language or native language has been established (Saville-Troike, 2012). For this reason, L2 learners display more homogenous linguistic experiences as they have been exposed to the second language later in life and through schooling, compared to HL learners who have been exposed to the language since early childhood in home and/or in their community (Lightbown & Spada, 2013; Polinski & Kagan, 2007).

When examining how L2 and HL learners build vocabulary, I first looked at the differences per category and scenario for each population. In other words, I compared the number of associations in Spanish and English and the number of blanks for each category for each population.

Graph 6

Percentage of each population that produced 5 NoA in Spanish



Graph 6 shows the percentages of participants that provided 5 semantic associations in Spanish for each of the following Spanish categories. Graph 6 shows that, overall, a higher percentage of HL learners (about 2% more) produced 5 Spanish associative items for each category. Graph 6 shows substantial difference between L2 and HL in certain categories such as, *casa* and *competir*. For instance, for the category *casa*, 34% percent of the HL learners responded with 5 associations in Spanish whereas 22% of the L2 participants provided 5 responses in Spanish for that same category. Likewise, in the case of *competir*, a higher number of HL participants (19%) were able to provide 5 answers in comparison to the L2 (14%).

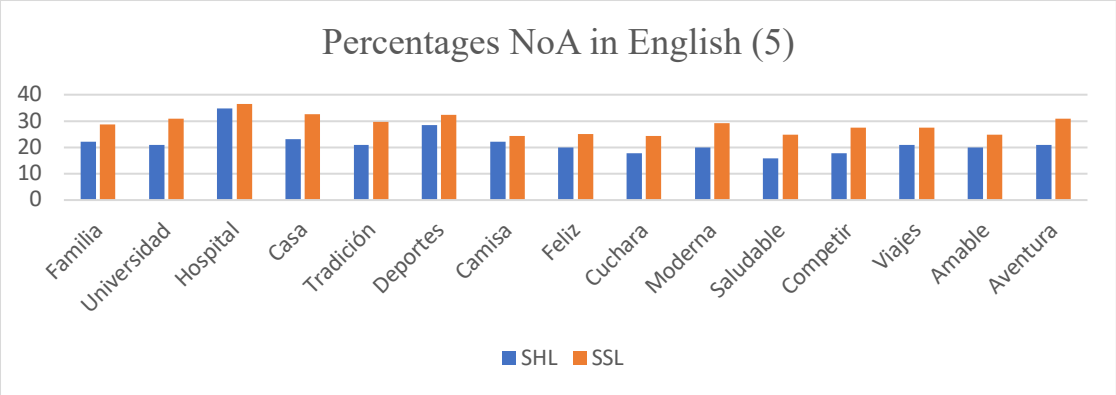
However, other categories had similar percentages of participants' responses. For example, for the category *deportes*, 23% of both participant populations (i.e. HL and L2) provided 5 answers. Finally, there were only two categories in which L2 learners slightly

outperformed their HL peers. For the category *familia*, 34% of L2 participants submitted 5 answers in Spanish, while 33% of HL learners submitted 5 answers in Spanish, and for the category *universidad*, 28% of L2 participants provided 5 answers in Spanish, while 27 % of HL learners provided 5 answers in Spanish.

In order to determine if there is a difference in Spanish word production between L2 and HL learners, I continue to examine Spanish categories by comparing the percentage of participants (L2 vs. HL) that provided all 5 possible semantic associations in English. Graph 7 below provides this comparison.

Graph 7

Percentage of each population that produced 5 NoA in English.



Graph 7 shows the percentages of participants that provided 5 semantic associations in English for each of the following Spanish categories. Graph 7 shows that in all categories a higher percentage of L2 learners produced 5 English semantic associations for each Spanish category. For example, for the category *competir* (English "to compete"), 28% of L2 learners responded with five answers in English, whereas only 18% of HL learners responded with 5 semantic associations in English. Another example where there was a great difference in English responses was for the category *aventura* (English "adventure"). For this category, 31% of the L2 participants provided 5 responses

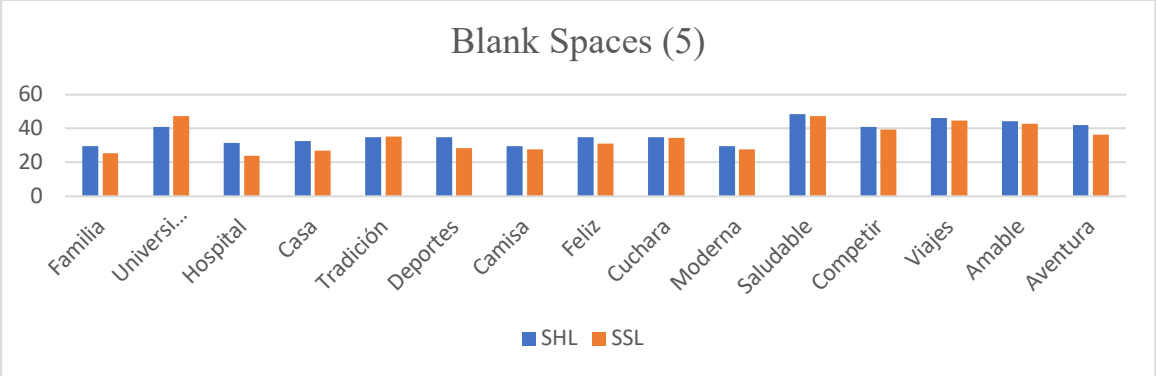
in English, while only 21% of the HL participants responded with 5 English associations. This difference was shown to be statistically significant as indicated by an independent t-test (see Table 7 below). The only two categories in which percentages of L2 and HL participants differ less was for *hospital* (English "hospital") and *camisa* (English "shirt"). For *hospital*, 37% of the L2 participants and 35% of the HL provided 5 answers in English. While for *camisa*, 24% of the L2 participants and 22% of the HL participants wrote 5 responses in English.

The combined findings from Graphs 6 and 7 identify differences in the number of responses for each population for each of the provided Spanish categories. The HL group produced more responses in the target language, especially in certain categories such as, *casa* and *competir*. One of the possible reasons why the results showed discrepancy may be due to the diverse language profile of HL learners. Perhaps some HL participants were exposed to Spanish more while growing up than other HL participants (Carreira, 2004). Regarding the English responses, results showed that L2 learners provided more responses in English than HL learners. This might be because some of the presented categories are still sparse for them in the L2, and they were able to recognize them, but were unable to produce semantic associations in the target language.

In addition to examining number of associations produced in Spanish and English, it is also important to identify what participants do not know in Spanish when reporting related words per category in the Spanish dataset. Graph 8 looks at what participants may not know as shown by the amount of responses left blank for the Spanish categories.

Graph 8

Percentage of each learner population that left 5 blank spaces blank (no response was entered)



Graphs 8 shows the percentages of participants that left the five possible answers blank, that is, provided no responses to the category. Overall, HL learners left more responses blank for most of the categories than L2 learners. Nevertheless, the difference between the percentages of each population was not big. One of the categories that shows a bigger difference is *hospital*. For this category, 32% of HL learners left all the answers blank whereas 24% of L2 learners left all possible responses blank for the same category. For other categories, such as *tradición*, the percentage of participants that left 5 blank responses was the same (i.e. 35%). Finally, *universidad* was the only category in which L2 learners showed a higher percentage of blank responses than HL learners, 47% vs. 41%, respectively.

Spelling is one of the possible explanations as to why HL learners left more responses blank than L2 learners. Research in HL acquisition maintains that some HL learners feel anxious about their writing abilities in their heritage language because they feel that it will reflect the variety of the language they speak (Torres, Arrastia-Chisholm, & Tackett, 2020). The results could also indicate that these are categories that they do not

know or that they vaguely know. In terms of learnability, instructors can identify areas for teaching more explicitly. Chapter 6 reviews in detail the implications for teaching Spanish and how instructors could teach new vocabulary to L2 and HL learners.

Additionally, in order to examine the difference between both populations when building semantic neighborhoods, I used inferential statistics to compare the results of semantic relatedness production in all Spanish categories and in all English categories. The two tables below summarize the findings for those variables in which participants statistically differ (for all of the results, see Appendix 4):

Table 7
Categories in which HL and L2 differ (Spanish Categories)

Variables in Spanish	*HL (95)*	*L2 (356)*	*T-TEST*
	Mean (SD)	Mean (SD)	P. Value
Total Spanish Cuchara	1.49 (2.14)	0.89 (1.76)	0.005 *
Total Spanish Casa	2.03 (2.37)	1.45 (2.13)	0.02 *
Total NoA Moderna	3.08 (2.30)	2.54 (2.25)	0.04 *
Total Spanish Saludable	1.46 (2.10)	0.97 (1.88)	0.03 *
Total English Aventura	1.21 (2.08)	1.74 (2.32)	0.04 *

Table 7 shows the findings obtained in an independent t-test between populations and for each of the provided Spanish categories. Results confirmed a significant difference for certain categories. For example, HL learners outperformed their L2 peers in Spanish semantic relatedness in *cuchara* [t(449) = -2.85, p = .005], *casa* [t(449) = -2.31, p = .02], and *saludable* [t(449) = -2.43, p = .03] (English "spoon," "house," and "healthy," respectively). Similarly, HL learners provided a higher number of associations in both English and Spanish for the category *moderna* (English "modern") [t(449) = -2.07, p = .04]. Alternatively, L2 learners differ from HL learners in English semantic relatedness for the word *aventura* (English "adventure") [t(449) = 2.49, p = .04].

When comparing answers for both populations in the English categories, results showed more variability of answers amongst categories. Table 8 provides a summary with all the categories in which participants answers differed (for all of the results, see Appendix 5):

Table 8

Categories in which HL and L2 differ (English Categories)

Variables in English	*HL (95)*	*L2 (356)*	*T-TEST*
	Mean (SD)	Mean (SD)	P. Value
Total Blanks Spoon	1.84 (2.29)	1.21 (2.01)	0.01*
Total English Spoon	3.07 (2.30)	3.60(2.15)	0.04*
Total NoA Spoon	3.11 (2.30)	3.79 (2.00)	0.004*
Total Blank Happy	1.94 (2.36)	1.22 (1.97)	0.003*
Total English Happy	2.87 (2.39)	3.61 (2.08)	0.003*
Total NoA Happy	3.04 (2.36)	3.74 (1.98)	0.004*
Total Blank Shirt	1.81 (2.27)	1.26 (2.02)	0.03*
Total English Shirt	3.06 (2.32)	2.59 (2.12)	0.03*
Total NoA Shirt	3.18 (2.26)	3.71(2.02)	0.03*
Total Blank Eng Hospital	1.75 (2.28)	1.21 (2.03)	0.03*
Total English Eng Hospital	3.06 (2.36)	3.67 (2.13)	0.02*
Total NoA Eng Hospital	3.26 (2.27)	3.78 (2.03)	0.03*
Total Blank House	1.65 (2.28)	1.12 (1.95)	0.02*
Total English House	3.09 (2.35)	3.60 (2.14)	0.05*
Total NoA House	3.34 (2.27)	3.82 (1.99)	0.04*
Total Blank Tradition	2.08 (2.27)	1.39 (2.01)	0.004*
Total English Tradition	2.80 (2.29)	3.50 (2.09)	0.005*
Total NoA Tradition	2.87 (2.28)	3.62 (2.01)	0.002*
Total Blank Modern	2.04 (2.30)	1.51 (2.08)	0.03*
Total English Modern	2.86 (2.32)	3.39 (2.16)	0.04*
Total NoA Modern	2.97 (2.30)	3.48 (2.08)	0.04*
Total Blank Healthy	1.76 (2.26)	1.20 (1.99)	0.02*
Total English Healthy	3.12 (2.31)	3.69 (2.08)	0.02*
Total NoA Healthy	3.24 (2.26)	3.81 (1.98)	0.02*
Total Blank Traveling	1.72 (2.32)	1.24 (2.04)	0.05*
Total English Traveling	3.13 (2.34)	3.63 (2.15)	0.05*
Total Blank Kind	1.89 (2.28)	1.39 (2.03)	0.04*
Total NoA Kind	3.11 (2.28)	3.61 (2.02)	0.04*
Total Blank Adventure	2.01 (2.30)	1.33 (2.05)	0.005*
Total English Adventure	2.94 (2.31)	3.59 (2.11)	0.01*
Total NoA Adventure	2.99 (2.30)	3.68 (2.04)	0.004*

Table 8 displays the results obtained in an independent t-test between populations for each of the provided English categories. As we can observe, in general, L2 participants responded with a higher number of semantic associations than HL learners. Overall, Spanish HL learners left more spaces blank than L2 learners when responding to the English categories. This could be an indication that these categories for HL learners may be less dense than for their L2 peers.

Results in Table 7 and Table 8 are noticeably different. In Table 7, where participants had to provide associations in Spanish for each of the Spanish categories, their results only differed statistically for five categories. However, when responding in English to English categories, results were significantly dissimilar in most of the variables. One possible reason for why there was such a considerable difference is the participants' degree of bilingualism. When exposed to the Spanish categories, HL learners provided more numbers of associations in Spanish and in general. However, L2 provided more answers in English to the word *aventura* (English "adventure"). As mentioned above, this could be related to the perceived density of those categories. In the case of the HL learners, *cuchara, casa, moderna*, and *saludable* (English "spoon," "house," "modern," and "healthy," respectively) may be denser in Spanish than for the L2 learners. On the other hand, it could be that *aventura* was perceived as a sparse neighborhood by the L2 participants and, for this reason, they produced their answers in English. Regarding the results in Table 8, HL learners left more answers blank than their L2 peers. This, as previously stated, could be related to HL learners' self-efficacies in writing in either language. Additionally, L2 learners provided a higher number of semantic associations (NoA) and retrievals in English for most of the English categories.

This could be an indicator that those categories in English, their L1, are more dense than those for the HL learners who are to some degree bilingual.

To conclude, in order to study how L2 and HL learners build vocabulary via semantic relatedness, and if there is any difference between these two populations when building vocabulary, I first looked at the percentages of L2 and HL participants that provided five Spanish and English responses to the Spanish categories provided in the task (*familia, cuchara, camisa*, etc. [English "family, spoon, and shirt, etc.," respectively]) in order to examine the perceived density of those given words by each population (see Graphs 6 and 7). Additionally, I also explored what participants may not know by analyzing the percentage of participants that left 5 blank responses for each of the Spanish categories. Finally, I conducted independent t-tests to observe those categories in which L2 and HL participants significantly differed. As discussed above, overall results show that HL participants provided more Spanish semantic associations for those Spanish categories, whereas their L2 peers provided more English semantic associations for both Spanish and English categories, and HL learners left more responses blank for both Spanish and English categories than L2 learners.

The next research question explored the process of meaning making for both learner populations by examining the different language profiles and the linguistic variation in their vocabulary retrievals.

Research Question #3-Meaning-Making Processes and SND

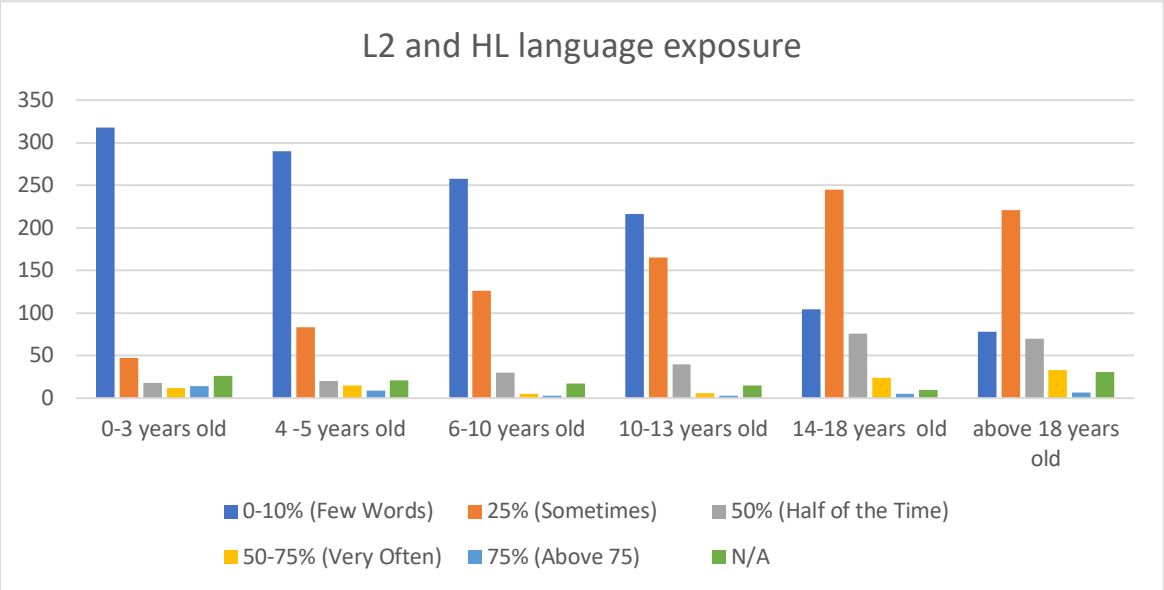
RQ #3: What is the nature of the meaning-making process when building vocabulary when learning a Heritage Language and a Second Language?

a. How does Vygotsky's meaning-making approach contribute to understanding and analyzing the formation of semantic neighborhoods (SN) in Spanish L2 and HL populations?

As discussed in chapter 3, in order to acknowledge the origins of vocabulary development in L2 and HL learners, I examined how L2 and HL learners construct meaning (Vigotski, 2007). In order to address this, I first studied their language exposure during the critical periods of their life (i.e., infancy, early childhood, school age, puberty, and adolescence) and then explored their vocabulary retrievals for the Spanish categories in the form of a word cloud. As Mahn (2003) argues, the stages and critical periods that an individual goes through may be culturally influenced, that is why I adapted Questions 11-16 based on the school system of the United States (see Appendix 1). According to Vygotsky (1998), these critical periods are essential to the understanding of the process of language development because during these critical periods there are qualitative changes at the personal, physical, mental, and social levels that influence the individual construction of meaning and development of concepts (Mahn, 2003). Graph 9 below shows the participants' responses to language exposure during critical periods from childhood to adulthood.

Graph 9

Percentage of Spanish Exposure by Age



Graph 9 shows six critical periods (adapted from Vygotsky,1998) in which participants indicated their Spanish language exposure for each of these critical periods. Second Language participants' language exposure is mostly represented by the blue and green bars. The HL participants' language exposure is represented by the other colors: orange, gray, yellow, and light blue. These results agree with Montrul (2012) in that there is a more linear development in the language acquisition for the L2 population than for the HL language acquisition, which is more changing. As Graph 9 shows, for some HL participants, Spanish language exposure decreased over the critical periods, from childhood to adulthood (i.e. high level of exposure at age 5 to minimal at age 18). For other HL participants, Spanish language exposure was reduced during elementary and high school, that is, from ages 6 to 18, and then increased again after the age of 18. Table 9 below shows an example comparing two randomly selected L2 and HL learners' responses to their language exposure and use.

Table 9

Example of responses by one L2 participant and one HL participant to language exposure and use

QUESTIONS	L2	HL
Gender	Female	Male
Age	19	21
Number of yrs USA	19	21
Studied in Spanish Country	No	No
Fluency in Spanish	Confident in Basic Conversation	Only Know Some Words and Expressions
Fluency in English	Very Confident in Extended Conversations	Very Confident in Extended Conversations
Mother Language	English	English
Father language	English	N/A
Language in Elementary School	English	English
Language in Secondary School	English	English
Exposure to Spanish at 0-3 yrs old	Few Words (0-10%)	Sometimes (25%)
Exposure to Spanish at 4-5 yrs old	Few Words (0-10%)	Sometimes (25%)
Exposure to Spanish at 6-10 yrs old	Few Words (0-10%)	Few Words (0-10%)
Exposure to Spanish at 10-13 yrs old	Few Words (0-10%)	Few Words (0-10%)
Exposure to Spanish at 14-18 yrs old	Sometimes (25%)	Few Words (0-10%)
Exposure to Spanish at Above 18 yrs Old	Sometimes (25%)	Sometimes (25%)
Speaks Spanish and English with	N/A	Colleague at Work
Speaks Spanish with	N/A	Colleague at Work

Table 9 provides an example of two participants' answers to the background section of the questionnaire (refer to Appendix 1 to see full questionnaire). As we can observe, in the case of the L2 learner, her language acquisition linearly increases over the years from infancy to adulthood. It seems that during her years of secondary education,

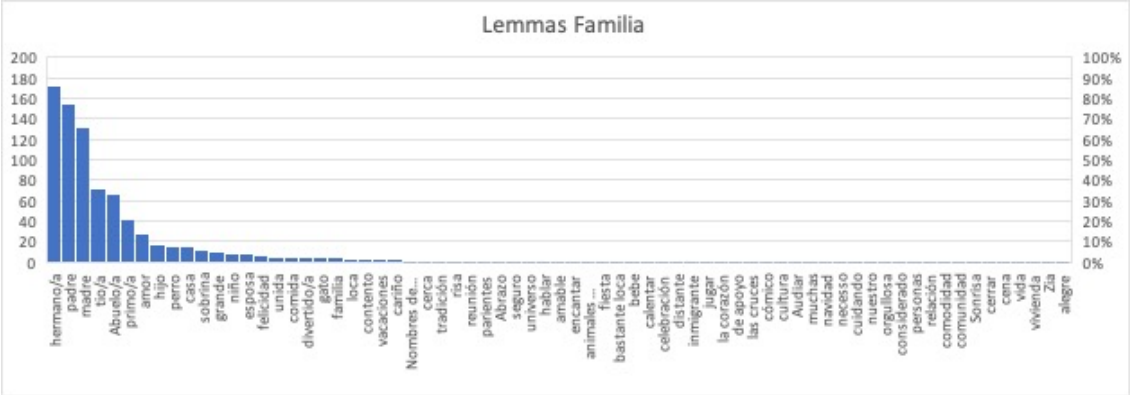
she was more exposed to Spanish. This could be attributed to the fact that many high schools in the United States offer Spanish as a second language. On the contrary, for the HL participant, his exposure shows to be less linear. He indicated that he had some exposure in Spanish during his infancy, before age 5, but indicated that his exposure to Spanish decreased during the critical ages, from age 6 to 18, which coincides with the major schooling years from kindergarten to college. This could be attributed to the fact that, as some researchers have pointed out (e.g., Alarcón, 2010), in many schools in the United States, where English is the dominant language, heritage language learners are underserved. Therefore, he might have not had the opportunity to have access to a heritage language program or differentiated instruction from K-12. Consequently, this could have made him postpone any sort of formal education in his heritage language to the university level where there is a wider range of opportunities.

Another reason could be related to the cultural and emotional experiences that the HL participant encountered while growing up. This could be related to the imposition of English-Only policies that fomented different types of punishment (e.g., corporal punishment) until 1968 that resulted in many Spanish speaking family members (i.e., parents and grandparents) not passing the language to their children and not encouraging them to learn Spanish in school (Collier & Thomas, 2009). Vygotsky uses the concept of *perezhivanie* to explain development. *Perezhivanie* "refers to the way people perceive, emotionally experience, appropriate, internalize and understand interactions in their social situations of development" (Mahn, 2012b, p. 111). Thus, the experiences that both L2 and HL learners bring into learning a language will shape their meaning-making processes.

In sum, Graph 9 and Table 9 provide a holistic view of participants' language profiles and contribute to the understanding of meaning-making by the L2 and HL participants. By means of examining the social, cultural, and historical processes that are a part of the individual learner's development, we capture the formation of semantic neighborhoods in Spanish by each L2 and HL learner better.

Graph 10 provides an example of participants' lemmas for the category *familia*. In order to better grasp participants' responses in Spanish, these were analyzed in a more qualitative manner by looking at the different patterns and categorizing them into lemmas. This way, Spanish retrievals were examined more deeply, and this informed me of what participants know and do not know, as well as their language variation.

Graph 10
Example of Category Familia



Graph 10 shows the lemmas encountered for the category *familia* based on the type frequency produced by all participants for this Spanish category. Graph 10 shows that lemmas such as *madre, hermano/a, padre, abuelo/a, primo/a*, and *tío/a* (English "mother", "sibling," "father," "grandparent," "cousin," and "uncle/aunt," respectively) are more salient than others, such as *comunidad* (English "community"). For example,

the lemma *hermano* (English "brother") was formed by 172 participants' retrievals whereas other categories were less salient, such as *felicidad* (English "happiness"), which had 7 instances. Furthermore, Graph 10 shows that participants produced more type tokens for emotional words than concrete or abstract concepts.

For this study, I adapted the differentiation among emotion, concrete, and abstract words as in Altarriba and Bauer (2004) because I believe it is important to distinguish between words that contain affective meaning and those that do not contain affective meaning. This differentiation is especially important when examining participants' responses and understanding the relationship between everyday and scientific concepts in order to develop and expand the vocabulary repertoire of L2 and HL learners (Vigotski, 2007). For this study, emotion words are those that contain affective meaning, emotional experience (e.g., pleasure or unpleasure), and low, medium or high arousal components, such as *anxious* and *father*. Concrete words, such as *cup* and *flower*, are those that are used to describe something that can be perceived by our senses (e.g., smell, touch). Finally, I refer to abstract words as those that define concepts that are independent from material objects (i.e., *wealth* and *height*) (adapted from Altarriba & Bauer, 2004, p.392).

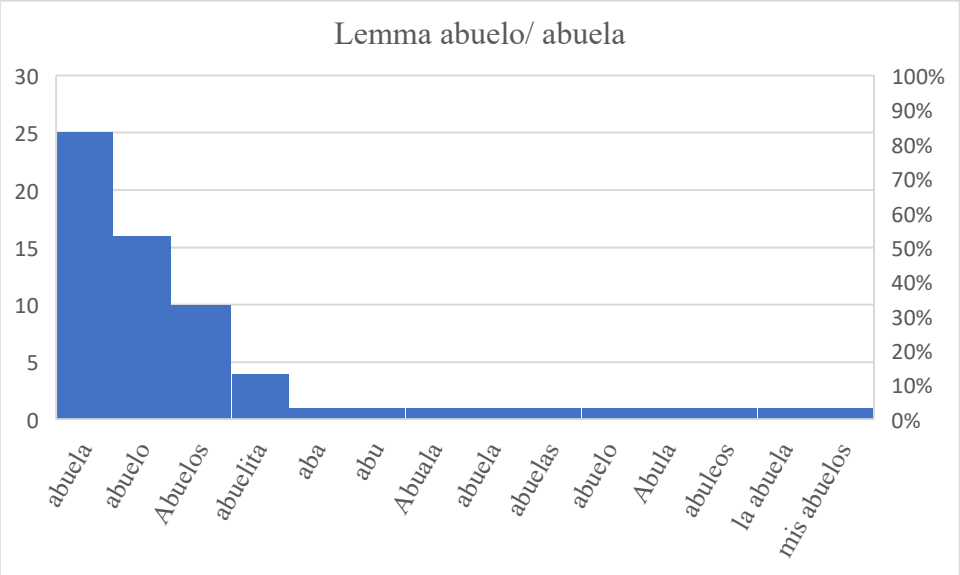
For example, 154 instances were produced for the concept *padre* (English "father"), one instance was produced for *personas* (English "people/ persons"), and one for *relación* (English "relationship"). According to Altarriba and Bauer (2004), concrete concepts are better recalled than abstract ones. However, emotion words are better recalled than either concrete or abstract words because they "activate different levels of concreteness, imageability and context availability relative to both abstract and concrete words" (p. 407).

This explanation coincides with Vigotski (2007) when he considers the individual's *Perezhivanie* in the qualitative transformations in the development of the system of concepts. As discussed in Chapter 3, everyday and academic concepts take opposite paths of development, but instructors can use everyday concepts, which contain more emotional meaning, to develop more scientific concepts (i.e., novel concrete or abstract academic concepts). Graph 10 examines an example of a lemma where we can observe everyday concepts that L2 and HL participants bring into the classroom.

When examining the lemmas encountered in each category, I noticed there were some linguistic variation among participants' responses that deserved to be examined. Therefore, to learn more about participants' retrievals, Graph11 shows an example of a more detailed analysis of one of the lemmas from the category *familia*. I have chosen the word *abuelo/abuela* to show this example because it is a word that contains affective meaning. In order to understand the individual *thinking*/*languaging* system, as well as the processes of meaning making, Vigotki (2007) highlights the importance of looking at an individual's biological, social, emotional, and educational experiences as part of the development of an individual's system of concepts. Words, such as *abuelo/a* (English "grandfather/ grandmother"), contain emotional value and everybody has a different sense of what this word means (Mahn & John-Steiner, 2012, p. 46)

Graph 11

Example of lemma abuelo/a for the category familia



Graph 11 shows an example of the different items produced for the lemma *abuelo/a* (English "grandfather/grandmother") by the L2 and HL participants. This example shows how a lemma can have many possible answers and inform us of participants' linguistic variation. For example, *abuelita* is a Spanish term that shows affection and is commonly used by many Spanish speaking families. We can also observe that someone also produced the word *abu* for *abuela*. In many Spanish speaking families, the use of nicknames, such as *abu*, to address grandparents is very common. For example: *yayo*/*yaya* (Spain), *nona*/*nono* (Argentina, Uruguay), *tata*/*tato* (Chile, Spain), *nana*/*nano* (Chile), etc. In terms of learnability, instructors can use this information not only to empower students' variations but to introduce new terminology and talk about the importance of language variation in Spanish. This aspect is very important, since the United States has a long history with the Spanish language and students need to be aware

of the linguistic diversity of Spanish speaking communities that live in and outside of the United States.

Additionally, in order to examine the different linguistic forms that participants produced, I looked at participants' answers in the form of word clouds. The different word clouds allowed me to identify patterns that were difficult to observe in a table or graph. For example, the word clouds organized words by type frequency making the words with more exemplars bigger and closer to the center. After these word clouds were created, I could the identify trends and which words stood out more than others. Since I am examining semantic neighborhoods, word clouds illustrate what a neighborhood looks like and which words are closer and which ones are more distant. I also included word clouds because it allows me to compare semantic neighborhoods between participants and have a holistic view of their retrievals in English and Spanish.

As part of my analysis, I used word clouds as another method of analyzing language variation and participants' responses. Clouds 1 and 2 below constitute an example of a dense category (*universidad*) and a sparse category (*competir*) to explore the responses for these categories to understand how neighborhood density informs us of learners' vocabulary repertoires.

Figures 5 and 6

Comparison of dense category Universidad (Cloud 1) versus sparse category Competir (Cloud 2).

Figure 5

Word Cloud 1 for dense category Universidad

1

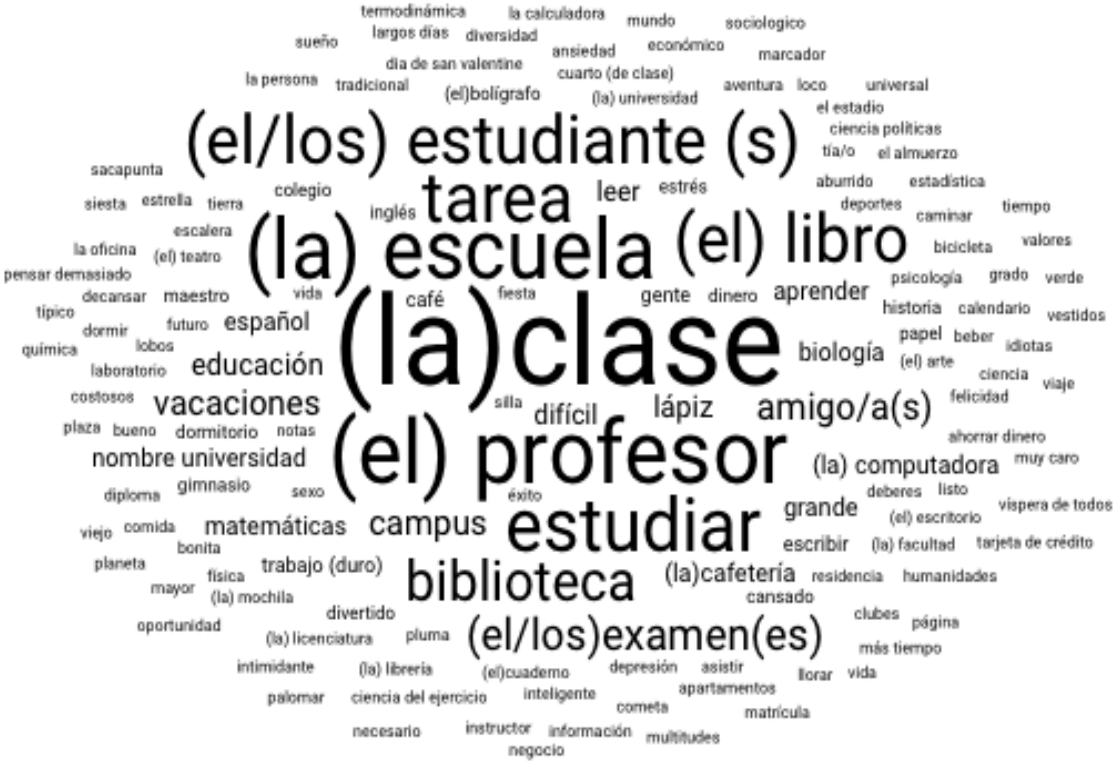
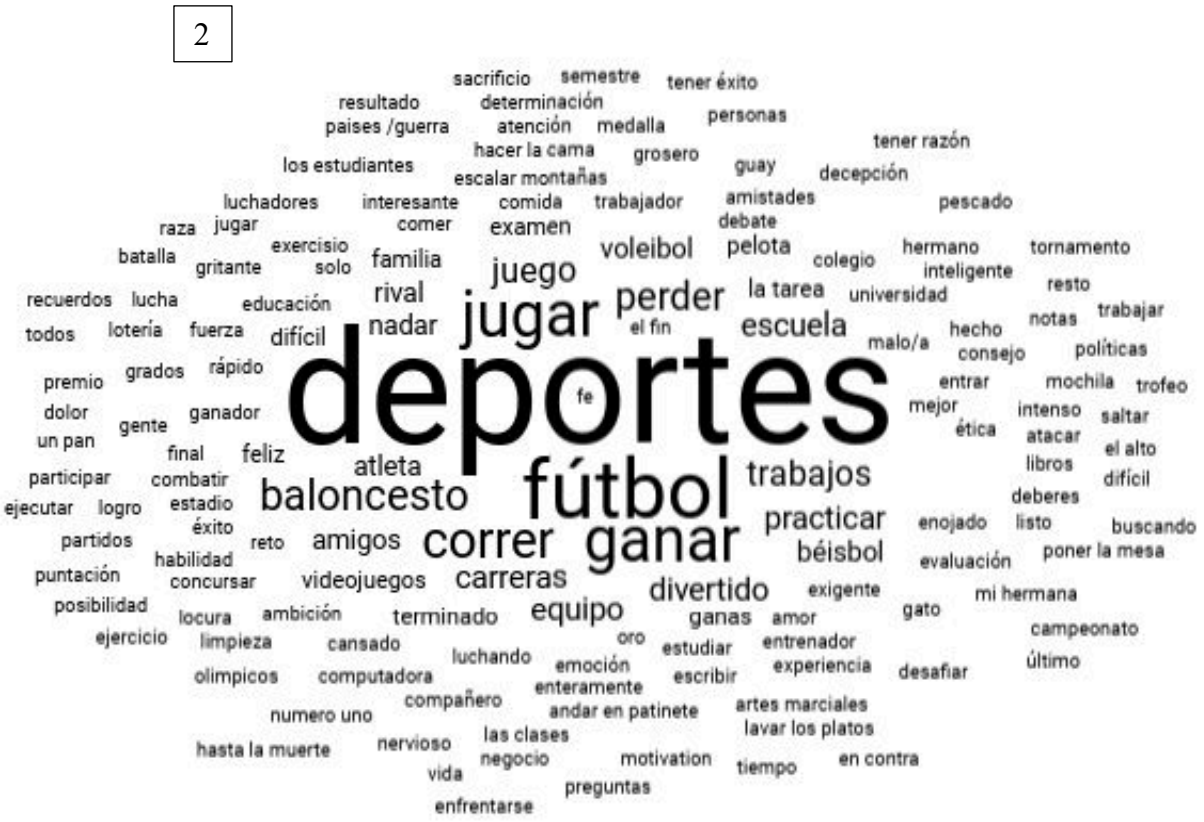


Figure 6

Word Cloud 2 for sparse category Competir



Figures 5 and 6 show L2 and HL retrievals in Spanish for a dense category (*universidad*) and a sparse category (*competir*). Figure 5 (word cloud for dense category *universidad*) presents all responses from L2 and HL to the category *universidad* (English "university"). As we can note, Figure 5 is more dense because it shows more prototypical elements closer to the center and to other semantically related words. As mentioned above, word clouds allow a researcher to detect salient patterns and trends. In Figure 5 several participants provided noun phrases (i.e., determiner + noun) instead of a noun produced in isolation. For example, there were four instances of *la biblioteca* and two instances of *los estudiantes*. This is an indication that these students probably learned this

vocabulary as a chunk. It is common that Beginning-level Spanish students learn vocabulary as a chunk, that is, masculine/feminine determiner and masculine/feminine noun, because Spanish is a binary (masculine and feminine) gender language whereas English is not. Concepts are not learned in isolation and tend to appear in morphosyntactic constructions in the speech chain. The fact that these participants learned these words as chunks may mean that they have not yet identified the morphosyntactic boundaries of the constructions in which the concept appears (Bybee, 2006; Croft, 2001). As instructors, this means that we need to introduce this lexical unit out of the morphosyntactic construction to reinforce the concept. Instructors can do this by presenting the same word in different contexts (Mokhtar, Rawian, Yahaya, Abdullah, & Mohamed, 2017).

Figure 6 represents the answers provided for the category *competir* (English "to compete") which was perceived as sparse. As we can see in Figure 6, *competir* has less Spanish retrievals than *universidad*, 439 retrievals vs. 759 retrievals, respectively. Figure 6 (word cloud for sparse category *competir*) also shows that all elements are more spread out in the neighborhood, that is, they are more distant from each other and from the center, than in Figure 5. For example, we can see that there are less salient vocabulary items (those words that are bigger had higher number of instances), and words are not as close together as in Figure 5. For instance, words on the right side of the cloud (i.e. *ética*, *enojado*, *mejor* (English "ethics," "angry," and "better," respectively) are further from other concepts and the center.

In the case of Figure 5 (word cloud for dense category *universidad*), all words seem to be closer to each other and more uniformly placed. It is also noticeable that in

Figure 6 (word cloud for sparse category *competir*), *competir* had less prototypical elements (i.e., *deportes* and *jugar* [English "sports" and "to play," respectively]) associated with the given category and there is a wide variety of one instance words (i.e. *premio* and *tiempo* [English "award" and "time," respectively]) in the answers provided by participants.

Figure 5 (*universidad*) represents one of the categories perceived as dense by participants. For this neighborhood, participants produced 759 retrievals in Spanish. Conversely, Figure 6 (*competir*) was identified as sparse as only 439 Spanish retrievals were produced for this category by the L2 and HL participants. According to previous research on child and adult word learning, individuals tend to produce more words for dense semantic and phonological neighbors. Semantic and phonological density may facilitate learning because, when a new word is encountered, other phonological and semantically related words are activated, and this could have an impact on word learning (Floyd & Goldberg, 2020; Samuelson & Smith, 2000; Stamer & Vitevitch, 2012; Storkel, 2004, 2009). If we consider this information, it may help with vocabulary teaching because instructors could potentially focus first on introducing and practicing dense words and expand vocabulary in those dense categories.

To continue with the analysis of participants' responses and language variation to given Spanish categories, I explored the difference between L2 and HL participants. To do this, I took a closer look at some examples of words clouds for each type of language profile (i.e., L2 and HL learners). This analysis revealed interesting information that addresses L2 and HL learners meaning-making processes in the construction of SND. As

such, Figures 7, 8, 9, and 10 illustrate the different responses for each learner population for two categories that were found to be substantially different: *cuchara* and *saudable*.

Figures 7 and 8
Example of responses to the category cuchara by L2 learners (Cloud 3) versus HL learners (Cloud 4)
Figure 7
Word Cloud 3 for Reponses to category Cuchara by L2 Learners

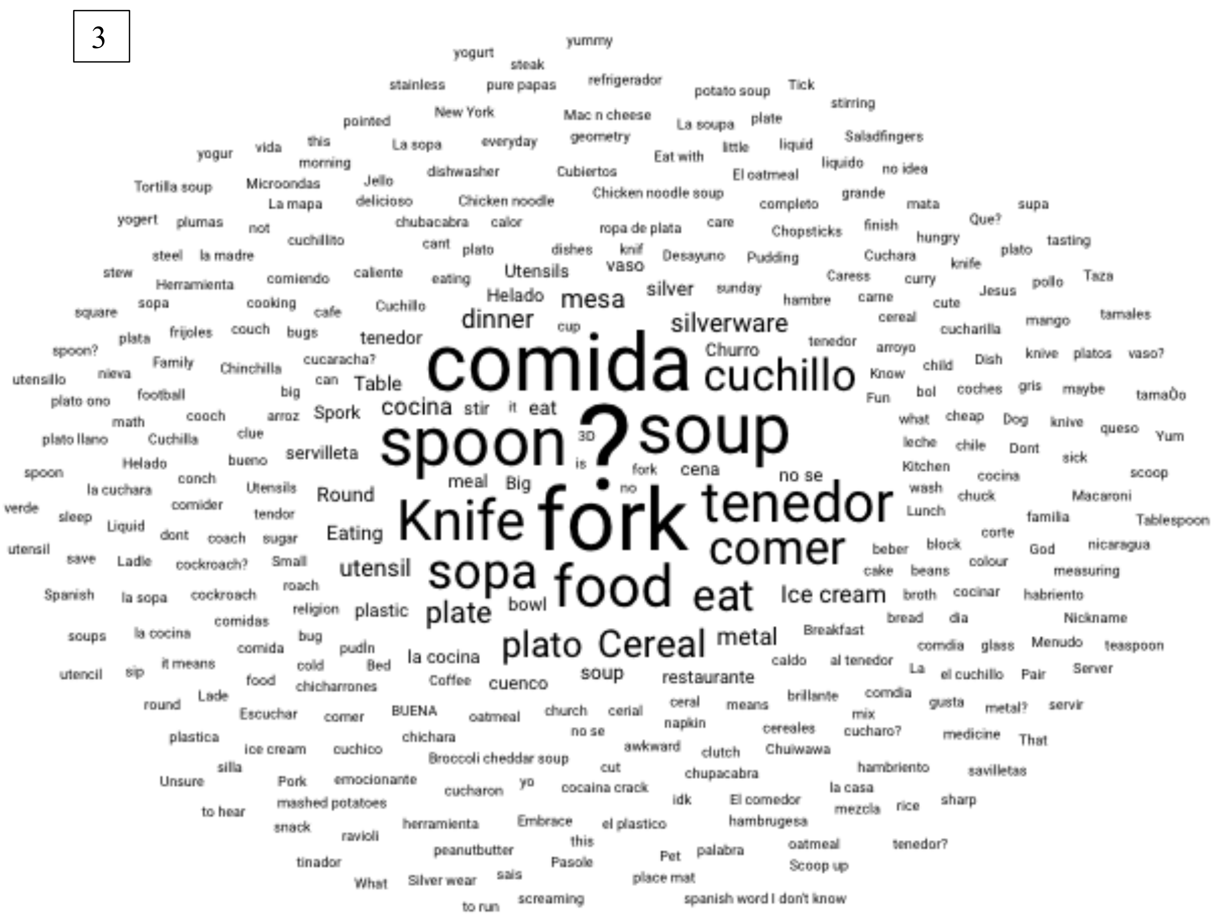


Figure 8

Word Cloud 4 for Reponses to category Cuchara by HL Learners

Figures 7 and 8 are examples of statistically different L2 and HL retrievals (HL [mean 1.49; SD 2.14] vs. L2 [mean 0.89; SD 1.76]; $p = 0.005$, see Table 7). Figure 7 represents all the answers provided by L2 learners for the category *cuchara* (English "spoon") and Figure 8 shows all the retrievals by HL learners for the same category. To address the variation of responses for the category *cuchara*, I have included all the answers provided by participants (Spanish, English, "?", etc.). As we can observe, the category *cuchara* is more semantically dense for HL learners (Figure 8, word cloud for responses to category *cuchara* by HL learners) in Spanish. In this regard, HL learners not only provided more semantic associations in the target language (i.e., Spanish), but those

associations correspond to prototypical items (e.g., *comida* and *sopa*) closer to the cue word (*cuchara*) and to other elements in the neighborhood (cf. Figure 8).

On the contrary, for L2 participants, *cuchara* is a more sparse category because L2 learners provided more answers in English (i.e., "soup" and "spoon") and their responses are more spread out in the neighborhood. One interesting pattern that I observed for both L2 and HL learners was that they wrote responses based on phonological similarity in English and Spanish. For example, HL learners phonological based associations in Spanish were *cucaracha* (English "cockroach") (1 token), *churro* (1 token), and in English, 2 participants wrote "cockroach." On the other hand, L2 learners produced 11 associations based on phonological similarity in Spanish: *chicharra* (English "cicada") (1 token), *chupacabra* (2 tokens), *chinchilla* (1 token), *Chiwuawua* (1 token), *churro* (1 token), *cucaracha* (1 token). In English, L2 participants responded *church* (2 token), *coach* (1 token), and *cockroach* (2 tokens). Similarly, participants used the same phonological strategy in other categories when unsure about the word meaning. For example, in the following clouds, Figure 9 and Figure 10, participants also related a similar sounding word to produce a semantic association (i.e. *saludable*-salute)

Figures 9 and 10

Example of Responses to the category Saludable by L2 learners (Cloud 5) versus HL learners (Cloud 6)

Figure 9

Word Cloud 5 for Reponses to category Saludable by L2 Learners

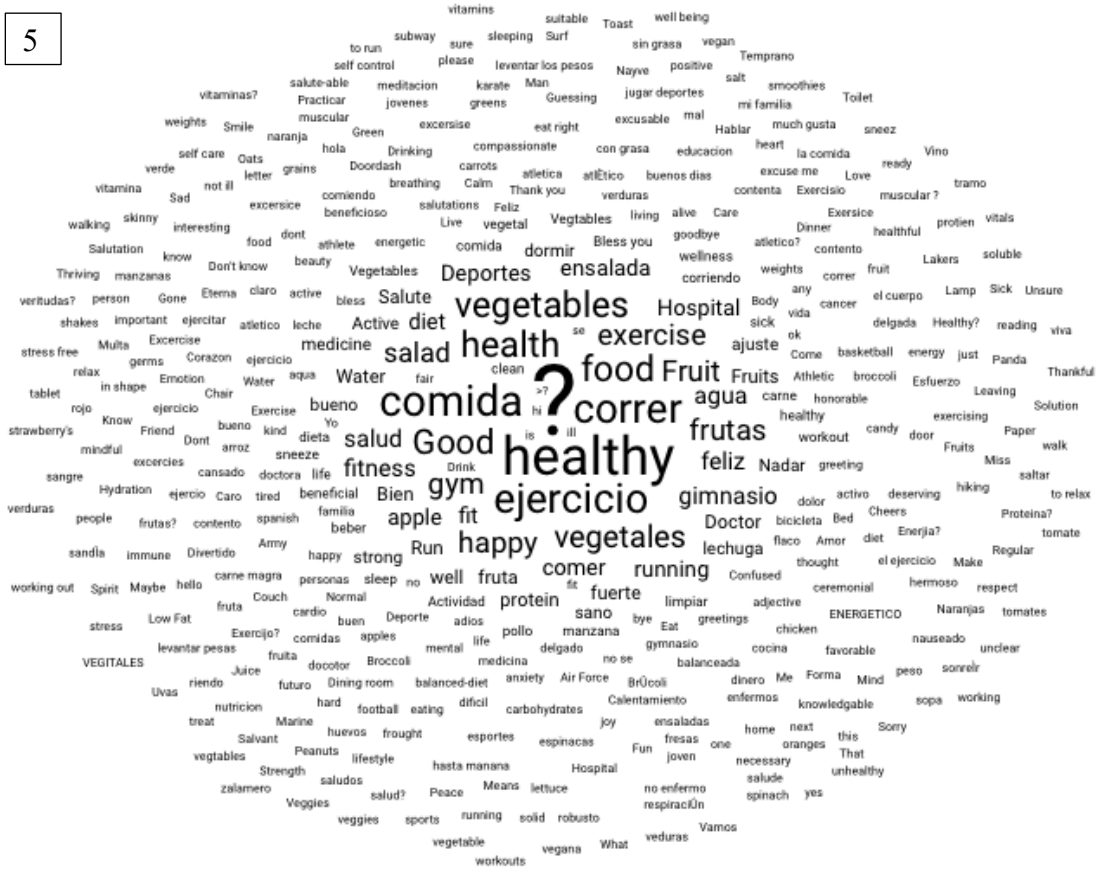
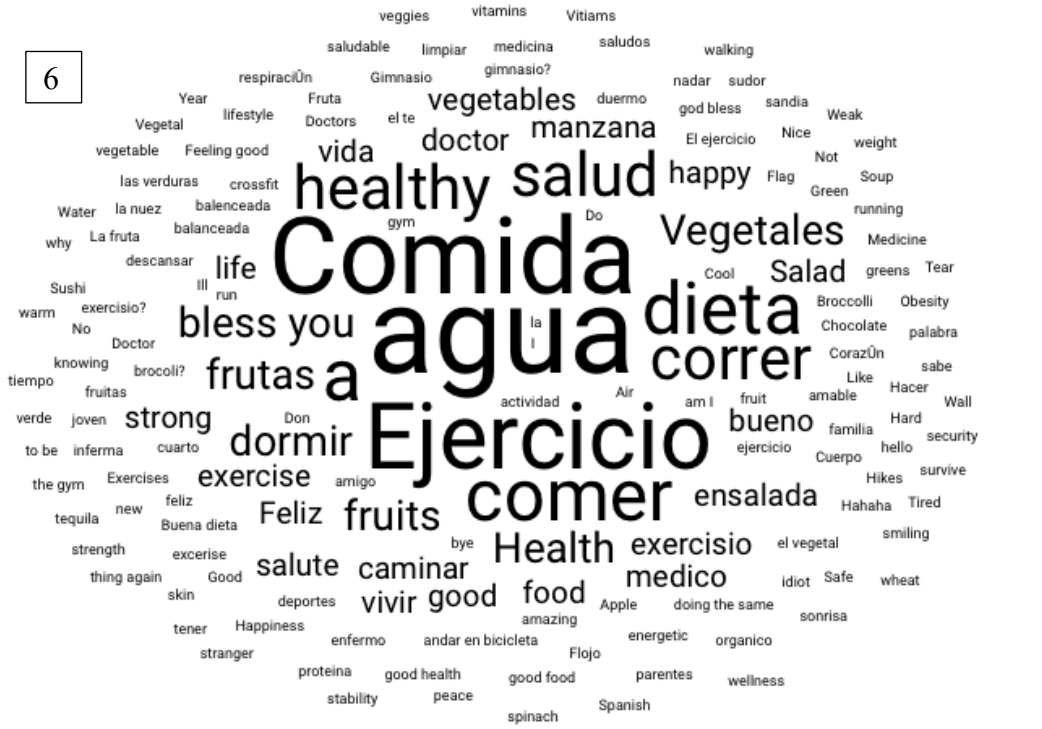


Figure 10

Word Cloud 6 for Reponses to category Saludable by HL Learners

6



Figures 9 and 10 illustrate the responses provided by L2 and HL to the category *saludable* (English "healthy"). Similarly, to what has been observed in Figures 7 and 8 above, the category *saludable* was found to differ statistically between L2 and HL learners [t(449) = -2.43, p = .03]. Cloud 9 shows all responses produced by L2 learners for the category *saludable* and Cloud 10 shows all answers provided by HL learners to the same category.

Following the same procedure as the one in Figures 7 and 8, all types of responses (English and Spanish) were considered while analyzing these neighborhoods. Figure 10 (word cloud for responses to category *saludable* by HL learners) shows that *saludable* in Spanish is a more dense category for HL learners than for L2 learners since they produced more answers in Spanish and have more Spanish exemplars closer to the target word and among themselves. Conversely, *saludable* in Figure 9 (word cloud for

responses to category *saludable* by L2 learners) is more sparse for L2 learners because they produced more answers in English to the target word and they are more spread out around the neighborhood. In L2 and HL responses for this category, I noticed, as in Figure 7 and Figure 8, that some participants made a phonological relationship to the target word. For instance, some of the L2 participants' phonological responses were *saludos* (English "greetings") (1 token), *salute* (5 tokens), *salutations* (2 tokens), *salutable* (1 token), *honorable* (1 token), *hola* (English "hello") (1 token), and *hi* (1 token). In the case of HL learners, one participant responded *saludos* and 2 responded *salute*.

Upon compiling the findings from Figures 7, 8, 9, and 10, we can observe that phonological similarity plays a role when building vocabulary in terms of semantic relatedness. It seems that when participants were unsure about the meaning of the concept, they decided to base their response on phonological similarity (e.g. *cuchara* /ku't͡ʃara /- *cucaracha* /kuka'ɾa't͡ʃa/ (English "spoon- cockroach"). There are several studies that look at the effects of cognates and false cognates in vocabulary learning in a second language. For example, Otwinowska and Szewczyk (2017) and Costa, Santesteban, and Caño (2005) argued that the effect of cognates (i.e. *dieta* /ˈdɪjɛta /-*diet* /daɪət/) and false cognates (i.e. *deporte* /deˈporte/ -*deport* /dɪˈpɔɹt/ (English "sports-deport") may impact vocabulary learning for bilinguals and L2 learners.

The linguistic proximity in terms of semantics, phonology, and orthography can provide advantages in word learning because cognates may be written and pronounced in the same manner in both languages in the native and target language, in this case, English and Spanish. However, sometimes orthography, semantics, and phonology may not

match, as is the case with false cognates, and spelling and/or phonological similarity may have a different meaning in the L2 or heritage language. When considering how this information may be considered in terms of teaching Spanish as a L2 or HL, instructors can use cognates and false cognates when preparing activities and teaching interventions that explicitly compare and contrast cognates and false cognates between English and Spanish.

To conclude, the analysis of meaning-making processes (Vigotski, 2007) and the origins of how vocabulary building develops in L2 and HL learners have been addressed in the present study by closely observing the following: 1) participants' responses to language exposure (N = 451), 2) participants' Spanish vocabulary retrievals (dense vs. sparse), and, 3) by looking at the different retrievals by population (i.e., HL vs. L2). First, I examined the responses of HL and L2 learners in the background questionnaire to learn more about their language profiles. Secondly, Figures 5 and 6 provided a general overview of the participants' responses to determine dense and sparse categories. Finally, more specific examples for each population were presented in Figures 7 to10 to provide a snapshot on how L2 and HL participants' answers differed.

In the section on language exposure presented earlier in this chapter, results showed that HL and L2 learners are exposed to the language differently while growing up. In the case of the HL learners, their exposure to Spanish can vary due to the degree of Spanish that they encountered while growing up. However, HL learners that participated in the present study seemed to share less exposure to their heritage language during their primary and secondary education. On the other hand, L2 learners have had a more linear exposure to Spanish, that is, their exposure to Spanish has increased over the years,

throughout their schooling. Participants' diverse backgrounds influences the manner they build vocabulary as in most cases HL learners outperform their L2 peers by providing more Spanish semantically related words to the Spanish categories provided in the task. Additionally, HL learners presented more dense neighborhoods in Spanish than their L2 counterparts because more participants provided more instances of the same response (e.g. *agua* [English "water"] in Cloud 6). Holistically speaking, L2 and HL learners have produced more sematic associations in the target language for those categories identified as dense. Both L2 and HL learners showed a tendency to recall first words that contain emotional aspects (e.g., *father*, *amor*) than concrete (e.g., *comida*) or abstract words (e.g., *considerado*).

By means of comparing and contrasting both populations, I gained further understanding of the strategies used by participants when building vocabulary in Spanish from similar sounding words in English (cf. above cognates and false cognates). These findings inform us of the strategies learners use when they are uncertain of how a word is written in the target language, in this case Spanish, and can be applied into the language classroom. The next chapter will identify and discuss some pedagogical interventions to use in Spanish coursework for L2 and HL learners.

Conclusion

In this chapter, I have presented the results obtained through the *Opinio* survey as a way to understand participants' language background and prior vocabulary knowledge in Spanish. This survey was created based on the three theoretically grounded approaches that constitute the conceptual framework of this study: 1) Semantic Neighborhood Density (SND); 2) Vygotsky Meaning-Making Approach; and, 3) Second and Heritage

Language vocabulary learning. As shown above, the *Opinio* questionnaire allowed me to address Research Questions 1-3. Research Question 1 examined the pre-existing structure of L2 and HL participants' semantic neighborhoods and how L2 and HL learners of Spanish process and build vocabulary in terms of semantic relatedness. Research Question 2 focused on analyzing the differences in vocabulary building between L2 and HL learners in terms of sematic relatedness. Finally, Research Question 3 investigated the nature of the meaning-making processes in HL and L2 learners and how a close examination of meaning-making processes contributes to the understanding of the formation of semantic neighborhoods.

Overall, the results showed that HL and L2 learners differ in the way they build semantic neighborhoods and construct meaning. In general, the results showed that HL participants produced a higher number of Spanish semantic associations for the given Spanish categories, whereas their L2 peers produced more English semantic associations for both the Spanish and English categories. Also, HL learners left more responses blank in both the Spanish and English categories. This interesting finding could be related to HL learners' negative perceptions of their writing abilities (Torres, Arrastia-Chisholm & Tackett, 2020). Moreover, both groups of participants produced more words that contain affective aspects, and some participants learned vocabulary as part of a construction (i.e., determiner + noun). They also use phonological similarity as a strategy to relate one word semantically to another word. For instance, two L2 participants related *cuchara-chupacabra* and one HL participant related *saludable-saludos.*

With regard to word learning in children, previous research on Neighborhood Density suggests that semantic similarity and the vocabulary lexicosemantic structure of

a child are likely to influence the process of word learning (Storkel & Adlof, 2009). Although, much of the research on the field of SND has focused on how semantic neighbors are activated in the first language rather than in the L2 or HL (e.g.Mirman & Magnuson 2006, 2008; Buchanan et al., 2001), few studies related to neighborhood density have studied word recognition in orthographic and phonological neighborhoods and found facilitative effects in word learning (e.g., Marian & Blumefield, 2006; Van Heuven, Djktra, & Grainer, 1998). Additionally, language-based models (i.e., association norms) that use free association tasks, as the one implemented in the *Opinio* Survey in the present study, have been mostly used in computational psycholinguistics and linguistics (e.g., Mirman & Magnuson, 2008). Thus, the analysis of semantic networks has mostly been examined through numbers and values assigned to words in a large corpus in order to simulate the mental semantic space of speakers of a specific language (e.g., Durda & Buchanan, 2008).

However, for this study, I have adapted the idea of free association tasks to create a survey that would capture participants' retrievals in order to understand their meaning-making process and how they build their vocabulary repertoire. The present study adapted different semantic principles (e.g., NoA, semantic size, and semantic richness) studied in SND that look at the relationship between semantic nodes in order to analyze the different responses of participants in a free association task. The reason why I have looked at NoA, semantic size, and semantic richness as part of SND is because they inform us about how density is constructed for each given category by each participant.

For the present study, NoA was measured by examining token frequency in English and Spanish for each category. Previous studies on SND found that NoA is an

indicator of semantic density in free association tasks (e.g., Duñabeita, Avilés & Carreiras, 2008). In the case of semantic size and semantic richness, these principles tend to be examined together because they are interrelated in such a way that words with larger semantic size tend to be semantically richer (e.g., Danguecan & Buchanan, 2016; Pexman et al., 2008). In the present study, semantic size was measured by the number of token frequency in both Spanish and English, and semantic richness was based on type frequency in Spanish and lemmas. The purpose of this analysis was to observe what type of relationship existed between the different retrievals derived from the given target words to better understand L2 and HL learners semantic mapping and use it as a baseline to teach vocabulary in the language classroom.

In addition to documenting how semantic neighborhoods can be used to create a questionnaire that would better inform us of students' vocabulary repertoires, this dissertation is proposing effective practices to teach vocabulary to L2 and HL learners (see Chapter 6 for details). As previous research in HL learning has argued, further research needs to be conducted in vocabulary learning and acquisition to better address the linguistic needs of students (e.g., Zyzik, 2016). We must emphasize that L2 and HL learners vary on their language exposure and that exposure can influence the way they learn vocabulary. For this reason, part of this dissertation follows Vygotsky´s meaning-making approach (Vigostki, 2007), and I examined participants' language exposure and the variability in participants' responses to cue words. Results showed that HL learners presented linguistic advantages in vocabulary production in comparison to their L2 peers. For example, HL learners produced more complex everyday structures that convey

linguistic variation, such as *andar en bicicleta* (English "to ride a bicycle), which normally would appear in a textbook as *montar en bicicleta* (Carreiras, 2016)

The present study differs from previous studies in SND because it has explored the vocabulary repertoire of L2 and HL participants rather than trying to understand how their semantic space is organized in each of these populations. Instead of using a computational analysis to understand semantic relatedness, I used descriptive statistics to provide a summary of each participant population and their responses. A t-test was conducted to determine if there were statistically significant differences between categories and to draw conclusions from the obtained results. Finally, I used inductive coding to categorize participants' Spanish responses into lemmas by looking at all lexical forms that had the same meaning (e.g. *hermano*, *el hermano*, *mis hermanos*, etc.) (English: "brother," "the brother," "my brothers," respectively).

This approach was different to other studies when calculating SND counts (e.g., Buchanan et. al., 2001; Danguecan & Buchanan, 2016; Nelson et al., 1998) as I created a coding system based on previous semantic principles (e.g., NoA) and used the median and mean of participants' responses to set a threshold between dense and sparse categories. In order to verify if this was a reliable method of analysis, I explored density in two other ways (i.e., inferential statistics and token/type frequency) that also matched with semantic neighborhood theory and that reinforced the reliability of my analysis and came to show the same results. Thus, I calculated token and type frequency for the Spanish and English responses and compared the results between L2 and HL participants.

Furthermore, I also explored the relationship between semantic richness and density by means of using lemmas to learn more about participants' language variation.

In the field of SND, semantic richness is not restricted only to the measure based on the number of features, density, number of senses, imageability, and the interaction body-object interaction (Yap, Tan, Pexman & Hargraves, 2011). It can also be studied through the number of semantic associations (NoA) (Duñabeita et. al., 2008), the NoA of the first associates in a free association task (Nelson et al., 1998), lexical ambiguity (Yap et.al., 2015), frequency of co-occurrence (Yap et al., 2011), and semantic similarity- 5000 (MSS-5000) (Yap et al., 2011).

In addition to examining NoA, semantic size, and semantic richness as closely related variables (Pexman et al., 2008), in the present study, I proposed another possible way to measure semantic richness based on Hay and Baayen's (2005) paradigmatic analogy that looks at the importance of lemmas in paradigmatic relationships that illustrate lexical representation and processing. In other words, paradigmatic analogy looks at the relationship that is held between elements of the same category and between elements that are combined to each other (pp. 343-344). Furthermore, I also adapted the concept of how lemma works in bilingual production. In this regard, Traxler (2011, pp. 423-424) explains that bilinguals must select the correct lemma before producing the concept in the target language, in this case, Spanish as a L2 or HL language.

The findings in the present study show a correlation between the concepts that presented semantically rich dense lemmas (many participants' items with the same meaning for that lemma) and the semantic richness of that concept as participants were beginner-level learners of Spanish (i.e., L2 or HL learners). These results indicate that there is a direct relationship between neighborhood density and lemmas: those categories in which there were lemmas with many instances were also perceived as dense in all the

parameters analyzed under RQ1. Hence, these categories were semantically robust, or rich, in the L2 and HL learners' lexicon. To illustrate this information with an example, the category *universidad* had several lemmas with many instances (e.g. *estudiante* (77 instances), *profesor* /a (55 instances), *escuela* (49 instances), etc.) (English: "students" (77instances), "professor" (55 instances), "school" (49 instances), etc.) demonstrating that many participants generated a higher number of idiosyncratic responses that were strongly connected to the target word and among them.

The next chapter moves on to proposals for teaching vocabulary in Beginning-level Spanish language classrooms. As such, it proposes some pedagogical implications and teaching interventions that can be used in L2 and HL teaching based on the data collected and examined in the *Opinio* survey administered in the present study.

Chapter 6
Pedagogical Implications

Introduction

The present study provides an integrative vision based on previous findings of three theoretically grounded approaches (i.e., Semantic Neighborhood Density (SND), Vygotsky's Meaning-Making, and Second Language (L2) and Heritage Language (HL) vocabulary acquisition) in order to understand L2 and HL vocabulary building and learning. This chapter addresses the fourth and last research question of the dissertation proposed in the methodology chapter (i.e., Chapter 4) that queries how semantic relatedness and the process of meaning making can help instructors teach Spanish L2 and HL learners. In the next paragraphs, I propose various pedagogical interventions that could be used in Spanish language teaching contexts in order to help Spanish L2 and HL learners expand their Spanish vocabulary.

Vygotsky's Meaning Making approach and Vocabulary Learning

Vygotsky (1987) highlights the idea that, in order to understand second language development, and in the present study, HL development, both mental and personal individual development need to be studied deeply and from all perspectives by means of considering social and cultural factors as part of the individual intellectual development (Mahn, 2012a, p. 5). In Chapter 3, we saw that a close examination of early childhood development is key to understanding how the child, and, therefore, the individual, acquires language. Language happens through qualitative transformations with the external (i.e., relationship with others and the environment) and the internal (i.e., transformation of consciousness and formation of the neuronal network). The child's

perception shifts as s/he is able to name objects and construct meaning through the act of *generalization*. In the present study, the HL learners indicated that they were exposed to Spanish from early childhood (i.e., 0-3 years old and 4-5 years old). Despite the fact that the quantity of language exposure to the heritage language (HL) (i.e., Spanish) and the dominant language (i.e., English) varies among participants, many HL learners acquire basic forms of vocabulary in their HL during those early years of childhood before attending school (Potowski, 2008, p. 231).

Another fundamental qualitative transformation that occurs in language acquisition is when a child enters school and is introduced to academic concepts (Vigotski, 2007). In the results observed in Chapter 5 of the present study, HL learners indicated that their exposure to Spanish diminished after the age of 5, which is the age that is normally associated with children beginning Kindergarten in the United States. Silva Corvalán (2003) argues that after the age of 5, for many HL learners, the acquisition of their heritage language is interrupted, and this interruption affects their grammar and vocabulary development in the HL. However, in the case of many L2 learners, they start learning the target language, in this case Spanish, when they begin elementary or high school (Potowski, 2008, p. 231).

As observed in the results presented in Chapter 5, when HL learners begin going to school, many of them experience an abrupt language shift because they go from speaking the heritage language at home to speaking mostly in English (Corvalán, 2003; Montrul, 2012). As a result, HL learners have unique experiences with their heritage language, that influence their meaning-making processes. This may also mean that L2 and HL learners may present different *thinking/languaging* systems, that is, HL learners

have a thinking language system that includes the L2 from birth, whereas L2 learners may only have a *thinking/languaging* system that is exclusively in English (Mahn, 2012a, p. 6).

Based on students' responses to the background questionnaire and their language profile, we could argue that HL learners may have a bifurcated[18] *thinking/languaging* system from birth because both languages are part of their language development (even if each part of that *thinking*/*languaging* system presents different percentages (e.g. 25 % Spanish/75 % English)). On the contrary, L2 learners may have a *thinking/languaging* system that is in English and add the second *thinking /languaging* system in Spanish as they are exposed to the Spanish language. In the case of L2 learners, English plays a fundamental role and is dominant in their meaning-making processes when exposed to the Spanish language (Mahn, 2018, 2012; Potowski, 2008).

Through the implementation of a survey, as the one designed for this study, the instructor can diagnose students' probability in terms of certain preconditions for vocabulary development. A survey like the one presented in this dissertation can help instructors identify a potential difference in the construction of semantic neighborhoods by both L2 and HL learners. According to Vygotsky (1987), concepts are not developed until adolescence, "Although the foundation for concepts is laid when children begin to

[18] By bifurcated *thinking language system,* I mean that for HL learners Spanish is part of their lexical representation and semantic neighborhoods construction. Sometimes there is an overlapping of both languages and sometimes vocabulary items may be separated. This does not necessarily mean that there are two *thinking languaging systems* that are hermetically sealed and autonomous. Bifurcated is used in this study with an integrative vision, meaning that there are two subsystems that behave as one.

acquire language, they do not use concepts existing in systems until they reach adolescence" (Mahn, 2012b, p. 119).

Before adolescence, there are modes of thinking that are key for concept formation and generalization (i.e., *syncretic*, *thinking in complexes*, *thinking in concepts*). All participants in this study are 18 years old or older, so they have already gone through this process of concept formation in their primary language(s). For this reason, the questionnaire used in the present study included questions related to the participants' language exposure. In this study, L2 participants indicated that only English was part of their L1 development, whereas HL learners indicated both Spanish and English were part of their language development.

As HL learners develop a series of mental functions, such as attention, memory and/or abstraction, they build their semantic neighborhoods and, by default, neighborhood density. Consequently, their neighborhood density has been determined by how much they were exposed to their HL and how much Spanish there was in this process. Spanish and English meaning-making processes became intermixed as their *thinking/languaging* system was being constructed, and as a result, each participant had a unique linguistic history that has been characterized by qualitative changes from childhood to college. This finding has implications for both the academic abilities and the affective components of learning for both populations. For instance, many HL learners indicated in the questionnaire that they were exposed to academic concepts, such as scientific concepts, later in life than their L2 peers. Results showed that for L2 learners, some of the academic concepts were introduced before college (i.e., in elementary school or high school), whereas, for the HL learners, there is a gap between the everyday

concepts that they acquired in early childhood and the academic concepts that they begin acquiring at the college level (85 out of 95 HL participants indicated that English was the primary language of the schools they attended). In this case, the degree of proficiency for HL learners is defined by their exposure to the language at home and is mediated by the social and cultural factors to which s/he has been exposed in her/his life.

Since HL learners have had some previous exposure to their HL, their *thinking/languaging* system may be partially intermixed, and this system may stop being intermixed and become predominately English as they begin going to school where they are exposed only to English. The *thinking/languaging* system then starts intermixing again as they learn Spanish as an adult. However, in the case of the L2 learners, their exposure to the language comes mostly through school instruction and the quantity of input may vary (i.e., they may receive input outside of the classroom), but their contact with the Spanish language mostly occurs in the classroom (Potowski, 2008, p. 231).

Several researchers in Heritage Language Acquisition (see, Montrul, 2010; Polinsky, 1997; Potowski & Muñoz-Basols, 2018) argue that the vocabulary HL learners possess is context specific and depends on their experience, which is why it conveys emotional aspects that are part of the learner's past experiences with the language. Many of the words in the HL learner's repertoire are related to the home and community environment rather than the classroom or an academic setting. This means that their everyday concepts are in both English and Spanish, but their academic concepts are going to be mostly in English. Because of their language dominance in English, their academic conceptual development is in English and this affects their Semantic Neighborhood Density. The difference of quantity of exposure in the HL as they were developing their

system of concepts will vary between HL learners. The construction of the *thinking/languaging* system is not the same for someone that has been exposed to Spanish during their childhood 25% of the time than for someone that was exposed to Spanish 90% of the time. Even if both of these cases did not receive any input in Spanish during elementary and high school , for someone that has received 90% exposure during their first years of childhood, they will incorporate more Spanish in their conceptual development when learning scientific or academic concepts (Mahn, 2012; Pascual y Cabo, 2016).

In situations, as the ones encountered in the *Opinio* survey used in this dissertation, in which participants differ to a greater or lesser extent in their vocabulary repertoire, it is recommended to apply Vygotsky's Zone of Proximal Development (ZPD) principle. Generally speaking, the ZPD refers to the gap between what the individual can do by himself/herself (e.g., many everyday concepts may be already acquired by a HL learner) and what s/he needs to acquire by means of scaffolding, teacher guidance or peer collaboration (e.g., possible academic/scientific concepts that need to be acquired) (Mahn & John-Steiner, 2002, 2012).

Following ZPD principles, after diagnosing participants' semantic building and knowledge, instructors can use the results as a baseline to help students reach the next "proximal" level of development. For instance, activities that are related to the vocabulary of the house may be more challenging for L2 than for HL learners as HL learners are more comfortable with everyday interactions and conversations (Sánchez-Muñoz, 2016). However, activities based on more technical or academic vocabulary may be more challenging for the HL learner than for the L2 learner because the latter typically

receive input through formal instruction (Potowski, 2008). In this sense, adjusting the activities to meet each population's ZPDs based on their own linguistic abilities allows for the conceptualization of a curriculum based on the specific needs of the student population rather than using impersonal models. Once instructors have identified students' starting points as both L2 and HL learners, in terms of vocabulary, the instructor can determine which type of activities help students reach a higher level of conceptual knowledge in those vocabulary areas that were perceived as sparse.

How Semantic Relatedness informs Vocabulary Instruction

Several studies in psycholinguistics and cognitive linguistics emphasize the idea that meaningful learning depends on the relationship between prior knowledge and experience as concepts are not learned in isolation (e.g., Vigotski, 2007; Nelson, McEvoy, & Schreiber, 2004). However, "Language instructors tend to look for gaps in knowledge...[r]ather than assign value to the rich and varied linguistic backgrounds that these learners bring with them" (Polinsky & Kagan, 2007, p. 373). In order to identify the multiple linguistic backgrounds that students bring to the language learning context, the development of an instrument or tool that recognizes students' previous vocabulary knowledge and experiences can be used as a platform for curriculum development and to teach vocabulary more efficiently.

As reviewed in Chapter 1, studies on Semantic Neighborhood Density have mainly focused on examining the degree of semantic relatedness between a target word and its surrounding neighbors (Buchanan et al., 2001; Daguecan & Buchanan, 2016; Durda & Buchanan, 2008). Also, in many cases, these investigations on SND mainly focused on how semantic memory is organized (Durda & Buchanan, 2008). However, few studies

(see, e.g., Steyvers & Tenenbaum, 2005) have argued that SND can also predict the dynamics of semantic memory and how words are learned. In the field of SLA, several researchers (see, e.g., N. Ellis, 1997; Schmitt, 2000; Vigotski, 2007) agreed that for a word to be produced, the individual needs to know its relationship to other words. Consequently, every word that is learned is linked to other words and the meaning of that word changes with experience. The individual continues to create links for that word with other words as the student deepens the understanding of its meaning (Hatch & Brown, 1994).

Results on the degree of semantic associations identified in Chapter 5 provide a baseline to the ZPD, but they also allow to clearly establish which areas of vocabulary are stronger than others. For instance, the data in the present study showed that HL and L2 learners produce more semantic associations for those categories that were identified as dense. This suggests that in terms of instruction, teachers can implement a method of diagnosis (e.g., surveys or questionnaires) such as the second section of the *Opinio* survey. This step will allow them to become aware of the words that students identify as dense, that is, words that students know well and can link to other semantically related words. Consequently, as a starting point in vocabulary instruction, teachers can expand on those words identified as dense to model how to relate to other concepts and introduce new vocabulary. Once students feel more comfortable and are able to produce these words in different real task-based scenarios, instructors may move into those categories identified as sparse.

On the other hand, theoretical approaches in cognitive linguistics and usage-based learning have postulated that the structure of mental representation and the individual

construction of meaning is built upon memories of exemplars of language use (Bybee, 2006; N. Ellis, 2006). In the same vein, Vygotsky's concept of *generalization* emphasizes the fact that meaning comes into existence due to a social and a communicative need that happens at the collective and individual level. Thus, people construct meaning in order to make sense of the world and communicate with others (John-Steiner & Mahn, 1996). These theoretical approaches, as well as SND, suggest that there is a relationship between conceptual development and vocabulary growth which are key components in language learning. Developing these skills can pave vocabulary learning in the L2 and HL.

Regarding this study, SND has provided keen insight into the structure and activation of vocabulary. The results on the *Opinio* survey used in this dissertation showed that the organization of concepts in our mental lexicon is based on its relationship with other elements. When a concept has a more connected relationship to other concepts (i.e., it is more dense), it is more easily activated (Mirman & Magnuson, 2008; Reilly & Desai, 2017) For example, the word *familia* (N=856) was perceived as dense by both groups, L2 and HL learners, because they were able to produce more semantic associations to this category in comparison to others, such as *aventura* (N=453). This is an indication that this category was more accessible to learners, and therefore, it probably facilitated the activation of other concepts that are related to this category (Mani & Huettig, 2012). In terms of vocabulary teaching, this suggests that instructors should aim to create scenarios that encourage meaningful interactions in which students learn how to establish multiple connections with other words and different relationships between words. In doing so, instructors can help increase the number of exemplars in those sparse areas of vocabulary and enhance richer and stronger semantic associations.

In sum, as instructors, the implementation of a survey and being aware of students' background and vocabulary repertoire will aid student learners to expand their vocabulary knowledge by creating activities that foment word relatedness (e.g., synonym webs or analogy activities). In the following section, I discuss and propose various pedagogical interventions that can be used in the classroom to teach vocabulary as well as the baseline survey described earlier.

Vocabulary Learning Strategies

As discussed in Chapter 2, research on vocabulary instruction in SLA and HLA has not received much attention until recently (Nation, 2001; Nation & Webb, 2011; Potowski & Muñoz-Basols, 2018). Nevertheless, vocabulary teaching is essential to language and communication, and is also one of the more challenging areas of L2 and HL language proficiency due to the complexity and amount of knowledge that this task requires (Meara, 1980; Nation, 2001; Schmitt, 2010). As we have observed through the present study, it is also closely connected to an individual's experiences and their processes of perception, memory, categorization, and generalization (Bybee, 2006; N. Ellis, 2006; Vigotski, 2007; Nelson et al., 2004; Schmitt, 2000). The cognitive perspective in psychology and linguistics introduced the concept of second language learning and acquisition as a similar process to L1 acquisition. From this perspective, learning is active, which means students encode input and relate it to their own experience and store it as an individual paradigm (Lightbown & Spada, 2013, pp. 108-118).

Based on that principle, there are multiple language learning strategies (e.g., determination strategies, social strategies, memory strategies, cognitive and

metacognitive strategies) that can be used to teach vocabulary in the second or heritage language (Schmitt, 1997). However, we must highlight that when we teach vocabulary, we not only want to teach specific terms, we also want to expand students' vocabulary and teach them strategies to develop thinking processes and make connections that can be applied to other areas of their life (Mokhtar et al., 2017; Stahl & Nagy, 2007; Vigotski, 2007). The objective of vocabulary teaching is to build an understanding of words and to deeply engage students in thinking about word meanings (Shanahan, 2005). That is, the reason learning vocabulary takes time and requires a combination of different types of activities and contexts is addressed by Nation (2001) in the following quote:

> Learning a word is a cumulative process. We cannot expect a word to be learned in one meeting and so we need to see each meeting as a small contribution to learning. Learning a word occurs across a range of different learning conditions, […] those condition should involve roughly equal proportions of the four strands of meaning-focused input, language-focused input, meaning-focused output and fluency development. (Nation, 2001, p. 296)

In agreement with Nation (2001), instructors would teach vocabulary through a combination of activities that stimulate mental access to the word (e.g., use of surveys, games, such as *Scattergories*, and communicative activities), as well as, activities that expand vocabulary size and the variability of semantic associations (i.e., semantic mapping activities- e.g. a spider web activity where students can connect words based on themes). In the same vein, Henriksen (1999) highlights the importance of understanding lexical knowledge as a continuum that goes from the recognition of the lexical item to its production. In order to do that, instructors can work on vocabulary progressively along

the semester and teach different activities that focus on both explicit instruction and learning (e.g., filling the gaps, apply a specific word in a sentence) and implicit instruction and learning (e.g., structure input, binding activities) in order to boost students' vocabulary, reading, and comprehension as well (Al-Darayseh, 2014; Mokhtar et al., 2017) (see Table 10).

Every student benefits when instruction is tailored to their needs, so if we collect information about students' learning histories, patterns, and strategies, we can design or adapt our activities in a way that is more meaningful to our students (Tomlinson & Moon, 2013). To collect this information, instructors can create a survey similar to the one used in this study to have a general idea of where students stand in terms of linguistic background and vocabulary knowledge. Then, based on the collected data, there are some examples of activities that can be used in the classroom to expand vocabulary and model the process of meaning making. For instance, instructors may ask students to collect interesting words from their own communities or words that they have heard and want to know more about. Instructors could later ask students to identify in which contexts these words are used, look at the etymology or provide context for these words.

In addition to the vocabulary building activities recommended above, I propose in the following sub-sections six types of pedagogical interventions based on the results obtained in the electronic survey used in the present study. These pedagogical interventions include: 1) pedagogical interventions that promote sociolinguistic awareness; 2) semantic mapping as an activity to strengthen semantic relatedness; 3) the implementation of cognates and false cognates in the classroom; 4) an example of vocabulary intervention ; 5) the role of emotional, concrete and abstract words via an

activity of reciprocal teaching; and, 6) practice vocabulary "noun-phrase" chunks (i.e., Determiner + Noun).

Sociolinguistic Awareness Activities

When teaching vocabulary in language courses, instructors should be encouraged to start with language aspects that are salient for students (Enright & McCloskey, 1985; Smith, 2002; Tomlinson & Moon, 2013). By salient aspects I refer to all the language characteristics that students are aware of and those that catch students' attention and interest. Using information that considers themes and topics in which students are interested not only motivates learners but supports their learning of new information and vocabulary by making it more meaningful (Correa, 2011). For instance, one aspect of vocabulary that students often inquire about is lexical variation. For example, students often ask why the word *colectivo* is used to refer to a "bus" in Argentina while in Spain, the word *autobús* is used, or why they may have grown up using the word *guajalote* for "turkey", but the word *pavo* appears in textbooks. Thus, instructors should work on developing students sociolinguistic and sociopragmatic language awareness from beginning levels not only to empower HL linguistic variations but to also teach both HL and L2 learners about language uses and ideologies. In order to do that, instructors should incorporate *Critical Language Awareness* (Fairclough, 1992, 2001) principles as part of their curricular practices.

In the context of HLA, Critical Language Awareness (CLA) emerged in the 90s when researchers, such as Norman Fairclough, brought together critical discourse analysis and pedagogy claiming that language plays a fundamental role in power and social dynamics (Leeman, p. 348, 2018). This curricular postulate is essential in the field

of Spanish HLA to address the need to validate students' prior knowledge and voices, as well as to foster the implementation of pedagogical practices that promote social change (Leeman, 2018). Critical Language Awareness is a theoretical framework that has its roots in previous studies on critical pedagogy (e.g., Freire, 1970, 2000; Giroux, 1983), critical discourse analysis (e.g., Fairclough 1992, 2001; Woda, 1999), new literacy studies (e.g., Gee 1996, 1998), critical consciousness (Freire 1973, 1993), geopolitics and cultural studies (Walsh, 2007), as well as in studies on linguistics and the dynamics of power in social structures (Fairclough, 2007) (Leeman, 2018; Holguín, 2018). One of the most influential work in CLA was Freire's concept of critical pedagogy (CP) that analyzed how education policies and values favored the dominant class that historically oppressed and marginalized students that did not belong to that class. Thus, the main focus of critical pedagogy was to highlight critical consciousness and teach students to question and challenge oppressive beliefs and practices (Freire, 1970, 2000). Critical Language Awareness not only focuses on a critical approach to pedagogy, but it also integrates the concept of language awareness (LA) that originated in the United Kingdom (Fairclough, 1992). Language Awareness aimed to improve language instruction for speakers of non-standard varieties of English and foreign language including critical discourse analysis as part of the curriculum (Leeman, 2018).

In regard to CLA and HL education, experts propose a similar argument to previous studies (e.g., Fairclough, 1992) in order to improve heritage language and build on CLA proposals to focus on empowering students' voices by encouraging students' active participation in their communities (e.g., conducting research projects). Additionally, it focuses on developing students' critical thinking and reflection processes

to better understand linguistics ideologies, power relationships, and the construction of identity (Beaudrie, Amezcua, & Loza, 2020; Holguín, 2018). For instance, one of the main goals in CLA in HL is to boost the appreciation of linguistic varieties by exploring language use in real context. Students can deepen their language development and communicative abilities by putting into practice the linguistic practices of their own communities (Ducar, 2008).

Only a few examples of linguistic variation (8 instances) were encountered in the results obtained in the *Opinio* survey which could be due to the fact that the survey was a written survey or that L2 and HL participants are in beginning-level classes of Spanish; therefore, results should not be expected to show an abundance of linguistic variation. As part of the results, participants, especially HL learners, left blank responses to different categories (an average of N=35 participants left all responses blank for each of the Spanish categories). One of the possible explanations why this occurred could be related to the negative feeling that some HL learners may experience about their own linguistic variation due to the stigmatization imposed by speakers of more prestigious Spanish varieties who consider HL vernacular forms as less prestigious (Potowski, 2008; Torres et al., 2020). In this regard, instructors may empower students' self-efficacies and voices by focusing on CLA approaches when designing activities that strengthen the linguistic and social identity- especially the one from heritage language students and their communities. For example: In HL classrooms, instructors could ask students to conduct interviews or research projects that will open the discussion, therefore question, the different linguistic ideologies that generate stereotypes, stigmatization, and diminish Spanish as a Heritage Language (Beaudrie et al., 2020). This activity could be

differentiated by asking HL learners to conduct the interview/research project in their communities, if possible (Ducar, 2008), and for L2 learners, in a Spanish neighboring community or a community that they may have access to.

Another possible factor why there were not many examples of linguistic variation in the data collected in this study could be related to HL learners' low self-perception of their writing skills since multiple HL participants indicated (N=59) not having formal education in their heritage language until later at the university level (Montrul, 2012). Based on this information, instructors ought to encourage students to value their own language varieties and also use them in the classroom in order to expand their vocabulary repertoires. For example, including samples of HL learners' vocabulary repertoire in the classroom (Fairclough & Mrak, 2003) as well as helping students identify differences in register (i.e., formal versus informal) without demeaning their vernacular variations (Lynch, 2003; Martínez, 2003; Potowski, 2005). Another example could be instructors asking HL students to interview a family or community member who speaks Spanish about certain words that are linguistically diverse depending on their community (e.g., what words do they know for English "turkey").

In the case of L2 learners, since they may not know anyone that speaks Spanish, instead of interviewing a family member, they might conduct a mini research project about a Spanish speaking community in their state. Instructors may also ask students to present the oral interview in a written form or presentation. The designed activity can further develop students' written and oral skills. In mixed classrooms, HL learners can enlighten their L2 peers by bringing real samples from their families and communities. All students can later work together creating a glossary adding those real samples as part

of the classroom vocabulary[19] together with other samples that L2 learners may have collected from the internet/library. Additionally, implementing CLA as part of the Spanish class curriculum not only will reinforce heritage learners' linguistic and social identity, but it will provide access to their heritage language and culture as well as it will recognize the value of their variety and all others (Beaudrie et al., 2020). For example, instructors can discuss in class the concepts of *variation* and *dialect*. Then, HL learners can work on critical thinking activities that validate the discursive practices of their own linguistic variations and other communities that students are interested in learning more from (e.g., philosophical chairs activity) (Beaudrie et al., 2020). In the case of L2 learners, they can work with a HL peer to learn more about their community or the instructor may identify a reading in English that shows Spanish linguistic variations in the United States.

Another factor that correlates with CLA and that instructors should consider when addressing vocabulary in language teaching contexts is students' *perezivhanie* (Vygotsky, 1998) and their affective needs. As described by Mahn (2003), the concept of *perezhivanie* makes reference to "the process through which humans perceive, emotionally experience, appropriate, internalize, and understand interactions in their environment" (as cited in Mahn & John-Steiner, 2012, p. 54). In the case of HL learners, as speakers of a minority language, they may feel that their linguistic varieties are less prestigious or may feel insecure about their linguistic abilities in Spanish because they have mainly used their HL in informal contexts (Potowski & Carreira, 2004). As

[19] Some publishers offer the possibility to include additional vocabulary to their e-books. This type of resource should be used in the classroom to provide a richer scope of linguistic variation.

instructors, implementing a tool, such as the one presented in this study (i.e., a survey), will make us aware of the linguistic diversity of our students.

Consequently, instructors can encourage and motivate their students by opening a dialogue about the different linguistic and discursive variations and how we can say something in different ways in Spanish. For example, as we saw in Chapter 5, participants produced the word *abu* for *abuelo*/*abuela*. *Abu* is a more familiar, less formal manner to refer to "grandfather/grandmother" that denotes love and closeness to that family member. Thus, instructors can use examples like this one produced by participants to introduce different ways of saying *abuela.* Also, vocabulary teaching can go beyond looking for an appropriate level reading or folk tale that matches the students' reading level. This activity would not only reinforce and introduce new concepts related to the family and home, it would also open a discussion to talk about culture and traditions in Spanish speaking communities. Using real samples from students' vocabulary repertoires not only empowers and value students´ prior knowledge, but they can be used to exercise agency and teach students about making their own decisions when using the language.

In sum, surveys like the one presented in this study can not only help instructors to learn about students cultural and linguistic profiles, but it can be used as a tool to guide the instructor to make pertinent modifications in the class curriculum (Correa, 2011). Including pedagogical strategies that go beyond the mere linguistic practices and incorporating CLA will encourage students to dialogue about not only sociopragmatic and linguistic practices in the Spanish speaking countries (i.e., Bolivia, México, etc.), but the use of Spanish in the United States. Moreover, including CLA as part of the curriculum, it will open the discussion about the benefits of being bilingual and address

controversial issues, such as power relationships, linguistic ideologies, and language maintenance. These are vital topics that need to be addressed in the classroom in order to validate students' voices and prior experiences, as well as, stimulate meaningful learning (Beaudrie et al., 2020, Correa, 2011). Incorporating CLA in beginning-level Spanish classes will help to dispel the idea that certain standard varieties of Spanish are better than others. It will also contribute to decrease the emotional and linguistic distress of many students fomenting linguistic equity, inclusivity, and diversity.

Semantic Mapping

In Chapter 2, we saw that in order to comprehend a text in the second language we need to know about 8,000-9,000-word families and about 6,000-7,000-word families for a spoken text (Nation, 2006). However, by the time L2 students go to college they know around 2,000-4,000-word families (Laufer, 2017). Because of this, one vocabulary strategy that can facilitate learning, retrieval and retention of new material is semantic maps (Schewel, 1989; Zahedi & Abdi, 2012). Semantic maps are a learning strategy to visually organize thoughts, ideas, and concepts in a specific order. To do this, a schema, or map, is created to explicitly show the relationship between concepts, ideas or supporting details. When used in the classroom, students can actively make connections between their prior knowledge and novel concepts learned in the classroom or reading information (Johnson, Pittleman, & Heimlich, 1986; Schewel, 1989). This strategy also pushes students to recognize meaning and go beyond the classic form-meaning vocabulary learning (Baumann, Kame'enui, & Ash, 2003; Heimlich & Pittleman, 1986).

Moreover, semantic mapping can be used to meet students' ZPD by expanding on their prior vocabulary knowledge and scaffolding it to a higher level. This vocabulary

strategy not only expands on vocabulary learning, it also reinforces the meaning of prior knowledge, such as everyday concepts (Schewel, 1989). It can also help L2 and HL learners with their development of other essential language skills, such as reading and writing.

Semantic mapping is a technique that can be implemented at any proficiency level and is also known as "semantic webbing", "semantic networking" or "plot maps" (Dilek & Yürük, 2013). For this technique, a diagram is created in which many words are connected to a drawing, topic or word. This strategy is used to create associative networks among words (Zahedi & Abdi, 2012). One way that this strategy can be implemented by instructors to meet the ZPD of L2 or HL learners is by collaboratively creating a semantic map together. The instructor can model for students how to connect ideas and concepts to a specific topic (i.e., brainstorm). By using this strategy as a guided and collective activity, the instructor can model for students how to build vocabulary, and can also introduce a variety of mnemonic strategies that students can apply to other fields, such as how to group by themes, use images, associate terminology, elaborate ideas or improve the comprehension of new vocabulary (Zahedi & Abdi, 2012).

Another reason this strategy is useful and can expand on a learner's vocabulary is because an instructor can develop the semantic map according to a special topic and can combine students' prior knowledge with new terminology by asking them questions (e.g., what are some of the characteristics of this item?, when/where/how do we use this item?) and using synonyms/antonyms. Moreover, the instructor can include linguistic variation as part of the map by including examples from other countries and communities and by encouraging students to brainstorm or research on lexical variation. For example, in

Spain “mug” is called *taza*, whereas in Colombia it’s called *pocillo*. Figure 1 below provides an example of a semantic map:

Figure 11
Illustration of a Basic Semantic Map of Cuchara

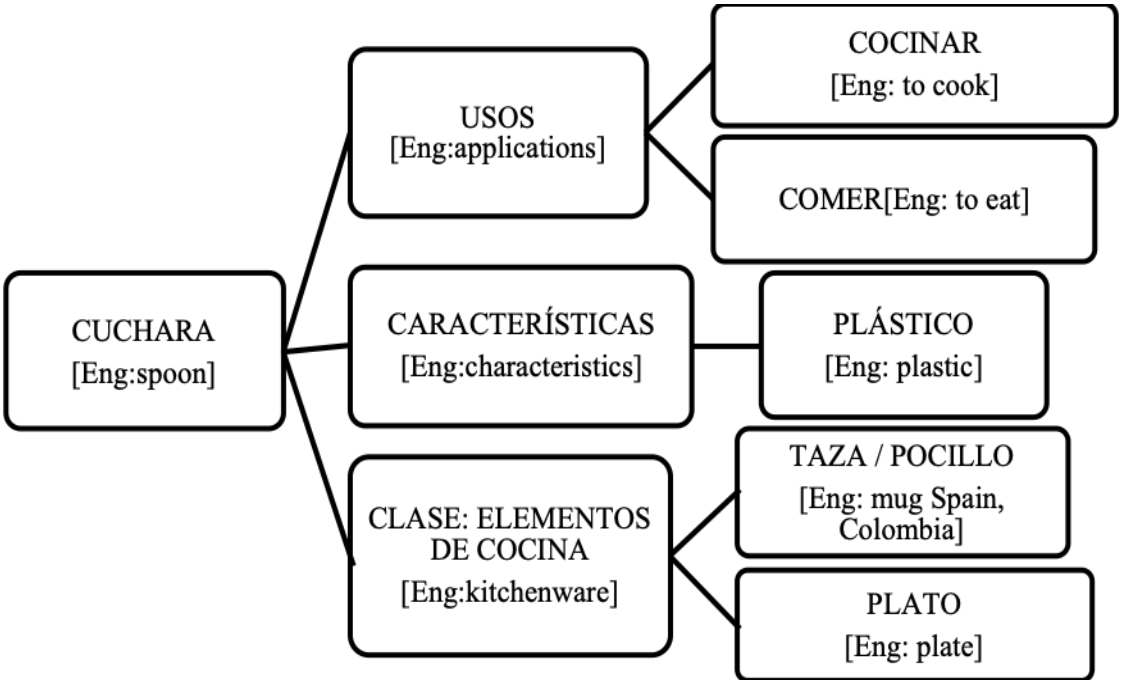


Figure 11 shows how a basic semantic map could be built for a vocabulary item. As above mentioned, semantic maps activate an individual’s lexical representation, and by using this strategy the student can write the main concept in the center of the semantic map. For example, the student can begin with the word, in this case, *cuchara,* on the left side of the map and then add related ideas, thoughts or concepts to it, such as *it is made of plastic*, *it is used for eating*, etc. Students can expand on the semantic map as much as possible.

Based on the results obtained in the survey, participants perceived the word *cuchara* as a sparse category. As presented in Figure 11, instructors can ask students to

share their experiences or ideas that come to mind when they see the word *cuchara* ("spoon" in English). The instructor can help students by providing tips or guiding them to establish connections and writing key words on the board. Afterwards, students can provide examples together as a class, work in pairs and from there, complete more meaningful activities where they write sentences or a story within a specific context.

Another way to keep track of word leaning with semantic maps is by putting those words on a bulletin board or on a word wall and rearranging them in a different manner along the semester. For example, if the key word is *cuchara* and students have already come up with a list of connecting words, instructors can ask students to rearrange them by different types of relationships. For instance, rearrange the words by kitchen items, by situations (i.e., situations where you need a spoon) or by different types of materials.

The Use of Cognates and False Cognates

Another popular strategy in vocabulary development is the use of cognates and false cognates in the language classroom (Moss, 1992; Otwinowska-Kasztelanic, 2009). This cognate/false cognate noticing strategy is normally taught explicitly by the instructor in order to build learners' confidence rapidly (Rivers & Temperley, 1978, as cited in Mugford, 2008). As reviewed in Chapter 2, the use of cognates and false cognates can have advantages or disadvantages for L2 and HL language processing and learning (Haynes, 1993; Costa et al., 2005; Lightbown & Spada, 2013; Degani & Tokowicz, 2013). However, instructors need to be mindful that although English and Spanish share many cognates, it is not always easy to identify a cognate such as *stomach- estómago.* Furthermore, English and Spanish also share several false cognates. Therefore, instructors should not assume that students will recognize cognates because sometimes

they are identical in meaning and form (e.g. actor-*actor*), but other times they can differ orthographically and not be easily identifiable (e.g. allergic- *alérgico*)

Similarly, students may also face challenges when encountering words that have an almost identical form but completely differ in meaning (e.g. soap-*sopa* ("soup" in English). Therefore, instructors need to teach students how to identify cognates and remember that "vocabulary development is more successful when learners are fully engaged in activities that require them to attend carefully to the new words and use them in productive tasks" (Lightbown & Spada, 2013, p. 64). One way that cognates and false cognates can be introduced in the L2 and HL language classrooms can be by collaboratively (i.e., instructors and students working together) creating a list of cognates and false cognates that reflect their home language and prior knowledge and the target language they are learning. For example, based on the results of the *Opinio* survey, students found a similarity between *deportes-deport* or *saludable- salute*. Thus, instructors should use this information to explicitly discuss with students the differences between a cognate and a false cognate with the two languages involved, that is, their first language and the target language. Then, if the instructor wants to involve students learning beyond classroom, s/he can ask students to complete a small research project for homework and ask their friends, family, and/or community members about their own experiences with Spanish-English cognates-false cognates. This type of activity promotes CLA and can be used to identify and discuss with students the multiple cognates and false cognates that appear in their textbook and/or course activities and which ones are used in different Spanish communities in the U.S. (e.g., English "to apply"- Spanish *aplicar*).

Additionally, when teaching cognates and false cognates in the HL classroom, Martinez, Beaudrie and Fairclough (2016) encourage activities that require productive knowledge and critical thinking. As such, HL learners should be exposed to new vocabulary terms (e.g., as the false cognate identified in this study *deporte*) in three different steps: 1) through incidental reading where target words are glossed; 2) post reading with comprehension questions; and, 3) an activity of productive knowledge, such as using those false cognates in sentences. This set of activities proposed here for HL classrooms could also be differentiated for beginning L2 learners in the first step (incidental reading) by using a more explicit activity, such as a matching English-Spanish activity (i.e., memory cards).

Example of Lesson Plan

After documenting pedagogical interventions that could be implemented in the Spanish classroom to develop vocabulary learning based on the data from the *Opinio* survey, in this section of the chapter I propose an example of a sequence of vocabulary-based teaching interventions that could be used in the Spanish language classroom. The distribution of a method of diagnosis at the beginning of a Spanish class can inform instructors about their students' language profile and language knowledge. By extension, instructors can use this information as a platform to design and improve vocabulary learning in the classroom.

The proposed activities in Table 1 are not time constrained and can be used and adapted throughout a given instructional period, ideally in different class periods during a thematic unit. As mentioned above, it is not recommended to expect students learn

vocabulary at once. Students learn vocabulary after a period of time and after being exposed to different types of activities and conditions (Nation, 2001).

Table 10
Vocabulary Intervention Template

Vocabulary Intervention Template

Pre-Activity	• Students submit a background questionnaire about their linguistic profile and experience with the Spanish Language. Differentiation for HL: Add an open-ended question about the influence of Spanish as part of their home and culture (e.g., who is the person they normally speak Spanish with?)
Warm-Up Activity	• *Scattergories* game to help students see the relationship between words and categories. • Students have a piece of paper or card with different words and a space for five responses in each column • Students come up with as many responses as possible that relate to those categories (Time: approximately 1 minute for each category) Tip: This activity can be done as a pre- activity, so the instructor has time to collect their answers and see which categories students know better. If done as a warm-up, the instructor can ask the class to talk about their responses and come up with a preliminary list on the board with words they know and words they do not know yet.
Semantic Map Activity	• Based on the *Scattergories* categories or the words produced by students, the instructor determines a target concept as an example of a larger concept (e.g. *camisa* (English: "shirt")) • Ask students what it would be a larger group in which the word *camisa* fits. For example: *ropa* (English: "clothes") and connect the two words in the board to model for students. • Instructor can ask students to write several words around the target item. They can do that in pairs, small groups or as a class by asking students to stand up and write a word at the time. • Instructor can ask students to write other words that are connected to the words that surround the target word. For example: stripes, summer, etc. Tip: If students do not know the words in the target language, instructor may ask students to draw those concepts.

Cognates and False Cognates

- After the semantic map activity, ask students to find three or four cognates (words that are similar in form and meaning) out of the semantic map that they previously created. They can do that first in pairs and later share their findings together as a class.
- Using that information, some false cognates may come up or the instructor can introduce false cognates that they could encounter inside that category.
- The instructor could introduce other cognates and false cognates that students should be aware of. The instructor could then add them to the list and teach them explicitly to students.
- As a fun and quick wrap-up activity, students could construct small sentences orally using cognates and false cognates. For example: Students pass a ball around and say sentences aloud.

Tip: For homework students can research other cognates and false cognates that are common in other Spanish-speaking communities or Spanish-speaking countries.

Reading Activity Scavenger Hunt

- The instructor looks for a reading containing some of the words that came up classroom activities/discussion and introduce new words. Ideally, look for a book that is also culturally relevant to the classroom. (e.g., a reading about something related to the Spanish culture)
- Once the instructor has selected a reading, they can create an activity in which students have to find words in the text using clues provided by the instructor (e.g., a piece of clothing that is commonly used in summer and has seven letter, look for a quote that expresses the relationship between the *sombrero vueltiao* [English: "vueltiao hat"] and the Colombian culture). Students can do this in pairs or small groups.
- This activity will reinforce the meaning of the words students already know and will help them infer meaning of novel words.

Tip: Look for a story that is relevant to the culture of the Hispanic communities they are from or they are interested in.

Story Activity

- Instructor will prepare a vocabulary list with all the key words that came up during previous activities and distribute this list to students in the class.
- The instructor will review the meaning of the words (e.g., contest game, *Pictionary*)
- As a class, following a jigsaw activity, they will create sentences orally and model how to create a story.
- To do that, the instructor can have cards with clues (e.g., create a sentence including the word *camisa de mangas cortas* from the list (English: "short-sleeve shirt")). Then the second student will have to add to the story using their word and so on.
- After modeling the activity, students can be in small groups of three. Using butcher paper or a computer tell them to create a story together. In the story they could give their opinion, personal preferences,

	feelings or ideas about an issue related to the target concept being studied. • Instructor can walk around and monitor the activity. For more advance students: Ask them to use two words from the list of vocabulary in each sentence.
Wrap-Up	• If the writing activity was completed on paper, students could do a gallery walk and read each other's' stories and provide some feedback on their peers' writing. • If they completed the activity on a computer, the instructor could ask students to present their stories to the rest of the classroom.

The proposed activities in Table 10 illustrates how instructors could incorporate a survey, tool or activity to learn about their students' linguistic profile and vocabulary building and develop a set of activities based on their answers. The template includes different vocabulary activities (e.g., *Scattergories*, scavenger hunt) that could be used during a thematic unit to reinforce and expand on vocabulary knowledge in the Spanish class.

The Acquisition of Emotion, Concrete and Abstract Words in L2 and HL

An aspect that is key to consider when working with vocabulary development in the classroom is that words related to emotions may be acquired differently in the second language and heritage language due to how they were learned (Altarriba & Basnight-Bown, 2012, p. 451). Some studies in language processing have examined the acquisition of words that contain emotional valence in the L2, foreign language and bilinguals (Altarriba & Bauer, 2004; Altarriba & Basnight-Bown, 2012; El-Dakhs & Altarriba, 2018). Emotional valence here refers to words that label or provoke an emotion, whether it is a positive or negative emotion (i.e., happy or sadness) (Altarriba & Bauer, 2004; Altarriba & Basnight- Bown, 2012).

Researchers agree that emotional words have a facilitative effect in recognition, attention and memory tasks in comparison to neutral words (e.g. *silla* ("chair" in English) (Altarriba & Basnight-Bown, 2012; Kuperman, Estes, Brysbaert & Warriner, 2014). For instance, Altarriba and Basnight-Bown (2012) studied the acquisition of concrete, abstract, and emotion words among L2 learners and found that even though the semantic representations of all types of words were acquired, there was a difference in which type was automatically activated. Their results showed that new words with emotional valence were produced faster than non- emotion words.

Results in Chapter 5 demonstrated that participants produced more words that contained affective valence. For example, the categories *tradición*, *familia,* and *religión* were some of the lemmas with more Spanish items. In terms of learning, researchers have suggested that emotion words seem to be more encoded in the native language (Altarriba, 2003; Pavlenko, 2008). This may indicate that HL learners, who are to some extent bilingual, still have a strong connection to emotional words since they learned Spanish in a naturalistic manner while growing up. That is why they were able to recall more words that contained emotional valence.

In the same vein, Vygotsky's (1987, 1997) approach to meaning making provides a rich understanding of the relationship between emotion and language development. Vigotski (2007) describes that the system of *thinking and languaging* is dialectically interconnected and creates verbal thinking which is the foundation for the development of consciousness: "These interconnections form a system in which language, thought, and social interaction influence one another as meaning is created" (Mahn & John-Steiner, 2012, p. 32). Regardless if the focus is L1, L2 or HL language acquisition, emotions are a

key part of an individual's development. Language acquisition is not only an internal process, it is also social and cultural (Mahn & John-Steiner, 2002; Vigotski, 2007). Second language and HL learners may behave emotionally different in the classroom because of their unique cultural, historical, and emotional experiences.

Understanding students' diverse experiences can help instructors develop vocabulary teaching strategies (Laufer, 1998; Altarriba & Basnight-Bown, 2012). For example, one strategy that could be used in language teaching scenarios is to introduce the three types of words (i.e., emotion, concrete, and abstract) and ask students to lead the discussion about text (cf. reciprocal teaching, Jaya, 2020; Palincsar & Brown, 1984; Spörer, Brustein, & Kieschke, 2009). The instructor can choose a text that is culturally and linguistically relevant to students' linguistic profile and proficiency level and expand on vocabulary size while developing other skills, such as generating questions, summarizing, clarifying vocabulary, and predicting what may come next (Spörer, Brustein, & Kieschke, 2009, p. 273). For instance, based on students' responses, the instructor can focus on developing those concepts that were identified as more sparse, such as *saludable*.

In order to do that, the instructor first needs to model how to lead a discussion using a different reading. Afterwards, the instructor will provide a different reading related to the given concept or topic, in this case, *saludable* (e.g., reading about healthy habits). That text will then be analyzed in small groups, and in each group, students will have a different role (e.g., prepare questions, summarize the text, clarify vocabulary using a dictionary, and predict what comes next). The goal of this activity is to encourage students to lead their own discussion and take turns as leader. This type of activity will be

very beneficial to students' vocabulary development because they are in charge of working with the terminology they encounter, and with developing ideas and understanding based on that text. This activity may help students to wonder beyond the text and connect meaning beyond the classroom and to their lives and own experiences.

(Determiner + Noun) Nominal Phrases

According to the data collected, one interesting finding that was observed was that several participants' responses included complete morphosyntactically formed structures, such as determiner + noun (e.g., *la clase*). This type of structure was provided by both L2 and HL learners. I did not find any example in which a participant would say "el flor" (English, "the" (masculine) "flower" (feminine)), that is, the use of a masculine determiner with a feminine noun. However, it should be mentioned that gender agreement has been shown to be problematic for both L2 and HL learners (Alarcón, 2009; Montrul, Foote, & Perpiñan, 2008). Hence, it is likely to encounter these types of constructions in beginner-level Spanish classes because Spanish nouns possess grammatical gender (i.e., feminine or masculine), and English lacks grammatical gender (Tokowicz & MacWhinney, 2005; Alarcón, 2009).

Studies in English-Spanish L2 bilinguals have been found that the masculine determiner tends to be the default determiner used when assigning gender to an English noun (Parafita- Couto et. al., 2016). Research in HL acquisition argues that HL learners tend to be accurate in gender agreement in syntactic structures such as *largas horas* (English, "long hours") (an example response from the category *hospital*). However, HL learners may have some issues with lexical gender identification such as "el/la enfermo" (English, "the sick person") (Montrul, Foote & Perpiñan, 2008). This pattern is not

relevant in this study because no examples of mismatching masculine/feminine determiner + masculine/feminine noun were found. However, it is important to mention and pay attention when teaching vocabulary as participants provided a "chunk" (determiner + noun) entry as if it were internalized and processed as one word. In the specific case of this study, what I want to emphasize is that due to the fact that Spanish has grammatical gender and English does not, many students in Beginner-level Spanish courses will learn vocabulary words as part of a morphosyntactic chunk (determiner + noun) instead of learning the noun as an independent item and apply gender agreement later via a determiner in pre-nominal position.

As previously discussed, it is important to highlight that concepts are not learned in isolation, and in many cases, learners will memorize the morphosyntactic chunk as part of their vocabulary items. For instructors, this means that each noun needs to be introduced in different contexts and activities so students can implicitly infer that the determiner and the noun are different parts of a morphosyntactic structure, and they do not always go together (Bybee, 2006; Croft, 2001).

Conclusion

The current chapter addressed the final research question of the present study by analyzing how semantic relatedness and the process of meaning-making can help instructors teach Spanish vocabulary to L2 and HL learners. I have highlighted the importance of being aware of our students' linguistic background and the prior knowledge that they bring to the classroom. In order to do that, it is recommended that instructors create and use a questionnaire, such as the *Opinio* survey proposed in this

dissertation, to learn about students' previous language exposure and the way they build their vocabularies. By using a method of diagnosis as such, instructors will be better equipped to design customized pedagogical tools and vocabulary activities that will better address their students' needs when developing their vocabulary repertoires.

In conclusion, the findings from the previous research questions (i.e., RQ1, RQ2, and RQ3), the pedagogical implications detailed above, and the proposed template presented in this section of the dissertation call for an alternative method of instruction where learners' experiences are used a baseline and foundation to further enrich learners' vocabulary repertoires via multiple activities tailored to better fit their linguistic and individual needs.

Concluding Remarks

The goal of the present study was to provide an alternative and innovative approach to teaching Spanish vocabulary to L2 and HL learners by integrating three different theoretically based approaches: 1) Semantic Neighborhood Density (SND), 2) Vygotsky's Meaning-Making processes, and 3) Second and Heritage Language Acquisition. The present study focused on the analysis of participants' language profiles as a baseline and diagnosis for further interventions when teaching Spanish vocabulary. Two language learning profiles from second language learners and heritage language learners of Spanish have been examined to determine whether there was a difference between participants' responses to the target words in Spanish provided in an electronic questionnaire created using *Opinio* software. This dissertation contributes to the existing literature in SND by proposing another approach different from corpus-based semantic

research studies that consisted on the implementation of a free association task (Nelson, McEvoy, & Schreiber, 2004; Nelson, McKinney, Gee, & Janczura, 1998).

I also proposed an alternative method of SND counts by using descriptive and inferential statistics rather than computational analysis, as well as, I incorporated a more qualitative approach to further examine student's responses by using inductive coding and grouping their responses into lemmas. Furthermore, this study contributes to Vygotsky's Meaning-Making Approach (Vigotski, 2007) because I used it as one of the theoretical pillars of this research in order to understand the foundation of SND as well as to examine vocabulary learning and acquisition in the L2 and HL learners. To the best of my knowledge, no previous research in Semantic Neighborhood Density has been used to analyze word relatedness in L2 and HL learners to set a baseline for pedagogical purposes. Additionally, using Vygotsky's Meaning-Making approach as part of the analysis and collecting participant responses in a free association task in the form of an electronic survey has added a new unexplored dimension to the project.

It was predicted that L2 learners and HL learners would differ in how they would construct meaning and build vocabulary based on semantic relatedness (Degani & Tokowicz, 2013). However, the findings of this study showed that L2 and HL learners only differed in certain categories such as *cuchara* (English "spoon") where HL learners produced more semantic associations in the target language (i.e., Spanish). This may be due to the previous input received by HL learners who grow up in a bilingual environment, that is, Spanish was the language primarily spoken at home (Potowski, 2008). The results also demonstrated that participants were able to produce a higher number of semantic associations in the target language for those categories identified as

coming from dense neighborhoods as defined by number of semantic associations (NoA), NoA in the target language, responses left blank, semantic size, and semantic richness. However, for those categories identified as belonging to sparse neighborhoods, L2 participants tended to respond in English, whereas HL learners were more inclined to leave more responses blank. These findings have implications in teaching as it informs us about what students know and what they need to learn or what instructors need to reinforce. Lastly, the results also showed that in both groups, some participants responded using language chunks (i.e., determiner + noun), produced more words that contained emotional valence, and, when in doubt, they used phonological similarity to semantically relate one concept to the target word.

By embarking on the present study, I gained insight on how L2 and HL learners build vocabulary (e.g., stronger and weaker areas for each population, use of cognates and false cognates), as well as how participants' prior knowledge and understanding how they build vocabulary can be applied into the language classroom. Using participants' background knowledge will not only enhance students' motivation, but it will also provide a strong foundation for vocabulary learning in Spanish as a L2 and HL courses. Language instructors, especially the ones that teach Spanish and face some challenges when addressing the multiple needs of their students, may use the kind of diagnostic questionnaire and teaching intervention strategies as the ones described in this dissertation project when approaching vocabulary learning in diverse language classrooms.

Limitations

To the best of my knowledge, I am not aware of research that integrates the fields of Semantic Neighborhood Density, Vygotsky Meaning-Making Approach, and Second and Heritage Language Acquisition as an integrative conceptual framework to study vocabulary development and learning of Spanish as a L2 and HL. Therefore, the analysis and interpretation of this study may present some imperfections since this is the first study that combines the above-mentioned theoretical postulates and used different measures when determining semantic richness beyond first languages in free association tasks.

For the present study, I developed a method of data collection and examination of the results that incorporated different approaches. While adapting and building my instrument and analysis from previous research (e.g., Buchanan et al., 2001; Nelson et al., 1998, 2004; Mahn, 2003, 2012; Parafita Couto et al., 2016; Torres, 2013; Vigostki, 2007; Zyzik, 2016), I advanced previous methodologies mentioned in the literature on SND by means of additional testing on the effects of SND and other lexical characteristics in word learning in L2 and HL adults. Consequently, some inconsistencies or areas for improvement may be recognized. For example, one thing that I would do differently would be having the survey written only in the target language (i.e., Spanish), instead of having it in English and Spanish. It is likely that some responses were primed because of this. Also, it would have been a good idea to do it orally instead of written where students had to listen to the cue words and respond verbally since previous research in HLA states that HL learners tend to perform better in aural tasks (Valdés, 1999; Montrul, 2010).

In addition, it would have also been helpful to add open-ended questions in the first set of the questions in the survey (background section) in order to have a deeper

understanding of participants' language profiles. For example: "Please provide few sentences about how you started learning Spanish" or "Provide an example of the first few words you said in Spanish/English or other languages if applicable." This would have contributed to better understanding their processes of meaning making and, therefore, contribute to the design of more efficient pedagogical interventions to learn vocabulary.

For the present study, the target population consisted of two groups: L2 and HL learners of Spanish, and the accessible population consisted of Beginner-level university students who were primarily from two colleges in the Southwest region of the United States. One of the strengths of this design is that I obtained data from two very different populations whose context I am familiar with, therefore, I was aware from the beginning of possible issues that could have arisen while collecting data, such as not having an equal sample of both populations or having to exclude participants that spoke more than one Romance language. In order to avoid inferential jumps (Bracht & Glass, 1968) we need to consider that the results of this study may not be generalizable to populations in different states or geographic regions due to the heterogeneity of what constitutes a heritage learner (Beaudrie & Fairclough, 2012; Carreira, 2004; Wilson & Ibarra, 2015; Zyzik 2016). Furthermore, the socioeconomic status in each region and college may be different, and for this reason, the results of this study may not be generalizable to populations across the country or in other countries.

For the present study, content validity was addressed by investigating and adapting previous research that examined SND and language acquisition (e.g., Buchanan et al., 2001; Nelson et al., 1998, 2004; Stamer & Vitevitch, 2012), Vygotsky's Meaning-

Making Approach (e.g., Vigotski, 2007; Mahn, 2003, 2012), and research in Second and Heritage Language Acquisition (e.g., Carreira, 2014, 2016; Nation, 2001, 2004, 2006; Zyzik, 2016). Secondly, I was also able to develop the *Opinio* survey based on three previous studies: Parafita Couto et al. (2016), Torres (2013), and Mahn (2003).

Future Research

The findings from the electronic survey and the proposal for language teaching interventions in vocabulary development of Spanish can be further advanced in future research by means of documenting vocabulary growth while implementing and contrasting different vocabulary teaching interventions. Additionally, a longitudinal research study that includes an immediate posttest (i.e., one week after) and delayed posttest (i.e., four weeks after) to assess if students have acquired the new vocabulary should be conducted in order to compare results over two or more semesters to demonstrate the robustness of both the survey as a baseline to teach vocabulary to L2 and HL learners and the impact of given teaching interventions that help learners to enhance their vocabulary repertoires in the target languages.

Also, a replication of the research study in other communities of the USA and outside where Spanish and English coexist as an L1, L2, HL language would determine if the findings in this study could be applied to other participants circumstances. It could also be interesting to replicate this study with other languages and heritages languages other than Spanish to determine if the results are similar for other populations.

Final Reflections

This study calls for a multi-layered method for teaching vocabulary which instructors can develop and adapt into their curriculums and activities to fit their students' needs. The present dissertation contributes to research on vocabulary learning and acquisition in the fields of SLA, HLA, and educational research and practice. First, it has contributed to SND by proposing a scope of analysis based on descriptive and inferential statistics, token and type frequency and the examination of lemmas. Second, the present study also incorporated the theoretical contribution of Vygotsky's (1987) meaning-making approach by using this framework as a foundation to understand SND and vocabulary development in L2 and HL learning. Vygotsky's meaning-making processes encourage instructors to go back to the origin of their students' language exposure and acquisition to better understand the way they create meaning and develop their system of concepts. Third, this research illustrates the need of a tailored- approach to teaching Spanish vocabulary to L2 and HL learners based on their own linguistic profiles and how they build vocabulary. As previously mentioned, HL learners and L2 learners not only differ in linguistic abilities, but they also differ in their affective, historic, and sociocultural profile (Carreira, 2014, 2016). That is why it is important to investigate the implementation of tools and teaching interventions as the ones used in this dissertation to help language instructors become aware of the cultural diversity of their students, as well as serve as an opportunity to learn and share experiences with students when mutually building vocabulary knowledge.

Appendix 1

This appendix shows the questions that appear in the *Opinio* Survey for participants to complete.

Background Questionnaire (adapted from Parafita Couto et al., 2016; Torres, 2013; Mahn, 2003)

BACKGROUND QUESTIONNAIRE
In this first section, I would like to know a little bit about your background and exposure to Spanish and English. Please fill out this information to support my study.

1. Are you: Male ☐ Female ☐ Other ☐?

2. Age:…….……

3. Number of years living in the US:…….……

4. Have you studied in a Spanish Speaking country?
Yes ☐ No ☐

5. If so, in which country?

6. From what age to what age?

7. If yes, what is the highest level of formal education that you completed in that country?
☐ Junior High or equivalent
☐ High School or equivalent
☐ Bachelor's Degree, Diploma of Higher/Further Education, or equivalent
☐ Master's Degree, Doctorate, or equivalent
☐ None of the above

8. Have you studied in a bilingual education, immersion or dual language program (a school where you learned Spanish and English at the same time?
☐ Yes
☐ No
☐ Other (Please specify) ……

9. How well do you feel you can speak Spanish?
☐ Only know some words and expressions
☐ Confident in basic conversations
☐ Fairly confident in extended conversations
☐ Confident in extended conversations

10. How well do you feel you can speak English?

☐ Only know some words and expressions
☐ Confident in basic conversations
☐ Fairly confident in extended conversations
☐ Confident in extended conversations

11. Which language(s) did your mother speak to you while you were growing up (if applicable)?
☐ Spanish
☐ English
☐ Spanish & English
☐ Other (Please specify) ……
☐ N/A

12. Which language(s) did your father speak to you while you were growing up (if applicable)?
☐ Spanish
☐ English
☐ Spanish & English
☐ Other (Please specify) ……
☐ N/A

13. Which language(s) did any other guardian or caregiver (i.e. grandmother, grandfather, aunt, cousins, siblings) speak to you while you were growing up (if applicable)?

☐ Spanish
☐ English
☐ Spanish & English
☐ Other (Please specify) ……
☐ N/A

14. Through which language(s) were you predominantly taught at primary school?

☐ Spanish
☐ English
☐ Spanish & English
☐ Other (Please specify) ……

15. Through which language(s) were you predominantly taught at secondary school?

☐ Spanish
☐ English
☐ Spanish & English
☐ Other (Please specify) ……

16. Please, click the percentage of Spanish you think you were exposed to in the following age periods:

Example:

Age periods	Percentages of exposure of Spanish					
	0-10 % (few words)	25% (Sometimes)	50% (half of the time)	50%-75% (very often)	Above 75% (most of the time/ always)	N/A
0-3 years old					✓	
4-5 years old					✓	
6-10 years old			✓			
10-13 years old		✓				
14-18 years old					✓	
Above 18					✓	

Please fill in table below

Age periods	Percentages of exposure of Spanish					
	0-10 % (few words)	25% (Sometimes)	50% (half of the time)	50%-75% (very often)	Above 75% (most of the time/ always)	N/A
0-3 years old						
4-5 years old						
6-10 years old						
10-13 years old						
14-18 years old						
Above 18						

17. In your everyday life, do you speak both English and Spanish with any of the following people? (You can select more than one answer)

☐ Friend
☐ Partner
☐ Family member
☐ Community member
☐ N/A

18. In your everyday life, do you speak Spanish with any of the following people? (You can select more than one answer)

☐ Friend
☐ Partner
☐ Family member
☐ Community member
☐ N/A

19. In what region are you currently enrolled in an institution where you are taking a Spanish course?

☐ **East Coast** (Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia)
☐ **Southeast** (Alabama, Florida, Georgia, Kentucky, Missouri, Mississippi, North Carolina, South Carolina, Tennessee, Arkansas, Louisiana)
☐ **Midwest** (Ohio, Michigan, Indiana, Illinois, Wisconsin, Iowa, Kansas, Nebraska, North Dakota, South Dakota, Minnesota, Oklahoma, Wyoming, Montana)
☐ **Southwest** (Nevada, Arizona, New Mexico, Colorado, Utah, Texas)
☐ **West Coast** (California, Washington, Oregon Hawaii, Alaska, Idaho)

20. Are you currently enrolled in a Spanish as a Heritage Language course?
Yes ☐
No ☐

21. Please write the full name of the course you are currently enrolled (i.e. SPAN101, Beginning Spanish I) ……

EVALUACIÓN SEMÁNTICA- SEMANTIC EVALUATION

En esta parte del cuestionario se le presentarán varias preguntas en español o inglés donde deberá escribir las primeras cinco palabras que le vengan a la mente cuando vea otra palabra. Por ejemplo: "escriba las palabras que le vienen a la mente relacionadas con COMIDA: aguacate, enchiladas, huevo, comer, deliciosa". Estas palabras pueden ser de cualquier categoría gramatical (i.e. sustantivo-tomate; verbo-comer; adjetivo-salada). Por favor, escriba las primeras palabras que se le ocurran, no hay respuestas correctas o incorrectas.

Si no se siente seguro deletreando o escribiendo una palabra en concreto por favor escriba un signo de interrogación al lado. Asimismo, si no puede pensar en más palabras para añadir, deje en blanco las casillas que corresponda.

Now in this section, you will be presented with words in Spanish or English. You will have to write the first five words that come to your mind when looking to another word. For example: write the first five words that come to your mind when you see FOOD (i.e. burger, to eat, fries, cupcake and salty). These words can belong to any grammatical category (i.e. noun-tomato, verb-to eat, adjective- salty). Please, write the first words that come to your mind, there are not correct or incorrect answers. Also, write a question mark next to the word if you are unsure or do not feel confident on how to spell or write a specific word. Also, leave the space blank if you cannot think of more words to write.

1. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: FAMILIA
   6. _____
   7. _____
   8. _____
   9. _____
   10. _____

2. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: CUCHARA

1. _____
2. _____
3. _____
4. _____
5. _____

3. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: FELIZ

1. _____
2. _____
3. _____
4. _____
5. _____

4. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: UNIVERSIDAD

1. _____
2. _____
3. _____
4. _____
5. _____

5. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: CAMISA

1. _____
2. _____
3. _____
4. _____
5. _____

6. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: HOSPITAL

1. _____
2. _____
3. _____
4. _____
5. _____

7. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: CASA

1. _____
2. _____
3. _____
4. _____

5. _____

8. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: TRADICIÓN

1. _____
2. _____
3. _____
4. _____
5. _____

9. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: MODERNA

1. _____
2. _____
3. _____
4. _____
5. _____

10. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: DEPORTES

1. _____
2. _____
3. _____
4. _____
5. _____

11. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: SALUDABLE

1. _____
2. _____
3. _____
4. _____
5. _____

12. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: COMPETIR

1. _____
2. _____
3. _____
4. _____
5. _____

13. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: VIAJES

1. _____
2. _____

3. _____
4. _____
5. _____

14. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: AMABLE

1. _____
2. _____
3. _____
4. _____
5. _____

15. Por favor, escriba las primeras cinco palabras que le vengan a la mente relacionadas con la palabra: AVENTURA

1. _____
2. _____
3. _____
4. _____
5. _____

16. Please, write the first five words that come to your mind related with the Word: FAMILY

1. _____
2. _____
3. _____
4. _____
5. _____

17. Please, write the first five words that come to your mind related with the Word: SPOON

1. _____
2. _____
3. _____
4. _____
5. _____

18. Please, write the first five words that come to your mind related with the Word: HAPPY

1. _____
2. _____
3. _____
4. _____
5. _____

19. Please, write the first five words that come to your mind related with the Word: UNIVERSITY

1. _____
2. _____
3. _____
4. _____
5. _____

20. Please, write the first five words that come to your mind related with the Word: SHIRT

1. _____
2. _____
3. _____
4. _____
5. _____

21. Please, write the first five words that come to your mind related with the Word: HOSPITAL

1. _____
2. _____
3. _____
4. _____
5. _____

22. Please, write the first five words that come to your mind related with the Word: HOUSE

1. _____
2. _____
3. _____
4. _____
5. _____

23. Please, write the first five words that come to your mind related with the Word: TRADITION

1. _____
2. _____
3. _____
4. _____
5. _____

24. Please, write the first five words that come to your mind related with the Word: MODERN

1. _____
2. _____
3. _____
4. _____
5. _____

25. Please, write the first five words that come to your mind related with the Word: SPORTS

1. _____
2. _____
3. _____
4. _____
5. _____

26. Please, write the first five words that come to your mind related with the Word: HEALTHY

1. _____
2. _____
3. _____
4. _____
5. _____

27. Please, write the first five words that come to your mind related with the Word: TO COMPETE

1. _____
2. _____
3. _____
4. _____
5. _____

28. Please, write the first five words that come to your mind related with the Word: TRAVELING

1. _____
2. _____
3. _____
4. _____
5. _____

29. Please, write the first five words that come to your mind related with the Word: KIND

1. _____
2. _____
3. _____
4. _____
5. _____

30. Please, write the first five words that come to your mind related with the Word: ADVENTURE

1. _____
2. _____
3. _____
4. _____

5. _____

31. Would you like to receive credit for completing this survey?
Yes ☐ No ☐

32. Thank you for completing this survey. If you would like to receive credit, please go ahead and email the following code to your instructor: ENCCOMP

Appendix 2

This appendix contains the percentages of participants (N= 451) that responded: 1) 0, 1, 2, 3, 4 or 5 semantic associations (NoA); 2) 0, 1, 2, 3, 4 or 5 Spanish semantic associations; 3) 0, 1, 2, 3, 4 or 5 English semantic associations; 4) 0, 1, 2, 3, 4 or 5 blank responses for the given Spanish categories (*familia, cuchara, feliz, universidad, camisa, hospital, casa, tradición, moderna, deportes, saludable, competir, viajes, amable, aventura)*

% responses participants	NoA (5)	NoA (4)	NoA (3)	NoA (2)	NoA (1)	NoA (0)	Blank (5)	Blank (4)	Blank (3)	Blank (2)	Blank (1)	Blank (0)	Eng (5)	Eng (4)	Eng (3)	Eng (2)	Eng (1)	Eng (0)	Span (5)	Span (4)	Span (3)	Span (2)	Span (1)	Span (0)
Familia	64	2	3	2	2	28	26	2	2	3	2	65	27	2	1	2	2	66	33	2	4	0	2	57
Cuchara	30	6	4	3	4	48	46	4	3	3	2	41	23	2	2	2	4	68	15	2	2	4	3	73
Feliz	45	8	8	6	6	27	25	4	5	6	6	53	24	5	5	3	4	60	17	5	6	6	9	57
Universidad	58	6	4	1	2	29	28	2	0	4	5	61	29	3	2	1	1	64	28	3	4	1	3	61
Camisa	42	4	6	5	4	38	35	3	6	6	3	48	24	2	4	3	2	65	20	2	4	4	3	67
Hospital	53	4	5	3	3	31	30	3	3	5	4	55	36	4	2	1	1	57	16	2	4	3	4	71
Casa	56	6	4	2	3	29	28	3	2	4	5	58	31	2	2	2	2	62	25	4	4	2	2	63
Tradición	44	7	5	4	6	33	32	5	4	5	6	48	28	2	3	2	2	63	17	4	3	4	5	67
Moderna	39	3	7	8	6	37	35	5	8	7	3	43	27	1	3	4	2	63	15	2	4	5	4	71
Deportes	53	5	7	2	1	31	28	1	2	6	5	57	31	2	3	3	2	59	23	4	6	1	1	65
Saludable	36	3	4	2	2	51	47	3	3	5	3	39	23	0	2	2	2	71	16	3	3	2	2	74
Competir	41	3	5	6	5	40	40	5	6	5	3	42	25	2	2	2	2	67	16	1	3	4	4	72
Viajes	42	3	5	2	3	45	45	3	2	4	3	43	26	1	1	1	1	69	17	2	3	1	2	75
Amable	37	4	6	4	4	45	43	3	4	5	4	41	24	2	2	2	1	70	15	3	4	3	4	72
Aventura	45	4	4	6	4	38	37	4	6	4	3	46	29	2	2	1	1	65	16	1	2	6	3	72
Average	46	4	5	N/A	N/A	37	35	3	4	N/A	N/A	49	27	2	2	N/A	N/A	64	19	3	4	N/A	N/A	68
Median	44	4	5	N/A	N/A	37	35	3	3	N/A	N/A	48	27	2	2	N/A	N/A	65	17	2	4	N/A	N/A	71

Appendix 3

This appendix contains the percentages of participants (N= 451) that responded: 1) 0, 1, 2, 3, 4 or 5 semantic associations (NoA); 2) 0, 1, 2, 3, 4 or 5 Spanish semantic associations; 3) 0, 1, 2, 3, 4 or 5 English semantic associations; 4) 0, 1, 2, 3, 4 or 5 blank responses for the given English categories (*family, spoon, happy, university, shirt, hospital, house, tradition, modern, sports, healthy, to compete, to travel, kind, adventure)*

% responses participants	No A (5)	No A (4)	No A (3)	No A (2)	NoA (1)	N of A (0)	Blank (5)	Blank (4)	Blank (3)	Blank (2)	Blank (1)	Blank (0)	Eng (5)	Eng (4)	Eng (3)	Eng (2)	Eng (1)	Eng (0)	Span (5)	Span (4)	Span (3)	Span (2)	Span (1)	Span (0)
Family	73	15	2	1	1	21	21	5	1	2	2	73	67	14	2	0	0	27	5	0	0	0	2	92
Spoon	66	14	4	3	1	22	22	5	3	4	3	67	65	14	3	2	1	26	2	0	1	1	0	95
Happy	63	16	6	2	2	22	22	4	2	5	5	65	62	15	4	2	2	26	2	1	1	1	1	95
University	73	14	2	1	0	20	20	5	1	2	3	74	69	14	2	1	0	25	4	0	0	1	0	94
Shirt	64	15	6	2	2	22	22	5	2	6	3	65	63	15	5	2	1	26	1	0	1	1	2	95
Hospital	67	15	4	1	1	23	22	5	1	4	3	68	66	14	3	1	0	26	1	1	1	0	1	95
House	68	13	4	1	1	22	21	5	1	4	4	69	64	13	3	2	1	27	3	0	1	0	2	92
Tradition	59	13	7	4	2	23	23	5	4	7	5	59	57	13	7	4	1	26	1	0	0	1	1	96
Modern	58	16	6	4	3	24	24	5	5	6	4	59	57	16	6	4	2	27	1	0	0	1	1	96
Sports	73	15	2	1	1	21	21	5	1	1	2	74	73	15	2	2	1	22	1	0	0	0	0	98
Healthy	67	14	4	2	1	21	21	5	3	4	4	67	65	14	4	2	1	24	2	0	1	0	0	97
To Compete	61	15	6	3	2	24	24	5	3	5	4	62	61	15	5	2	2	26	0	0	1	1	1	97
Traveling	68	13	4	1	2	22	23	5	2	3	3	68	67	13	2	2	1	26	1	0	1	0	0	96
Kind	60	14	6	3	3	22	23	5	3	6	6	60	58	14	6	2	2	25	1	0	0	0	1	97
Adventure	63	15	6	2	1	24	24	5	3	5	4	63	62	14	5	3	1	26	1	0	1	0	0	98
Average	65	N/A	N/A	N/A	N/A	N/A	22	N/A	N/A	N/A	N/A	N/A	64	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A
Median	66	N/A	N/A	N/A	N/A	N/A	22	N/A	N/A	N/A	N/A	N/A	64	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A

Appendix 4

This appendix shows the findings obtained in an independent t-test for HL and L2 learners for each of the provided Spanish categories.

VARIABLES IN SPANISH	HL (95)	L2 (356)	T-TEST
	Mean (SD)	Mean (SD)	P. Value
Total Blanks Familia	1.73 (2.27)	1.46 (2.19)	0.30
Total English Familia	1.32 (2.11)	1.59(2.26)	0.29
Total Spanish Familia	1.92 (2.34)	1.95 (2.35)	0.90
Total Noa Familia	3.13 (2.31)	3.50 (2.21)	0.15
Total Blanks Cuchara	2.44 (2.36)	2.69 (2.37)	0.36
Total English Cuchara	1.12(1.98)	1.41(2.16)	0.23
Total Spanish Cuchara	1.49 (2.14)	0.89 (1.76)	0.005 *
Total Noa Cuchara	2.22 (2.32)	2.05 (2.29)	0.52
Total Blank Feliz	2.24 (2.25)	1.71 (2.13)	0.18
Total English Feliz	1.33(2.09)	1.72 (2.18)	0.12
Total Spanish Feliz	1.59 (2.09)	1.42 (1.95)	0.46
Total Noa Feliz	2.79 (2.21)	3.05 (2.14)	1.97
Total Blanks Universidad	1.89 (2.31)	1.54 (2.20)	0.17
Total English Universidad	1.26 (2.10)	1.75(2.31)	0.07
Total Spanish Universidad	1.77 (2.26)	1.68(2.26)	0.73
Total Noa Universidad	2.98 (2.31)	3.37 (2.21)	0.13
Total Blank Camisa	2.11 (2.31)	2.20 (2.29)	0.73
Total English Camisa	1.43 (2.15)	1.50 (2.16)	0.77
Total Spanish Camisa	1.45 (2.11)	1.29 (2.03)	0.48
Total Noa Camisa	2.53 (2.33)	2.62 (2.29)	0.71
Total Blank Hospital	1.94 (2.35)	1.83 (2.23)	0.67
Total English Hospital	1.91 (2.38)	2.06 (2.39)	0.57
Total Spanish Hospital	1.13 (1.98)	1.10 (1.88)	0.89
Total Noa Hospital	3.01 (2.33)	3.11 (2.24)	0.70
Total Blank Casa	1.65 (2.26)	1.74 (2.22)	0.74
Total English Casa	1.32 (2.15)	1.81 (2.33)	0.06
Total Spanish Casa	2.03 (2.37)	1.45 (2.13)	0.02 *
Total Noa Casa	3.34 (2.23)	3.21 (2.23)	0.63
Total Blank Tradición	2.13 (2.27)	2.08 (2.26)	0.87
Total English Tradición	1.49 (2.16)	1.68 (2.27)	0.48
Total Spanish Tradición	1.38 (2.10)	1.19 (1.93)	0.41
Total Noa Tradición	2.81 (2.27)	2.78 (2.25)	0.90
Total Blank Moderna	2.39 (2.20)	2.32 (2.26)	0.83
Total English Moderna	1.29(2.05)	1.67 (2.26)	0.14

Total Spanish Moderna	1.33 (2.03)	0.97 (1.79)	0.10
Total Noa Moderna	3.08 (2.30)	2.54 (2.25)	0.04 *
Total Blank Deportes	1.74 (2.24)	1.68 (2.20)	0.83
Total English Deportes	1.68 (2.27)	1.83 (2.27)	0.57
Total Spanish Deportes	1.58 (2.19)	1.49 (2.15)	0.72
Total Noa Deportes	3.08 (2.30)	3.14 (2.25)	0.83
Total Blank Saludable	2.80 (2.30)	2.68 (2.37)	0.65
Total English Saludable	0.96 (1.88)	1.37 (2.16)	0.09
Total Spanish Saludable	1.46 (2.10)	0.97 (1.88)	0.03 *
Total Noa Saludable	2.04 (2.32)	2.15 (2.36)	0.69
Total Blank Competir	2.66 (2.27)	2.42 (2.31)	0.37
Total English Competir	1.16 (2.01)	1.56(2.24)	0.11
Total Spanish Competir	1.23 (2.00)	1.01 (1.86)	0.31
Total Noa Competir	2.28 (2.26)	2.56 (2.31)	0.30
Total Blank Viajes	2.55 (2.40)	2.52 (2.38)	0.92
Total English Viajes	1.21 (2.09)	1.48 (2.24)	0.30
Total Spanish Viajes	1.24 (2.10)	0.99 (1.89)	0.26
Total Noa Viajes	2.45 (2.40)	2.44 (2.37)	0.96
Total Blank Amable	2.65 (2.28)	2.51 (2.34)	0.59
Total English Amable	1.22 (2.05)	1.40 (2.18)	0.47
Total Spanish Amable	1.08 (1.84)	1.07 (1.90)	0.96
Total Noa Amable	2.15 (2.23)	2.33 (2.33)	0.48
Total Blank Aventura	2.52 (2.34)	2.24 (2.31)	0.30
Total English Aventura	1.21 (2.08)	1.74 (2.32)	0.04 *
Total Spanish Aventura	1.27 (2.03)	1.02 (1.86)	0.25
Total Noa Aventura	2.46 (2.32)	2.72 (2.30)	0.33

Appendix 5

This appendix shows the findings obtained in an independent t-test for HL and L2 learners for each of the provided English categories.

Variables In English	HL (95)	L2 (356)	T-TEST
	Mean (SD)	Mean (SD)	P. Value
Total Blanks Family	1.47 (2.01)	1.12 (2.22)	0.13
Total English Family	3.33 (2.29)	3.58 (2.20)	0.31
Total Spanish Family	0.20 (0.89)	0.30 (1.13)	0.42
Total Noa Family	3.49 (2.25)	3.88 (2.01)	0.10
Total Blanks Spoon	1.84 (2.29)	1.21 (2.01)	0.01*
Total English Spoon	3.07 (2.30)	3.60(2.15)	0.04*
Total Spanish Spoon	0.08 (0.60)	0.19 (0.86)	0.25
Total Noa Spoon	3.11 (2.30)	3.79 (2.00)	0.004*
Total Blank Happy	1.94 (2.36)	1.22 (1.97)	0.003*
Total English Happy	2.87 (2.39)	3.61 (2.08)	0.003*
Total Spanish Happy	0.24 (1.05)	0.16 (0.78)	0.42
Total Noa Happy	3.04 (2.36)	3.74 (1.98)	0.004*
Total Blanks University	1.39 (2.21)	1.04 (1.95)	0.14
Total English University	3.51 (2.26)	3.68 (2.13)	0.48
Total Spanish University	0.11 (0.72)	0.27 (1.07)	0.16
Total Noa University	3.61 (2.21)	3.94 (1.96)	0.16
Total Blank Shirt	1.81 (2.27)	1.26 (2.02)	0.03*
Total English Shirt	3.06 (2.32)	2.59 (2.12)	0.03*
Total Spanish Shirt	0.13 (0.75)	0.14 (0.65)	0.88
Total Noa Shirt	3.18 (2.26)	3.71(2.02)	0.03*
Total Blank English Hospital	1.75 (2.28)	1.21 (2.03)	0.03*
Total English English Hospital	3.06 (2.36)	3.67 (2.13)	0.02*
Total Spanish English Hospital	0.20 (0.88)	0.12 (0.66)	0.36
Total Noa English Hospital	3.26 (2.27)	3.78 (2.03)	0.03*
Total Blank House	1.65 (2.28)	1.12 (1.95)	0.02*
Total English House	3.09 (2.35)	3.60 (2.14)	0.05*
Total Spanish House	0.31 (0.14)	0.27 (1.00)	0.77
Total Noa House	3.34 (2.27)	3.82 (1.99)	0.04*
Total Blank Tradition	2.08 (2.27)	1.39 (2.01)	0.004*
Total English Tradition	2.80 (2.29)	3.50 (2.09)	0.005*
Total Spanish Tradition	0.12 (0.73)	0.11 (0.62)	0.96
Total Noa Tradition	2.87 (2.28)	3.62 (2.01)	0.002*
Total Blank Modern	2.04 (2.30)	1.51 (2.08)	0.03*
Total English Modern	2.86 (2.32)	3.39 (2.16)	0.04*
Total Spanish Modern	0.11 (0.72)	0.10 (0.58)	0.92
Total Noa Modern	2.97 (2.30)	3.48 (2.08)	0.04*
Total Blank Sports	1.41 (2.20)	1.08 (1.99)	0.17
Total English Sports	3.59 (2.20)	3.86 (2.05)	0.26

Total Spanish Sports	0 (0)	0.07 (0.52)	0.19
Total Noa Sports	3.59 (2.20)	3.90 (2.01)	0.20
Total Blank Healthy	1.76 (2.26)	1.20 (1.99)	0.02*
Total English Healthy	3.12 (2.31)	3.69 (2.08)	0.02*
Total Spanish Healthy	0.18 (0.90)	0.11 (0.67)	0.43
Total Noa Healthy	3.24 (2.26)	3.81 (1.98)	0.02*
Total Blank Compete	1.65 (2.23)	1.47 (2.11)	0.47
Total English Compete	3.26 (2.28)	3.44 (2.17)	0.49
Total Spanish Compete	0.07 (0.44)	0.08 (0.48)	0.89
Total Noa Compete	3.34 (2.23)	3.52 (2.10)	0.47
Total Blank Traveling	1.72 (2.32)	1.24 (2.04)	0.05*
Total English Traveling	3.13 (2.34)	3.63 (2.15)	0.05*
Total Spanish Traveling	0.13 (0.75)	0.12 (0.63)	0.88
Total Noa Traveling	3.34(2.30)	3.77 (2.03)	0.08
Total Blank Kind	1.89 (2.28)	1.39 (2.03)	0.04*
Total English Kind	3.05 (2.29)	3.49 (2.11)	0.08
Total Spanish Kind	0.05 (0.51)	0.10 (0.58)	0.51
Total Noa Kind	3.11 (2.28)	3.61 (2.02)	0.04*
Total Blank Adventure	2.01 (2.30)	1.33 (2.05)	0.005*
Total English Adventure	2.94 (2.31)	3.59 (2.11)	0.01*
Total Spanish Adventure	0.05 (0.51)	0.09 (0.58)	0.60
Total Noa Adventure	2.99 (2.30)	3.68 (2.04)	0.004*

List of References

Adelman, J. S., Brown, G. D., & Quesada, J. F. (2006). Contextual diversity, not word frequency, determines word-naming and lexical decision times. *Psychological Science*, *17*(9), 814–823.

Al Farsi, B. H. (2018). Word meaning in word identification during reading: Co-occurrence-based semantic neighborhood density effects. *Applied Psycholinguistics*, *39*(5), 779–809. https://doi.org/10.1017/S0142716417000583

Alarcón, I. (2009). The processing of gender agreement in L1 and L2 Spanish: Evidence from reaction time data. *Hispania*, 814-828.

Alarcón, I. (2010). Advanced heritage learners of Spanish: A sociolinguistic profile for pedagogical purposes. *Foreign Language Annals*, *43*(2), 269–288. https://doi.org/10.1111/j.1944-9720.2010.01078.x

Al-Darayseh, A. (2014). The Impact of Using Explicit/Implicit Vocabulary Teaching Strategies on Improving Students' Vocabulary and Reading Comprehension. *Theory & Practice in Language Studies*, *4*(6).

Alqahtani, M. (2015). The importance of vocabulary in language learning and how to be taught. *International journal of teaching and education*, *3*(3), 21-34.

Altarriba, J. (2003). Does cariño equal "liking"?: A theoretical approach to conceptual nonequivalence between languages. *International Journal of Bilingualism*, *7*(3), 305–322. https://doi.org/10.1177/13670069030070030501

Altarriba, J., & Basnight-Brown, D. M. (2012). The acquisition of concrete, abstract, and emotion words in a second language. *International Journal of Bilingualism*, *16*(4), 446-452.

Altarriba, J., & Bauer, L. M. (2004). The distinctiveness of emotion concepts: A comparison between emotion, abstract, and concrete words. *The American journal of psychology*, 389-410.

Balota, David A. & Coane, Jennifer H. (2008). Semantic Memory. En J. H. Byrne, H. Eichenbaum, R. Menzel, H. L. Roediger III & D. Sweatt (eds.), *Handbook of learning and memory: A comprehensive reference* (pp. 512-531). Amsterdam: Elsevier.

Baskin, S., İşcan, A., Karagöz, B., & Birol, G. (2017). The Use of Vocabulary Learning Strategies in Teaching Turkish as a Second Language. *Journal of Education and Practice*, 9.

Baumann, J. F., Kame'enui, E. J., & Ash, G. E. (2003). Research on vocabulary instruction: Voltaire redux. *Handbook of research on teaching the English language arts*, *2*(1), 752-785.

Baus, C., Costa, A., & Carreiras, M. (2008). Neighbourhood density and frequency effects in speech production: A case for interactivity. *Language and Cognitive Processes*, *23*(6), 866–888. https://doi.org/10.1080/01690960801962372

Beaudrie, S., Amezcua, A., & Loza, S. (2020). Critical language awareness in the heritage language classroom: Design, implementation, and evaluation of a curricular intervention. *International Multilingual Research Journal*, 1–21. https://doi.org/10.1080/19313152.2020.1753931

Beaudrie, S. M., & Fairclough, M. A. (2012). *Spanish as a heritage language in the United States: The state of the field* (Zimmerman Third Floor PC4068.U5 S63 2012). Washington, DC: Georgetown University Press, ©2012.

http://libproxy.unm.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=cat05987a&AN=unm.778857657&site=eds-live&scope=site

Berlin B., & Kay, P. (1969). Basic color terms. Berkeley, California: University of California Press.

Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. Cambridge University Press.

Bialystok, E. (2007). Cognitive Effects of Bilingualism: How Linguistic Experience Leads to Cognitive Change. *International Journal of Bilingual Education and Bilingualism*, *10*(3), 210–223. https://doi.org/10.2167/beb441.0

Bialystok, E. (2017). The bilingual adaptation: How minds accommodate experience. *Psychological Bulletin*, *143*(3), 233–262. https://doi.org/10.1037/bul0000099

Bracht, G. H., & Glass, G. V. (1968). The external validity of experiments. *American educational research journal*, *5*(4), 437-474.

Brown, H. D. (2007). *Principles of language learning and teaching* (5th ed). Pearson Longman.

Brown, R., Waring, R., & Donkaewbua, S. (2008). Incidental vocabulary acquisition from reading, reading-while-listening, and listening to stories. *Reading in a Foreign Language*, *20*(2), 136.

Brown, A. L., Palincsar, A. S., & Armbruster, B. B. (1984). Instructing comprehension-fostering activities in interactive learning situations. *Learning and comprehension of text*, 255-286.

Buchanan, L., Westbury, C., & Burgess, C. (2001). Characterizing semantic space: Neighborhood effects in word recognition. *Psychonomic Bulletin & Review*, *8*(3), 531–544.

Burgo, C. (2015). Current Approaches to Orthography Instruction For Spanish Heritage Learners: An Analysis Of Intermediate And Advanced Textbooks. *Normas*, *0*(5). https://doi.org/10.7203/Normas.5.6816

Bybee, J. (2002). Phonological evidence for exemplar storage of multiword sequences. *Studies in second language acquisition*, *24*(2), 215-221.

Bybee, J. (2006). From usage to grammar: The mind's response to repetition. *Language*, 711-733.

Carreira, M. (2004). Seeking explanatory adequacy: A dual approach to understanding the term 'heritage language learner'. *Heritage Language Journal*, *2*(1), 1–25.

Carreira, M. (2014). Teaching heritage language learners: A study of programme profiles, practices and needs. *Rethinking heritage language education*, 20-44.

Carreira, M. M. (2016). A general framework and supporting strategies for teaching mixed classes. In D. Pascual y Cabo (Ed.), *Studies in Bilingualism* (Vol. 49, pp. 159–176). John Benjamins Publishing Company. https://doi.org/10.1075/sibil.49.09car

Carreiras, M., Perea, M., & Grainger, J. (1997). Effects of orthographic neighborhood in visual word recognition: Cross-task comparisons. *Journal of Experimental Psychology-Learning Memory and Cognition*, *23*(4), 857–871.

Catalan, R. M. J. (2003). Sex differences in L2 vocabulary learning strategies. *International Journal of Applied Linguistics*, *13*(1), 54–77. https://doi.org/10.1111/1473-4192.00037

Chavez, Y. (2017). *El léxico español de los estudiantes de herencia de secundaria en Houston*. University of Houston.

Chin, N. B., & Wigglesworth, G. (2007). *Bilingualism* (1 edition). Routledge.

Collier, V. P., & Thomas, W. P. (2009). *Educating English learners for a transformed world*. Dual Language Education of New Mexico/Fuente Press.

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review*, *82*(6), 407–428. https://doi.org/10.1037/0033-295X.82.6.407

Coltheart M, Develaar E, Johansson JT, Besner D. Access to the internal lexicon. In: Dornic S, editor. Attention and performance VI. Erlbaum; Hillsdale, NJ: 1976

Correa, M. (2011). Heritage language learners of Spanish: What role does metalinguistic knowledge play in their acquisition of the subjunctive? In L. Ortiz (Ed.), Selected proceedings of the 13th Hispanic Linguistics Symposium (p. 128–138). Somerville, MA: Cascadilla Proceedings Project.

Corvalán, C. S. (2003). El español en Los Ángeles: aspectos morfosintácticos. *Ínsula: revista de letras y ciencias humanas*, (679), 19-24.

Costa, A., Heij, W. L., & Navarrete, E. (2006). The dynamics of bilingual lexical access. *Bilingualism: Language and Cognition*, *9*(2), 137–151. https://doi.org/10.1017/S1366728906002495

Costa, A., Santesteban, M., & Caño, A. (2005). On the facilitatory effects of cognate words in bilingual speech production. *Brain and Language*, *94*(1), 94–103. https://doi.org/10.1016/j.bandl.2004.12.002

Cozby, P. C. & Bates, S. C. (2012). *Methods in behavioral research*. McGraw-Hill.

Cree, G. S., McNorgan, C., & McRae, K. (2006). Distinctive features hold a privileged status in the computation of word meaning: Implications for theories of semantic memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *32*(4), 643–658. https://doi.org/10.1037/0278-7393.32.4.643

Cree, G. S., & McRae, K. (2003). Analyzing the factors underlying the structure and computation of the meaning of chipmunk, cherry, chisel, cheese, and cello (and many other such concrete nouns). *Journal of Experimental Psychology: General*, *132*(2), 163–201. https://doi.org/10.1037/0096-3445.132.2.163

Croft, W. (2001). *Radical construction grammar: Syntactic theory in typological perspective*. Oxford University Press on Demand.

Croft, W., & Cruse, D. A. (2004). *Cognitive Linguistics*. Cambridge University Press.

Cuenca, M. J., & Hilferty, J. (2011). *Introducción a la lingüística cognitiva* (1. ed., 5. impr). Ed. Ariel.

Danguecan, A. N., & Buchanan, L. (2016). Semantic Neighborhood Effects for Abstract versus Concrete Words. *Frontiers in Psychology*, *7*. https://doi.org/10.3389/fpsyg.2016.01034

Davies, M., & Face, T. L. (2006). *Vocabulary Coverage in Spanish Textbooks: How Representative is It?* 12.

De Groot, A. M., & Van Hell, J. G. (2005). The learning of foreign language vocabulary. *Handbook of bilingualism: Psycholinguistic approaches*, 9-29.

Degani, T., & Tokowicz, N. (2013). Cross-language influences: Translation status affects intraword sense relatedness. *Memory & Cognition*, *41*(7), 1046–1064. https://doi.org/10.3758/s13421-013-0322-9

Diaz, I. (2015). Training in Metacognitive Strategies for Students' Vocabulary Improvement by Using Learning Journals. *PROFILE Issues in Teachers' Professional Development*, *17*(1), 87–102. https://doi.org/10.15446/profile.v17n1.41632Dilek, Y., & Yürük, N. (2013). Using Semantic Mapping Technique in Vocabulary Teaching at Pre-Intermediate Level. *Procedia - Social and Behavioral Sciences*, *70*, 1531–1544. https://doi.org/10.1016/j.sbspro.2013.01.221

Doughty, C. (2004). Effects of instruction on learning a second language: A critique of instructed SLA research. *Form-meaning connections in second language acquisition*, 181-202.

Dover, Y., & Moore, Z. (2020). Using Free Association Networks to Extract Characteristic Patterns of Affect Dynamics. 18.

Ducar, C. M. (2008). Student Voices: The Missing Link in the Spanish Heritage Language Debate. *Foreign Language Annals*, *41*(3), 415–433. https://doi.org/10.1111/j.1944-9720.2008.tb03305.x

Duñabeitia, J. A., Avilés, A., & Carreiras, M. (2008). NoA's ark: Influence of the number of associates in visual word recognition. *Psychonomic Bulletin & Review*, *15*(6), 1072–1077. https://doi.org/10.3758/PBR.15.6.1072

El-Dakhs, D. A. S., & Altarriba, J. (2018). The Distinctiveness of Emotion Words: Does It Hold for Foreign Language Learners? The Case of Arab EFL Learners. *Journal of Psycholinguistic Research*, *47*(5), 1133–1149. https://doi.org/10.1007/s10936-018-9583-6

Enright, D. S., & McCloskey, M. L. (1985). Yes, talking!: Organizing the classroom to promote second language acquisition. *TESOL Quarterly*, *19*(3), 431-453.

Elgort I., Nation P. (2010) Vocabulary Learning in a Second Language: Familiar Answers to New Questions. In: Seedhouse P., Walsh S., Jenks C. (eds) Conceptualising 'Learning' in Applied Linguistics. Palgrave Macmillan, London.

Ellis, N. C. (1997). Vocabulary acquisition: Word structure, collocation, grammar, and meaning. Cambridge University Press.

Ellis, N. C. (2006). Language acquisition as rational contingency learning. *Applied linguistics*, *27*(1), 1-24.

Ellis, N. C., & Laporte, N. (1997). Contexts of acquisition: Effects of formal instruction and naturalistic exposure on second language acquisition. *Tutorials in bilingualism: Psycholinguistic perspectives*, 53-83.

Ellis, R. (2005). Measuring implicit and explicit knowledge of a second language: A psychometric study. *Studies in Second Language Acquisition*, *27*(02), 141–172. https://doi.org/10.1017/S027226310505014X

Ellis, R. (2009). Implicit and explicit learning, knowledge and instruction. *Implicit and Explicit Knowledge in Second Language Learning, Testing and Teaching*, *42*, 3–25.

Fairclough, M. (2011). Testing the lexical recognition task with Spanish/English bilinguals in the United States. *Language Testing*, *28*(2), 273–297. https://doi.org/10.1177/0265532210393151

Fairclough, M., & Mrak, N. A. (2003). La enseñanza del español a los hispanohablantes bilingües y su efecto en la producción oral. *Mi lengua: Spanish as a heritage language in the United States*, 198-212.

Fairclough, N. (1992). Introduction. In N. Fairclough (Ed.), Critical language awareness (pp. 1–29). London:Longman.

Fairclough, N. (2001). Language and power (2nd ed.). London: Longman.

Fairclough, N. (2007). Linguistic insights Discourse and contemporary social change. In N. Fairclough, G. Cortese & P. Ardizzone (Eds.), Discourse and contemporary social change (pp. 25–48). Bern: Peter Lang.

Felix, S. W. (1981). The Effect of Formal Instruction on Second Language Acquisition 1. *Language Learning*, *31*(1), 87-112.

Fishman, J. A. (2001). 300-plus years of heritage language education in the United States. In J. K. Peyton, D. A. Ranard, & S. McGinnis (Eds.), *Heritage languages in America: Preserving a national resource* (pp. 81–97). Washington, DC: Center for Applied Linguistics.

Floyd, S., & Goldberg, A. E. (2020). Children make use of relationships across meanings in word learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. https://doi.org/10.1037/xlm0000821

Freire, P. (1973). *Education for critical consciousness*. New York, NY: Seabury Press.

Freire, P. (1993). *Pedagogy of the oppressed*. (30th anniversary ed.). New York, NY: Continuum.

Freire, P. (2000). *Pedagogy of the oppressed: 30th anniversary edition*. New York, NY: Continuum International. (Original work published 1970)

Garlock, V. M., Walley, A. C., & Metsala, J. L. (2001). Age-of-Acquisition, Word Frequency, and Neighborhood Density Effects on Spoken Word Recognition by Children and

Adults☆. *Journal of Memory and Language*, *45*(3), 468–492. https://doi.org/10.1006/jmla.2000.2784

Gass, S. M., & Selinker, L. (2001). *Second Language Acquisition: An introductory Course* (2nd ed.). Erlbaum Associates.

Gass, S. M., & Selinker, L. (2008). *Second Language Acquisition: An Introductory Course*. Taylor & Francis.

Gee, J. P. (1996). Social linguistics and literacies: Ideology in discourses (2nd ed.). London: Taylor & Francis.

Gee, J. P. (1998). What is literacy? In V. Zamel & R. Spack (Eds.), Negotiating academic literacies: Teaching and learning across languages and cultures (pp. 51–59). New York: Routledge.

Giroux, H. A. (1983). Theory and resistance in education: A pedagogy for the opposition. South Hadley, MA: Bergin & Garvey.

Goldinger, S. D., Luce, P. A., & Pisoni, D. B. (1989). Priming lexical neighbors of spoken words: Effects of competition and inhibition. *Journal of Memory and Language*, *28*(5), 501–518. https://doi.org/10.1016/0749-596X(89)90009-0

Goldstein, B.A. (2012). *Bilingual Language Development and Disorders in Spanish-English Speakers 2nd edition*. Baltimore, MD: Brookes Publishing Company

Gonzales, M. D., & Gonzales de Tucker, C. (2009). Español, Nuestra Herencia, Nuestro Tesoro: Spanish as a Heritage Language. Boston: Pearson Learning Solutions.

Gray, S., Pittman, A., & Weinhold, J. (2014). Effect of Phonotactic Probability and Neighborhood Density on Word-Learning Configuration by Preschoolers with Typical

Development and Specific Language Impairment. *Journal of Speech Language and Hearing Research*, 1011. https://doi.org/10.1044/2014_JSLHR-L-12-0282

Gu, Y., & Johnson, R. (1996). Vocabulary learning strategies and language learning outcomes. *Language Learning*, *46*, 643–679.

Guo, L.-Y., McGregor, K. K., & Spencer, L. J. (2015). Are Young Children With Cochlear Implants Sensitive to the Statistics of Words in the Ambient Spoken Language? *Journal of Speech Language and Hearing Research*, *58*(3), 987. https://doi.org/10.1044/2015_JSLHR-H-14-0135

Haddad, M. T. A. (2020). *Vocabulary Learning Strategies of EFL Undergraduate Students at Al- Balqa Applied University in Jordan*. *16*(1), 8.

Hahn, U., Bailey, T. M., & Elvin, L. B. C. (2005). Effects of category diversity on learning, memory, and generalization. *Memory & Cognition*, *33*(2), 289–302. https://doi.org/10.3758/BF03195318

Han, Z., & Cheng-ling, A. C. (2010). Repeated-reading-based instructional strategy and vocabulary acquisition: A case study of a heritage speaker of Chinese. *Reading in a Foreign Language*, *22*(2), 242.

Hancock, Z. (2002). *Heritage Spanish speakers' language learning strategies*. Washington, DC: ERIC Clearinghouse on Languages and Linguistics.

Hatch, E. M., & Brown, C. (1995). *Vocabulary, semantics, and language education* (Zimmerman Third Floor P123 H313 1995). Cambridge; New York: Cambridge University Press, 1995.

Hay, J., & Baayen, R. (2005). Shifting paradigms: Gradient structure in morphology. *Trends in Cognitive Sciences*, *9*(7), 342–348. https://doi.org/10.1016/j.tics.2005.04.002

Heimlich, J. E., & Pittelman, S. D. (1986). *Semantic Mapping: Classroom Applications.* Newark, DE: International Reading Association.

Henriksen, B. (1999). Three dimensions of vocabulary development. *Studies in Second Language Acquisition*, *21*(2), 303–317.

Herdina, P., & Jessner, U. (2000). The dynamics of third language acquisition. *English in Europe: The acquisition of a third language*, *19*, 84.

Hernández Muñoz, N., & López García, M. (2014). Análisis De Las Relaciones Semánticas A Través De Una Tarea De Libre Asociación en español Con Mapas Auto-Organizados. *RLA. Revista de lingüística teórica y aplicada*, *52*(2), 189–212. https://doi.org/10.4067/S0718-48832014000200009.

Holguín Mendoza, C. (2018). Critical Language Awareness (CLA) for Spanish Heritage Language Programs: Implementing a Complete Curriculum. *International Multilingual Research Journal*, *12*(2), 65–79. https://doi.org/10.1080/19313152.2017.1401445

Hollich, G., Jusczyk, P. W., & Luce, P. A. (2002). Lexical neighborhood effects in 17-month-old word learning. *Proceedings of the 26th Annual Boston University Conference on Language Development*, *1*, 314–23.

Hornberger, N. H, & Wang, S. C. (2008). Who are our heritage language learners? In D. M. Brinton, O. Kagan, & S. Bauckus (Eds.), *Heritage language education: A new field emerging* (3–35). New York, NY: Routledge.

Hsiao, I. Y., Lan, Y.-J., Kao, C.-L., & Li, P. (2017). Visualization Analytics for Second Language Vocabulary Learning in Virtual Worlds. *Journal of Educational Technology & Society*, *20*(2), 161–175.

Hulstijn, J. H. (2015). *Language Proficiency in Native and Non-native Speakers: Theory and research*. John Benjamins Publishing Company.

Ivanova, I., & Costa, A. (2008). Does bilingualism hamper lexical access in speech production? *Acta Psychologica*, *127*(2), 277–288. https://doi.org/10.1016/j.actpsy.2007.06.003

John-Steiner, V. & Mahn, H. (1996). Sociocultural approaches to learning and development: A Vygotskian framework. *Educational Psychologist*, *31*(3/4), 191– 206.

Johnson, D. D., Pittelman, S. D., & Heimlich, J. E. (1986). Semantic mapping. *The Reading Teacher*, *39*(8), 778-783.

Kagan, O., & Dillon, K. (2008). Issues in heritage language learning in the United States. In N. Van Deusen-Scholl & N. Hornberger (Eds.), *Encyclopedia of Language and Education* (2 ed., Vol. 4, pp. 143–156). Spring Science & Business Media LLC.

Kersten, S. (2010). *The Mental Lexicon and Vocabulary Learning: Implications for the Foreign Language Classroom*. BoD – Books on Demand.

Koda, K. (1994). Second language reading research: Problems and possibilities. *Applied Psycholinguistics*, *15*(1), 1–28. https://doi.org/10.1017/S0142716400006950

Krashen, S. D. (1982). *Principles and practice in second language acquisition* (1st ed). Pergamon.

Krashen, S. D., & Terrell, T. D. (1983). *The Natural Approach: Language Acquisition in the Classroom*. The Alemany Press, P.

Kuperman, V., Estes, Z., Brysbaert, M., & Warriner, A. B. (2014). Emotion and language: Valence and arousal affect word recognition. *Journal of Experimental Psychology: General*, *143*(3), 1065–1081. https://doi.org/10.1037/a0035669

Lakoff, G. (2008). Women, fire and dangerous things: What categories reveal about the mind. University of Chicago press.

Langacker, R. W. (1987). *Foundations of cognitive grammar: Theoretical prerequisites* (Vol. 1). Stanford university press.

Langacker, R. W. (2008). *Cognitive grammar: A basic introduction*. Oxford University Press.

Laufer, B. (1992). Reading in a foreign language: How does L2 lexical knowledge interact with the reader's general academic ability'. *Journal of Research in Reading*, *15*(2), 95-103.

Laufer, B. (1998). The development of passive and active vocabulary in a second language: same or different?. *Applied linguistics*, *19*(2), 255-271.

Laufer, B. (2010). Form focused instruction in second language vocabulary learning. In R. Chacón-Beltrán, C. Abello-Contesse, M.M. Torreblanca-López & M.D. López- Jiménez (Eds.), *Further insights into non-native vocabulary teaching and learning* (pp. 15–27). Bristol, Buffalo, Toronto: Multilingual Matters.

Laufer, B. (2017). From word parts to full texts: Searching for effective methods of vocabulary learning. *Language Teaching Research*, *21*(1), 5–11. https://doi.org/10.1177/1362168816683118

Laufer, B., & Goldstein, Z. (2004). Testing vocabulary knowledge: Size, strength, and computer adaptiveness. *Language Learning*, *54*(3), 399–436.

Laufer, B., & Rozovski-Roitblat, B. (2011). Incidental vocabulary acquisition: The effects of task type, word occurrence and their combination. *Language Teaching Research*, *15*(4), 391–411.

Lee, J., & VanPatten, B. (2003). Processing Instruction and Structured Input. *Making Communicative Language Teaching Happen*, 137-172.

Leeman, J. (2018). Critical Language Awareness and Spanish as a Heritage Language. In K. Potowski & J. Muñoz-Basols (Eds.), *The Routledge Handbook of Spanish as a Heritage Language* (1st ed., pp. 345–358). Routledge. https://doi.org/10.4324/9781315735139-22

Lightbown, P. (1998). The importance of timing in focus on form. *Focus on form in classroom second language acquisition*, *177196*.

Lightbown, P. (2000). Anniversary article. Classroom SLA research and second language teaching. *Applied Linguistics*, *21*(4), 431–462. https://doi.org/10.1093/applin/21.4.431

Lightbown, P., & Spada, N. (2013). *How languages are learned 4th edition-Oxford Handbooks for Language Teachers*. Oxford, UK: Oxford university press.

Locker, L., Simpson, G. B., & Yates, M. (2003). Semantic neighborhood effects on the recognition of ambiguous words. *Memory & Cognition*, *31*(4), 505–515. https://doi.org/10.3758/BF03196092

Luce, P. A., & Pisoni, D. B. (1998). Recognizing spoken words: The neighborhood activation model. *Ear and Hearing*, *19*(1), 1.

Lund, K., & Burgess, C. (1996). Producing high-dimensional semantic spaces from lexical co-occurrence. *Behavior Research Methods, Instruments, & Computers*, *28*(2), 203–208. https://doi.org/10.3758/BF03204766

Lynch, A. (2003). Toward a theory of heritage language acquisition: Spanish in the United States. In A. Roca & C. Colombi (Eds.), *Spanish as a Heritage Language in the United States* (pp. 25–50). Washington, DC: Georgetown University Press.

Lynch, A. (2008). The linguistic similarities of Spanish heritage and second language learners. *Foreign Language Annals*, *41*(2), 252–381.

Macdonald, G. (2013). *Aging and Semantic Processing*.

Mahn, H. (1999). Vygotsky's Methodological Contribution to Sociocultural Theory. *Remedial and Special Education*, *20*(6), 341–350. https://doi.org/10.1177/074193259902000607

Mahn, H. (2003). *Periods in child development: Vygotsky's perspective* (pp. 119–137). https://doi.org/10.1017/CBO9780511840975.008

Mahn, H. (2012a). Vygotsky and Second Language Acquisition. In *the Encyclopedia of Applied Linguistics*. American Cancer Society. https://doi.org/10.1002/9781405198431.wbeal1272

Mahn, H. (2012b). Vygotsky's Analysis of Children's Meaning Making Processes. *International Journal of Educational Psychology*, *2*, 100–126. https://doi.org/10.4471/ijep.2012.07

Mahn, H. (2018). Essential aspects of Vygotsky's theoretical framework and methodological approach revealed in his analysis of unit(ie)s. *The Routledge Handbook of Sociocultural Theory and Second Language Development* (pp. 56-74). J. P. Lantolf, M. Poehner, & M. Swain (Eds.). NY, NY: Routledge Press

Mahn, H., & John-Steiner, V. (2002). The Gift of Confidence: A Vygotskian View of Emotions. In G. Wells & G. Claxton (Eds.), *Learning for Life in the 21st Century* (pp. 46–58). Blackwell Publishing Ltd. https://doi.org/10.1002/9780470753545.ch4

Mahn, H., & John-Steiner, V. (2012). Vygotsky and sociocultural approaches to teaching and learning. *Handbook of Psychology, Second Edition*, *7*.

Mahn, H., & Meyer, R. J. (2020). Vygotsky And Reclaiming Meaning. *Reclaiming Literacies as Meaning Making: Manifestations of Values, Identities, Relationships, and Knowledge*, 259.

Mainela-Arnold, E., Evans, J. L., & Coady, J. (2010). Beyond capacity limitations II: Effects of lexical processes on word recall in verbal working memory tasks in children with and without specific language impairment. *Journal of Speech, Language, and Hearing Research*, *53*(6), 1656–1672.

Mani, N., & Huettig, F. (2012). Prediction during language processing is a piece of cake—But only for skilled producers. *Journal of Experimental Psychology: Human Perception and Performance*, *38*(4), 843–847. https://doi.org/10.1037/a0029284

Marchman, V. A., Martinez-Sussmann, C., & Dale, P. S. (2004). The language-specific nature of grammatical development: Evidence from bilingual language learners. *Developmental Science*, *7*(2), 212–224. https://doi.org/10.1111/j.1467-7687.2004.00340.x

Marian, V., & Blumenfeld, H. (2006). Phonological neighborhood density guides lexical access in native and non-native language production. *Journal of Social and Ecological Boundaries*, *2*, 3–35.

Martínez, G. A. (2003). Classroom based dialect awareness in heritage language instruction: A critical applied linguistic approach. *Heritage Language Journal*, *1*(1), [np].

Martínez, G., Beaudrie, S. M., Fairclough, M., & Georgetown, U. P. (2016). Innovative Strategies for Heritage Language Teaching: A Practical Guide for the Classroom.

McPhedran, M. J. (2014). *The Effects of Semantic Neighborhood Density on the Processing of Ambiguous Words*.

McRae, K., Cree, G. S., Seidenberg, M. S., & Mcnorgan, C. (2005). Semantic feature production norms for a large set of living and nonliving things. *Behavior Research Methods*, *37*(4), 547–559. https://doi.org/10.3758/BF03192726

Meara, P. (1980). Vocabulary Acquisition: A Neglected Aspect of Language Learning. *Language Teaching*, *13*(3–4), 221–246. https://doi.org/10.1017/S0261444800008879

Meara, P. M. (1983). *Vocabulary in a second language* (1st ed). Centre for Information on Language Teaching and Research.7

Mirman, D. (2011). Effects of near and distant semantic neighbors on word production. *Cognitive, Affective, & Behavioral Neuroscience*, *11*(1), 32–43. https://doi.org/10.3758/s13415-010-0009-7

Mirman, D., & Magnuson, J. S. (2006). *The Impact of Semantic Neighborhood Density on Semantic Access*. 6.

Mirman, D., & Magnuson, J. S. (2008). Attractor dynamics and semantic neighborhood density: Processing is slowed by near neighbors and speeded by distant neighbors. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *34*(1), 65–79. https://doi.org/10.1037/0278-7393.34.1.65

Mokhtar, A. A., Rawian, R. M., Yahaya, M. F., Abdullah, A., & Mohamed, A. R. (2017). Vocabulary learning strategies of adult ESL learners. *The English Teacher*, 12.

Montrul, S. (2005). Second language acquisition and first language loss in adult early bilinguals: Exploring some differences and similarities. *Second Language Research*, *21*(3), 199–249. https://doi.org/10.1191/0267658305sr247oa

Montrul, S. (2010). Current Issues in Heritage Language Acquisition. *Annual Review of Applied Linguistics*, *30*, 3–23. https://doi.org/10.1017/S0267190510000103

Montrul, S. A. (2012). Is the heritage language like a second language? *EUROSLA Yearbook*, *12*, 1–29. https://doi.org/10.1075/eurosla.12.03mon

Montrul, S., Foote, R., & Perpiñán, S. (2008). Gender Agreement in Adult Second Language Learners and Spanish Heritage Speakers: The Effects of Age and Context of Acquisition. *Language Learning*, *58*(3), 503–553. https://doi.org/10.1111/j.1467-9922.2008.00449.x

Moody, S., Hu, X., Kuo, L.-J., Jouhar, M., Xu, Z., & Lee, S. (2018). Vocabulary Instruction: A Critical Analysis of Theories, Research, and Practice. *Education Sciences*, *8*(4), 180. https://doi.org/10.3390/educsci8040180

Moss, G. (1992). Cognate recognition: Its importance in the teaching of ESP reading courses to Spanish speakers. *English for specific purposes*, *11*(2), 141-158.

Mugford, G. (2008). Keeping a Critical Eye on "Lexical Friends": Cognates as Critical Pedagogy in Pre-Service Teacher Education. *Profile Issues in Teachers Professional Development*, (9), 129-142.

Müller, O., Duñabeitia, J. A., & Carreiras, M. (2010). Orthographic and associative neighborhood density effects: What is shared, what is different? *Psychophysiology*, *47*(3), 455–466. https://doi.org/10.1111/j.1469-8986.2009.00960.x

Nation, I. S. P. (1990). *Teaching and learning vocabulary* (Zimmerman Third Floor PE1128 A2 N34 1990). New York: Newbury House Publishers, ©1990.

Nation, I. S. P. (2001). *Learning vocabulary in another language.* New York: Cambridge University Press.

Nation, I. S. P. (2006). How large a vocabulary is needed for reading and listening? *Canadian Modern Language Review, 63*, 59–82.

Nation, I. S. P (2013). *Teaching and learning vocabulary.* Boston: Heinle Cengage Learning.

Nation, I. S. P., & Gu, P. Y. (2007). *Focus on vocabulary*. NCELTR.

Nation, I. S. P., & Waring, R. (1997). Vocabulary size, text coverage and word lists. In N. Schmitt & M. McCarthy (Eds.), *Vocabulary: Description, acquisition and pedagogy* (pp. 6-19). Cambridge, UK: Cambridge University Press.

Nation, I. S. P., & Webb, S. (2011). Content-based instruction and vocabulary learning. *Handbook of research in second language teaching and learning*, *2*, 631-644.

Nelson, D. L., Bennett, D. J., & Leibert, T. W. (1997). One step is not enough: Making better use of association norms to predict cued recall. *Memory & Cognition*, *25*(6), 785–796. https://doi.org/10.3758/BF03211322

Nelson, D. L., McKinney, V. M., Gee, N. R., & Janczura, G. A. (1998). Interpreting the influence of implicitly activated memories on recall and recognition. *Psychological Review*, *105*(2), 299–324. https://doi.org/10.1037/0033-295X.105.2.299

Nelson, D. L., Schreiber, T. A., & McEvoy, C. L. (1992). Processing implicit and explicit representations. *Psychological review*, *99*(2), 322.

Nelson, D. L., McEvoy, C. L., & Schreiber, T. A. (1994). The University of South Florida word association, rhyme and word frequency norms. *Unpublished manuscript*.

Nelson, D. L., McEvoy, C. L., & Schreiber, T. A. (2004). The University of South Florida free association, rhyme, and word fragment norms. *Behavior Research Methods, Instruments, & Computers*, *36*(3), 402–407. https://doi.org/10.3758/BF03195588

Nelson, K. (1977). The syntagmatic-paradigmatic shift revisited: a review of research and theory. *Psychological bulletin*, *84*(1), 93.

O'Malley, J. M., & Chamot, A. U. (1990). *Learning Strategies in Second Language Acquisition.* Cambridge: Cambridge University Press.

Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The measurement of meaning* (No. 47). University of Illinois press.

Otwinowska-Kasztelanic, A. (2009). Raising awareness of cognate vocabulary as a strategy in teaching English to Polish adults. *Innovation in Language Learning and Teaching*, *3*(2), 131–147. https://doi.org/10.1080/17501220802283186

Otwinowska, A., & Szewczyk, J. M. (2017). The more similar the better? Factors in learning cognates, false cognates and non-cognate words. *International Journal of Bilingual Education and Bilingualism*, 1–18. https://doi.org/10.1080/13670050.2017.1325834

Oxford, R. L. (1990). *Language Learning Strategies: What Every Teacher Should Know*. Boston: Heinle & Heinle.

Pajares, F. (2003). Self-Efficacy Beliefs, Motivation, And Achievement In Writing: A Review Of The Literature. *Reading & Writing Quarterly*, *19*(2), 139–158. https://doi.org/10.1080/10573560308222

Paradis, J., Genesee, F., & Crago, M. B. (2011). Dual Language Development & Disorder (pp. 88-108). Baltimore: Paul H.

Parafita Couto, M. C., Munarriz, A., Epelde, I., Deuchar, M., & Oyharçabal, B. (2016). Gender conflict resolution in Spanish–Basque mixed DPs. *Bilingualism: Language and Cognition*, *19*(4), 834–853. https://doi.org/10.1017/S1366728916000572

Pascual y Cabo, D. (Ed.). (2016). Advances in Spanish as a heritage language (Vol. 49) John Benjamins Publishing Company.

Pavlenko, A. (2008). Emotion and emotion-laden words in the bilingual lexicon. *Bilingualism: Language and Cognition*, *11*(2), 147–164. https://doi.org/10.1017/S1366728908003283

Pearson, B. Z. (1998). Assessing Lexical Development in Bilingual Babies and Toddlers. *International Journal of Bilingualism*, *2*(3), 347–372. https://doi.org/10.1177/136700699800200305

Perea, M., & Rosa, E. (2003). Los efectos de facilitación semántica con las tareas de decisión léxica síno y sólo-sí. *Psicothema*, *15*(1), 114–119.

Pérez, M. A. (2007). Age of acquisition persists as the main factor in picture naming when cumulative word frequency and frequency trajectory are controlled. *The Quarterly Journal of Experimental Psychology*, *60*(1), 32–42. https://doi.org/10.1080/17470210600577423

Pexman, P. M., Hargreaves, I. S., Siakaluk, P. D., Bodner, G. E., & Pope, J. (2008). There are many ways to be rich: Effects of three measures of semantic richness on visual word recognition. *Psychonomic Bulletin & Review*, *15*(1), 161–167. https://doi.org/10.3758/PBR.15.1.161

Polinsky, M. (1995). American Russian: Language loss meets language acquisition. In *Formal Approaches to Slavic Linguisitics. Cornell Meeting*. Michigan Slavic Publications.

Polinsky, M. (2011). Reanalysis in Adult Heritage Language: New Evidence in Support of Attrition. *Studies in Second Language Acquisition*, *33*(2), 305–328. https://doi.org/10.1017/S027226311000077X

Polinsky, M., & Kagan, O. (2007). Heritage Languages: In the ?Wild? and in the Classroom. *Language and Linguistics Compass*, *1*(5), 368–395. https://doi.org/10.1111/j.1749-818X.2007.00022.x

Potowski, K. (2005). *Fundamentos de la enseñanza del español a hispanohablantes en los EE. UU*. Arco Libros.

Potowski, K. (2008) ¿Por qué ofrecen una clase para hispanohablantes? In Jennifer Ewald & Anne Edstrom (Eds.), *El español a través de la lingüística: Preguntas y respuestas*. Somerville, MA: Cascadilla (228-241).

Potowski, K., & Carreira, M. (2004). Teacher Development and National Standards for Spanish as a Heritage Language. *Foreign Language Annals*, *37*(3), 427–437. https://doi.org/10.1111/j.1944-9720.2004.tb02700.x

Potowski, K., & Muñoz-Basols, J. (Eds.). (2018). *The Routledge handbook of Spanish as a heritage language*. New York, NY: Routledge.

Quillian, M. R. (1962). A revised design for an understanding machine. Mechanical translation, *7* (1), 17-29.

Quillian, M. R. (1967). Word concepts: A theory and simulation of some basic semantic capabilities. *Behavioral science*, *12*(5), 410-430.

Reilly, M., & Desai, R. H. (2017). Effects of semantic neighborhood density in abstract and concrete words. *Cognition*, *169*, 46–53. https://doi.org/10.1016/j.cognition.2017.08.004

Richards, J. C. (1976). The Role of Vocabulary Teaching. *TESOL Quarterly*, *10*(1), 77. https://doi.org/10.2307/3585941

Ringbom, H. (1987). *The role of the first language in foreign language learning* (Vol. 34). Clevedon: Multilingual Matters.

Rivers, W. M., & Temperley, M. S. (1978). *A Practical Guide to the Teaching of English as a Second or Foreign Language*. Oxford University Press, 200 Madison Ave., New York, NY 10016.

Roca, A. (1974). Resources in the national interest: linguistic diversity in the United States. *International Journal of the Sociology of Language*, (79-80).

Rodd, J., Gaskell, G., & Marslen-Wilson, W. (2002). Making Sense of Semantic Ambiguity: Semantic Competition in Lexical Access. *Journal of Memory and Language*, *46*(2), 245–266. https://doi.org/10.1006/jmla.2001.2810

Rodrigo, V. (2009). Componente léxico y hábito de lectura en hablantes nativos y no nativos de español. *Hispania*, 580–592.

Rodríguez-González, E. (2012). Processing of Spanish Preterite Regular and Irregular Verbs: The Role of Neighborhood Density. *The Spanish Journal of Psychology*, *15*(1), 35–47. https://doi.org/10.5209/rev_SJOP.2012.v15.n1.37282

Rohde, D. L. T., Gonnerman, L. M., & Plaut, D. C. (2004). *An Improved Model of Semantic Similarity Based on Lexical Co-Occurrence*. 33.

Rosch, E.H. (1973). Natural categories. *Cognitive psychology,* 4(3)328-350.

Rubin, J. (1987). Learner strategies: Theoretical assumptions, research history and typology. In A. Wenden & J. Rubin (Eds.), *Learner strategies in language learning* (pp. 15–30). Englewood, NJ: Prentice Hall.

Sadat, J., Martin, C. D., Costa, A., & Alario, F.-X. (2014). Reconciling phonological neighborhood effects in speech production through single trial analysis. *Cognitive Psychology*, *68*, 33–58. https://doi.org/10.1016/j.cogpsych.2013.10.001

Samuelson, L., & Smith, L. B. (2000). Grounding Development in Cognitive Processes. *Child Development*, *71*(1), 98–106. https://doi.org/10.1111/1467-8624.00123

Sánchez-Muñoz, A. (2016). Heritage language healing? Learners' attitudes and damage control in a heritage language classroom. In D. Pascual y Cabo (Ed.), *Studies in Bilingualism* (Vol. 49, pp. 205–218). John Benjamins Publishing Company. https://doi.org/10.1075/sibil.49.11san

Sanz, C., & Leow, R. P. (2011). *Implicit and Explicit Language Learning: Conditions, Processes, and Knowledge in SLA and Bilingualism*. Georgetown University Press.

Saville-Troike, P. M. (2012). *Introducing Second Language Acquisition* (2 edition). Cambridge University Press.

Schewel, R. (1989). Semantic Mapping: A Study Skills Strategy. *Academic Therapy*, *24*(4), 439–447. https://doi.org/10.1177/105345128902400407

Schmitt, N. (1997). Vocabulary learning strategies. In N. Schmitt & M. McCarthy (Eds.), *Vocabulary. Description, acquisition and pedagogic* (pp. 199–227). Cambridge, England: Cambridge University Press.

Schmitt, N. (2000). *Vocabulary in Language Teaching.* Cambridge: Cambridge University Press.

Schmitt, N. (2008). Review article: Instructed second language vocabulary learning. *Language Teaching Research*, *12*(3), 329–363. https://doi.org/10.1177/1362168808089921

Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual*. Basingstoke: Palgrave Macmillan.

Schmitt, N. (2019). Understanding vocabulary acquisition, instruction, and assessment: A research agenda. *Language Teaching*, *52*(02), 261–274. https://doi.org/10.1017/S0261444819000053

Shanahan, T. (2005). *The National Reading Panel Report:* 48.

Smith, J. (2002). Learning styles: Fashion fad or lever for change? The application of learning style theory to inclusive curriculum delivery. *Innovations in Education and Teaching International*, *39*(1), 63-70.

Solon, Megan E. (2007). *Word Frequency and Neighborhood Density Effects on L2 Spanish Vocabulary Development*. 65.

Spörer, N., Brunstein, J. C., & Kieschke, U. (2009). Improving students' reading comprehension skills: Effects of strategy instruction and reciprocal teaching. *Learning and Instruction*, *19*(3), 272–286. https://doi.org/10.1016/j.learninstruc.2008.05.003

Stacy, A. W. (1997). Memory activation and expectancy as prospective predictors of alcohol and marijuana use. *Journal of abnormal psychology*, *106*(1), 61.

Stamer, M. K., & Vitevitch, M. S. (2012). Phonological similarity influences word learning in adults learning Spanish as a foreign language. *Bilingualism: Language and Cognition*, *15*(03), 490–502. https://doi.org/10.1017/S1366728911000216

Steyvers, M., Shiffrin, R. M., & Nelson, D. L. (2005). Word Association Spaces for Predicting Semantic Similarity Effects in Episodic Memory. In A. F. Healy (Ed.), *Experimental cognitive psychology and its applications.* (pp. 237–249). American Psychological Association. https://doi.org/10.1037/10895-018

Steyvers, M., & Tenenbaum, J. B. (2005). The Large-Scale Structure of Semantic Networks: Statistical Analyses and a Model of Semantic Growth. *Cognitive Science*, *29*(1), 41–78. https://doi.org/10.1207/s15516709cog2901_3

Stokes, S. F. (2010). Neighborhood density and word frequency predict vocabulary size in toddlers. *Journal of Speech, Language, and Hearing Research*, *53*(3), 670–683.

Storkel, H. L., Bontempo, D. E., Aschenbrenner, A. J., Maekawa, J., & Lee, S.-Y. (2013). The Effect of Incremental Changes in Phonotactic Probability and Neighborhood Density on Word Learning by Preschool Children. *Journal of Speech, Language, and Hearing Research*, *56*(5), 1689–1700. https://doi.org/10.1044/1092-4388(2013/12-0245)

Storkel, Holly L. (2001). Learning new words: Phonotactic probability in language development. *Journal of Speech, Language, and Hearing Research*, *44*(6), 1321–1337.

Storkel, Holly L. (2003). Learning new words II: Phonotactic probability in verb learning. *Journal of Speech, Language, and Hearing Research*, *46*(6), 1312–1323.

Storkel, Holly L. (2004). Methods for minimizing the confounding effects of word length in the analysis of phonotactic probability and neighborhood density. *Journal of Speech, Language, and Hearing Research*, *47*(6), 1454–1468.

Storkel, Holly L. (2009). Developmental differences in the effects of phonological, lexical and semantic variables on word learning by infants. *Journal of Child Language*, *36*(02), 291. https://doi.org/10.1017/S030500090800891X

Storkel, Holly L., & Adlof, S. M. (2009). The Effect of Semantic Set Size on Word Learning by Preschool Children. *Journal of Speech, Language, and Hearing Research*, *52*(2), 306–320. https://doi.org/10.1044/1092-4388(2009/07-0175)

Storkel, Holly L., Armbrüster, J., & Hogan, T. P. (2006). Differentiating phonotactic probability and neighborhood density in adult word learning. *Journal of Speech, Language, and Hearing Research*, *49*(6), 1175–1192.

Storkel, Holly L., Bontempo, D. E., & Pak, N. S. (2014). Online Learning From Input Versus Offline Memory Evolution in Adult Word Learning: Effects of Neighborhood Density and Phonologically Related Practice. *Journal of Speech Language and Hearing Research*, *57*(5), 1708. https://doi.org/10.1044/2014_JSLHR-L-13-0150

Storkel, Holly L., Maekawa, J., & Hoover, J. R. (2010). Differentiating the effects of phonotactic probability and neighborhood density on vocabulary comprehension and

production: A comparison of preschool children with versus without phonological delays. *Journal of Speech, Language, and Hearing Research*, *53*(4), 933–949.

Stoller, F., & Grabe, W. (1993). Implications for L2 vocabulary acquisition and instruction from L1 vocabulary research. *Second language reading and vocabulary learning*, 24-45.

Taler, V., Aaron, G. P., Steinmetz, L. G., & Pisoni, D. B. (2010). Lexical Neighborhood Density Effects on Spoken Word Recognition and Production in Healthy Aging. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *65B*(5), 551–560. https://doi.org/10.1093/geronb/gbq039

Terrell, T. D. (1986). Acquisition in the Natural Approach: The Binding/Access Framework. *The Modern Language Journal*, *70* (3), 213-227. https://doi.org/10.2307/326936

Thompson. I. (1987). Memory in language learning. In A. Wenden & J. Rubin (Eds.), *Learner Strategies in Language Learning* (pp. 15–30). New Jersy: Prentic-Hall.

Tokowicz, N., & MacWhinney, B. (2005). Implicit and explicit measures of sensitivity to violations in second language grammar: An event-related potential investigation. *Studies in second language acquisition*, *27*(2), 173-204.

Tomlinson, C.A., & Imbeau, M.B. (2013). Assessment and Student Success in a Differentiated Classroom.

Torres, J. R. (2013). *Heritage and second language learners of Spanish: The roles of task complexity and inhibitory control*. https://repository.library.georgetown.edu/handle/10822/558678

Torres, K. M., Arrastia-Chisholm, M. C., & Tackett, S. (2020). Perceptions of Writing Anxiety and Self-Efficacy Among Spanish Heritage Language Learners. *Journal of Hispanic Higher Education*, *19*(1), 84–98. https://doi.org/10.1177/1538192718775175

Traxler, M. J. (2011). *Introduction to psycholinguistics: Understanding language science*. John Wiley & Sons.

Valdés, G. (1981). Pedagogical implications of teaching Spanish to the Spanish-speaking in the United States. *Teaching Spanish to the Hispanic bilingual: Issues, aims, and methods*, 3-20.

Valdés, G. (1999). Incipient bilingualism and the development of English language writing abilities in the secondary school. *So much to say: Adolescents, bilingualism, and ESL in the secondary school*, 138-175.

Valdés, G. (2001). *Learning and not learning English: Latino students in American schools.* New York, NY: Teachers College, Columbia University.

Valdés, G. (2005). Bilingualism, heritage language learners, and SLA research: Opportunities lost or seized? *The Modern Language Journal*, *89*(3), 410–426.

Van Deusen-Scholl, N. (2003). Toward a Definition of Heritage Language: Sociopolitical and Pedagogical Considerations. *Journal of Language, Identity & Education*, *2*(3), 211–230. https://doi.org/10.1207/S15327701JLIE0203_4

Van Heuven, W. J. B., Dijkstra, T., & Grainger, J. (1998). Orthographic Neighborhood Effects in Bilingual Word Recognition. *Journal of Memory and Language*, *39*(3), 458–483. https://doi.org/10.1006/jmla.1998.2584

VanPatten, B., Williams, J., Rott, S., & Overstreet, M. (2004). *Form-Meaning Connections in Second Language Acquisition*. Routledge.

Velasquez, E. V. (2015). *Reconocimiento léxico y comprensión lectora de los estudiantes de español como lengua de herencia*. University of Houston.

Vitevitch, M. S. (1997). The neighborhood characteristics of malapropisms. *Language and Speech*, *40*(3), 211–228.

Vitevitch, M. S. (2002). The influence of phonological similarity neighborhoods on speech production. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *28*(4), 735–747. https://doi.org/10.1037//0278-7393.28.4.735

Vitevitch, M. S. (2007). The spread of the phonological neighborhood influences spoken word recognition. *Memory & Cognition*, *35*(1), 166–175. https://doi.org/10.3758/BF03195952

Vitevitch, M. S., & Luce, P. A. (2016). Phonological Neighborhood Effects in Spoken Word Perception and Production. *Annual Review of Linguistics*, *2*(1). https://doi.org/10.1146/annurev-linguist-030514-124832

Vitevitch, M. S., Luce, P. A., Charles-Luce, J., & Kemmerer, D. (1997). Phonotactics and syllable stress: Implications for the processing of spoken nonsense words. *Language and Speech*, *40*(1), 47–62.

Vitevitch, M. S., & Luce, P. A. (1998). When Words Compete: Levels of Processing in Perception of Spoken Words. *Psychological Science*, *9*(4), 325–329. https://doi.org/10.1111/1467-9280.00064

Vitevitch, M. S., & Luce, P. A. (1999). Probabilistic Phonotactics and Neighborhood Activation in Spoken Word Recognition. *Journal of Memory and Language*, *40*(3), 374–408. https://doi.org/10.1006/jmla.1998.2618

Vitevitch, M. S., & Rodríguez, E. (2005). Neighborhood density effects in spoken word recognition in Spanish. *Journal of Multilingual Communication Disorders*, *3*(1), 64–73. https://doi.org/10.1080/14769670400027332

Vitevitch, M. S., & Sommers, M. S. (2003). The facilitative influence of phonological similarity and neighborhood frequency in speech production in younger and older adults. *Memory & Cognition*, *31*(4), 491–504.

Vitevitch, M. S., & Stamer, M. K. (2006). The curious case of competition in Spanish speech production. *Language and Cognitive Processes*, *21*(6), 760–770. https://doi.org/10.1080/01690960500287196

Vitevitch, M. S., & Storkel, H. L. (2013). Examining the Acquisition of Phonological Word Forms with Computational Experiments. *Language and Speech*, *56*(4), 493–527. https://doi.org/10.1177/0023830912460513

Vigotski, L. S. (2007). Pensamiento y habla [Thought and speech](A. González, Trans.). *Buenos Aires: Colihue.(Original work published in 1934)*.

Vygotsky, L. S. (1987). *Problems of general psychology. The collected works of L. S. Vygotsky: Vol. 1*. Including the volume *Thinking and Speech*. New York, NY: Plenum.

Vygotsky, L.S. (1997*). The history of the development of higher mental functions*. *The collected works of L. S. Vygotsky: Vol. 4. Problems of the theory and history of psychology*. New York: Plenum.

Vygotsky, L. S. (1998). *The Problem of Age. The collected works of L. S. Vygotsky: Vol. 5. Child psychology*. New York: Plenum.

Vygotsky, L. S., Rieber, R. W., & Carton, A. S. (1988). *The Collected Works of L. S. Vygotsky: Problems of General Psychology, Including the Volume Thinking and Speech.* Springer.

Walsh, C. (2007). Shifting the Geopolitics of Critical Knowledge: Decolonial thought and cultural studies 'others' in the Andes. *Cultural Studies*, *21*(2–3), 224–239. https://doi.org/10.1080/09502380601162530

Wickham, H. (2014). Tidy data. *Journal of Statistical Software*, *59*(10), 1-23.

Widdowson, H. G. (1978). *Teaching language as communication*. Oxford University Press.

Wilcox, A., & Medina, A. (2013). Effects of semantic and phonological clustering on L2 vocabulary acquisition among novice learners. *System*, *41*(4), 1056–1069. https://doi.org/10.1016/j.system.2013.10.012

Wilson, D. V. (2006). How do we fight history?: Language trauma, historical factors, and linguistic consequences. *The Politics of Language.* Paper presented at The Politics of Language Conference, Oct. 21, 2006. University of New Mexico.

Wilson, D. V., & Ibarra, C. E. (2015). Understanding the inheritors: The perception of beginning-level students toward their Spanish as a heritage language program. *EuroAmerican Journal of Applied Linguistics and Languages*, *2*(2), 85–101.

Wilson, D. V., & Martínez, R. (2011). Diversity in definition: Integrating history and student attitudes in understanding heritage learners of Spanish in New Mexico. *Heritage Language Journal*, *8*(2), 270–288.

Yap, M. J., Lim, G. Y., & Pexman, P. M. (2015). Semantic richness effects in lexical decision: The role of feedback. *Memory & Cognition*, *43*(8), 1148–1167. https://doi.org/10.3758/s13421-015-0536-0

Yap, M. J., Pexman, P. M., Wellsby, M., Hargreaves, I. S., & Huff, M. J. (2012). An Abundance of Riches: Cross-Task Comparisons of Semantic Richness Effects in Visual

Word Recognition. *Frontiers in Human Neuroscience*, *6*. https://doi.org/10.3389/fnhum.2012.00072

Yap, M. J., Tan, S. E., Pexman, P. M., & Hargreaves, I. S. (2011). Is more always better? Effects of semantic richness on lexical decision, speeded pronunciation, and semantic classification. *Psychonomic Bulletin & Review*, *18*(4), 742–750. https://doi.org/10.3758/s13423-011-0092-y

Yates, M., Locker, L., & Simpson, G. B. (2003). Semantic and phonological influences on the processing of words and pseudohomophones. *Memory & Cognition*, *31*(6), 856–866. https://doi.org/10.3758/BF03196440

Zahedi, Y., & Abdi, M. (2012). The Effect of Semantic Mapping Strategy on EFL Learners' Vocabulary Learning. *Procedia - Social and Behavioral Sciences*, *69*, 2273–2280. https://doi.org/10.1016/j.sbspro.2012.12.198

Zentella, A. C. (1978). *Code switching and interactions among Puerto Rican children* (No. 50). Southwest Educational Development Laboratory.

Zentella, A. C. (2000). Puerto Ricans in the United States: Confronting the linguistic repercussions of colonialism. *New immigrants in the United States: Readings for second language educators*, 137-164.

Zyzik, E. (2016). Towards a prototype model of the heritage language learner: Understanding strengths and needs. In M. Fairclough and S. Beaudrie (Eds.), *Innovative approaches to heritage language teaching* (pp. 19-38). Washington, DC: Georgetown University Press.