

**THE INTERPRETATION OF N+N AND V+N COMPOUNDS
BY SPANISH HERITAGE SPEAKERS**

A Dissertation

by

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ABSTRACT

This study investigates how Spanish heritage language speakers interpret two types of compound constructions in Spanish: head-initial $[N+N]_N$ (e.g., *obra cumbre* ‘masterpiece,’ lit. ‘work summit’) and exocentric $[V+N]_N$ (e.g., *pelagatos* ‘poor man,’ lit. ‘peel+cats’). It was hypothesized that the greater the exposure of participants to English (that has right-headed compounds) the less Spanish-like their pattern of interpreting N-N compounds as left-headed. Further, it was hypothesized that Spanish heritage language speakers who acquire the V-O construction early (prior to age 12) and are thus more likely to be familiar with the conventional mechanism of word formation with the V-N configuration would be more accurate in interpreting $[V+N]_N$ than $[N+N]_N$ compounds, regardless of their degree of English-exposure. Finally, it was predicted that compounds that are higher in semantic transparency/opacity would be interpreted more accurately than those lower in opacity.

Spanish-English speakers were administered a compound interpretation task in which participants were to select the correct definition for 40 compound words in Spanish. Participants were classified into three groups: late sequential bilinguals who acquired Spanish monolingually in Mexico and learned English after age 12, early sequential bilinguals who acquired Spanish monolingually in the home but came into contact with English at approximately age 6 when they started school, and simultaneous bilinguals who acquired both languages early at home and for whom English has been the language of instruction and the dominant language in most social contexts. The

performance of these groups was compared to that of a control group consisting of Spanish-dominant speakers.

The findings showed support for the first hypothesis: individuals who acquired English late were better in interpreting the compounds than those who had more exposure to English. The second hypothesis was also supported in that all groups of bilinguals interpreted $[V+N]_N$ more accurately than $[N+N]_N$ compounds regardless of their degree of English-dominance. Finally, compound transparency affected interpretation accuracy. These findings indicate that bilinguals' performance on compound interpretation in one of their languages is affected not only by linguistic factors (headedness, transparency) but also by bilinguals' context of acquisition and use of their two languages.

DEDICATION

To my family for their unconditional support and encouragement during the long journey. To my husband, Nito, and our sons Delfino IV, Eric Eduardo, and Mauricio Rafael: thank you for your love and support.

To my sister Tona, who has supported me in too many ways to count.

To the memory of my parents.

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This dissertation largely owes to the inspiration, help, and patience of my committee chair, Dr. María Irene Moyna. During the 36th Annual Meeting of the Linguistic Association of the Southwest in Denver, Colorado, while having dinner with Dr. Moyna, my curiosity was piqued as she pointed out the morphological structure of *hombre araña* ('spider man, lit. man spider') and how difficult it could be for some bilinguals to interpret such a word. I was caught in a 'spider web' with Spanish compounds such as *telaraña* ('spider web', lit. 'web spider') at that precise moment. I became entangled with these complex words even more so after reading Moyna's previous work on Spanish compounding, and after recollecting so many instances where my students would hesitate upon encountering such words. Dr. Moyna, as committee co-chair, guided my project and was instrumental in the drafting of the study. I also wish to thank committee co-chair Dr. Roberto Heredia for all his help with the statistical analysis of the data collected. During the data collection and writing, Dr. Heredia spent countless hours listening to me talking about my research. He helped me conceptualize the study in order to understand the outcome of the experiments and substantiate the findings. Dr. Heredia also made possible the recruitment the participants from the subject pool of students enrolled in Psychology courses at Texas A&M International University. The writing was a long-drawn effort that tested my persistence and endurance and Dr. Moyna's and Dr. Heredia's patience and endurance as well. Therefore, I wish to express my enormous gratitude to both co-chairs for providing the best expert feedback any

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1. INTRODUCTION

Words ...they are persuaders and fortifiers,
tr tranquilizers and irritants;
and they are forces for good or evil –
builders and destroyers.
J. Donald Adams

1.1. Dissertation overview

This dissertation is a synchronic study that looks at the way in which three different bilingual groups interpret compound words in an experiment that included two tasks; the interpretation of two particular patterns, $[V+N]_N$ and $[N+N]_N$, based on their morphological structure, and their semantic transparency. This study has potential relevance for the field of heritage language acquisition, for the purpose of understanding the status of compounds in the bilingual lexicon of adult bilinguals. It will help identify specific characteristics of heritage speakers' vocabulary, semantics, and the effects of cross-linguistic transfer, which is how we refer to bilingual speakers' use of constructions in one language based on a structure from another language. When these effects go from the second language to the first, this is sometimes called 'reverse' or 'backward' transfer. For example, a Spanish-English bilingual might say **oil fish* rather than *fish oil* based on the word order of the Spanish compound *aceite de pescado*.

Language transfer could also explain errors in interpretation because compound structures differ in both languages. Heritage speakers whose L1 (Spanish) has left-headed compounds and whose L2 (English) has right-headed compounds might make errors of constituent misordering and interpret L1 compounds as right-headed. Also,

whether compound constituents are transparent or opaque, the lexical content may be analyzed but the semantic link may not be apparent since the meaning of the compound words cannot be derived from the meaning of its parts. Most importantly, the more we study heritage languages and their users, the more tools language educators will have to propose effective methods of heritage language re-acquisition and development. This study produces evidence of these bilinguals' transfer errors involving the structure and lexical content of compounds in order to reveal active links between L1 and L2 lexemes (minimal units in the lexicon).

Only Spanish compounds with the patterns $[N+N]_N$ and $[V+N]_N$ are considered in this investigation, because in the two languages these structures contain certain similarities and some crucial differences. Both English and Spanish combine a head and a complement in deverbal compounding to name someone or something, yet few compounds of the $[V+N]_N$ pattern are found in English (e.g., *pickpocket*, *scarecrow*), while the Spanish $[V+N]_N$ compound pattern is very productive (e.g. *abrecartas* 'letter opener,' lit. 'open-letters'). Note that English also has a productive compound pattern of this type, but it is inverted $[N+V\text{-er}]_N$ (e.g., *nutcracker*). In their internal structure these two Spanish patterns are different. In the Spanish $[N+N]_N$ structure, the leftmost head is a nominal, which percolates its nominal features to the entire compound (Figure 1.1).

In contrast, $[V+N]_N$ compounds have the structure of a verb phrase, with the verb governing the noun. A noun results after a merge operation between the verb and the noun to form a bare verb phrase that is then merged with a word class marker (WCM) head. This is schematically expressed in the structure tree in Figure 1.2.

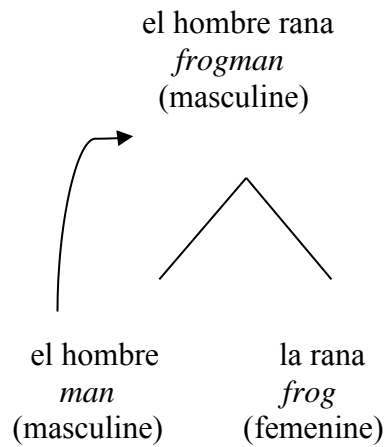


Figure 1.1. Percolation of nominal features in a N+N compound

In *matarratas*, which means ‘rat killer’ but is literally translated ‘kills-rats,’ neither of the two constituents is responsible for the grammatical category of the compound, since it is neither a verb nor a plural feminine noun. Regarding the $[V+N]_N$ pattern, it might be predicted that English has no effect on interpretation because it has no counterpart where the constituents have to be understood in reverse order (i.e. *killrat). Moyna (2011) provides a thorough account of the theory and history of compounding.

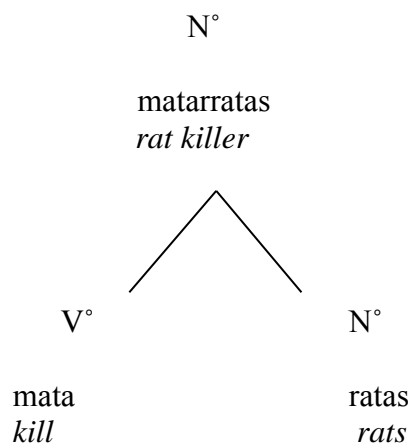


Figure 1.2. Morphological tree of *matarratas* ‘rat killer,’ lit. ‘kill+rats’

The [N+N]_N compounds included in the study are endocentric, while the [V+N]_N compounds are exocentric. An endocentric compound contains a semantic head, so *hombre rana* (‘man’ + ‘frog,’ lit. ‘frogman’) is a kind of man. Exocentric compounds do not have a head. In *rompenueces* ‘nutcracker,’ lit. ‘crack-nuts’, as noted above, neither the verb nor the non-head noun is responsible for the semantics of the compound. The existence of head-final [N+N]_N as competing patterns in English might affect interpretation because in the Spanish compounds included in this study, the head noun will be initial followed by the modifier (e.g. *hombre rana* ‘frogman’ lit. ‘man frog’) (Figure 1.3). In contrast, in English the head is final (e.g., *dog house*, *house shoes*).

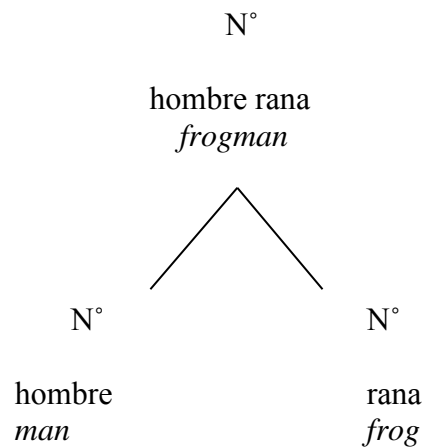


Figure 1.3. Morphological tree of *hombre rana*, ‘frogman,’ lit. ‘frog+man’

Semantic transparency, the second area of interest of this study, depends on whether a compound can be interpreted accurately based on the constituents’ meaning alone. Transparency in constituents and the relationship between head and non-head is fundamental to interpret both patterns. Compounds will be grouped according to transparency (T-transparent, O-opaque) in order to explore their basic nature: T-*abrecartas* (‘letter opener,’ lit. ‘open letters’) and O – *metepatas* (‘inopportune,’ lit. ‘meddle-foot’). Transparency allows semantic interpretation of the compound word based on the meaning of one or both constituents. The relationship between head and complement, including transparency and head-initial or head-final placement in the compound word in English and Spanish, will likely affect speakers’ ability to understand these patterns of compounding. This dissertation therefore offers a contribution to the morphological and semantic analysis of compounds.

The decision to study the interpretation of compound words by different groups of bilinguals was based on the objective of comparing their performance with that of stable adult native speakers. One of the questions I pose in this study is what happens to the Spanish native speaker, considered to be linguistically stable because of a continuous exposure to the language in a predominantly monolingual environment, once he or she moves to a bilingual community such as Laredo. Because of the population dynamics on the U.S.-Mexico border, where immigration is constant, different groups cross the border at different times and as a consequence, their linguistic experience is very dissimilar. Once on the U.S. side, the input and opportunities to use their native language decrease in many domains.

As I will show later, the age of acquisition of the second language affects the development of the first language. The milestones reached in each stage during bilingual children language acquisition ought to be considered when classifying the different types of bilingual speakers: simultaneous, early and late bilinguals. In this sense, comparing heritage speakers to *uninterrupted L1 speakers* is like comparing apples and oranges. On the other hand, identifying different types of HLS is like comparing apples to apples; there are many types, similar but at the same time dissimilar. By conducting research on the linguistic knowledge of these speakers, we find out about the stability of the language before the critical period for language development. While early and middle childhood is the period in which children are biologically equipped to learn a language with ease, this same period is also the most vulnerable to language loss in the absence of appropriate input and language use

(Montrul, 2008). The author proposes the ages of 8 through 10 as the time during which is it more likely to attain L2 native-like results and less likely to undergo L1 attrition (24).

This study considers the nature of the linguistic systems that develop under diminished input conditions. The speakers that participated include individuals who speak a vernacular dialect labeled “Border Spanish”, exclusive to this South Texas geographic area, and who generally use English in the formal domains. Many of these speakers have been exposed to academic English mostly through education. For some, Spanish is the L1 and the dominant language, maintained in both the formal and informal domains, but not always developed formally by these speakers. For others, Spanish is the L1, but English has become the dominant language. In the case of simultaneous acquisition, speakers acquire two L1s, but generally, only English has been supported by the educational system.

The geographic and social circumstances of heritage language speakers in this border region promote early and late contact between Spanish as L1 and English as L2 as well as simultaneous acquisition. This environment has promoted convergence, and “these patterns of convergence and discrepancies from the norm may be pronounced when the language is not nurtured or where normative pressures are lacking” (Zapata et al., 2005: 377). These authors state that in these contexts “the socially dominant language may encroach on domains considered critical for the acquisition and development of the full monolingual variety of the minority language (377).” These domains usually include home, social, workplace, education, and religion.

First and foremost, a fundamental concept is thoroughly discussed in this section, namely Spanish heritage language speakers (HLS) –speakers whose first language acquisition was interrupted or never completed. Even though HLS are often considered to be native speakers of their language, they frequently show systematic gaps in their abilities. The theories serving as the basis for the present discussion have been developed to explain the different linguistic profiles of these bilingual speakers. The phenomena of *incomplete acquisition* and *language loss* in this diverse group fall along a continuum. The range includes first language attrition in immigrants who are fluent or near-native speakers of English, along with cases of incomplete acquisition in the children of these immigrants. Typically, the majority language of the country becomes the primary language of these speakers, and the minority language becomes secondary. Depending on the situation, some individuals are exposed to two languages simultaneously, early, or late in their childhood. These bilinguals hear one language in the home and then become dominant in English after attending school. HLS of Spanish in the United States constitute the largest heritage population in the country. These speakers are a diverse group, with different language exposure and language use, which makes them an invaluable source of linguistic information about their bilingualism.

Simultaneous bilingualism is the result of acquiring two languages concurrently from birth or before the age of 3 in what is referred to as *bilingual first language acquisition* (BFLA). *Early sequential bilingualism* is the outcome of acquiring one language first and then a second language sometime between the ages of 4 to 12; correspondingly, *late sequential bilingualism* refers to *second language learners* (L2L)

in post puberty. *Incomplete acquisition* can be found in simultaneous and early bilinguals, due to lack of variable and abundant linguistic input and opportunities for use of the non-dominant language of the acquirer. Given that bilingualism itself does not determine the outcome of the L1, the linguistic characteristics of these speakers and their grammars are reviewed in light of my intent to show that depending on years of contact with English, the L1 of the Spanish heritage learner is dissimilar from that of monolingual peers. HLS tend to have near-native pronunciation, but might have trouble with complex grammar structures, academic registers, and vocabulary.

Lexical knowledge, retrieval and access are areas affected in *incomplete acquisition* or *language loss* in these types of learners. The interpretation of compound words by Spanish heritage language learners is therefore an integral part of the broader question about the knowledge of the native language in a border bilingual community. In order to better determine why HLS' grammatical competence may be limited or lost, even with early linguistic exposure as native speakers, previous research of several properties of the linguistic knowledge of these speakers is reviewed. L1 attrition or incomplete acquisition in childhood makes it a difficult challenge to evaluate what heritage speakers do and do not know in their L1. Since studies show that being bilingual from birth actually results in a lower ability in the HL than being monolingual with an L2 added later, this study is concerned with the potential loss of the L1 when it interacts with English as an L2 in different types of bilinguals: simultaneous, early and late.

This work will deal with the question of whether the interpretation of Spanish nominal compounds is influenced by English when the two languages are in contact, as they are in this community. Put differently, will English-dominant HS bilinguals interpret the compound words just as Spanish-dominant speakers? Which reading of such words comes most readily to their minds, the literal or the figurative? The lexicon is a language component that has not been sufficiently investigated in heritage language speakers. In particular, the issue of the interpretation of compound words by this population has not been addressed by previous research. The present study on these types of learners –late, early and simultaneous bilinguals – is pertinent, as these findings have implications for understanding the linguistic proficiency of a population of heritage language speakers that continues to grow in the United States. The theory outlined in this work will be based on the following hypotheses:

1. The amount of exposure heritage language speakers have to English will determine whether or not they interpret $[N+N]_N$ and/or $[V+N]_N$ compounds in Spanish as they do compounds in English. That is, these speakers are more likely to consider the right constituent the head of the compound.
2. Bilingual heritage language speakers will interpret $[V+N]_N$ more accurately than $[N+N]_N$ compounds regardless of their degree of English-dominance. Given that Spanish heritage language speakers have acquired the V-O order before the critical age of 12, they are familiar with the conventional mechanism of word formation with the V-N configuration. In English, most of these V+N combinations (i.e. fix-man) are ungrammatical.

3. Semantic transparency/opacity will play a role in accurate interpretation. This expectation is based on Libben's (1997) four-way classification of transparency of compounds, applied to Spanish. It is hypothesized that bilingual speakers will correctly interpret transparent compounds (T), such as *espantapájaros*, ('scarecrow,' lit. 'scare' + 'birds') while opaque compounds (O), such as *ahorcaperros* (a type of sliding knot, lit. 'choke' + 'dogs') might be interpreted literally.

To test these hypotheses, the participants answered a two-part questionnaire via *Survey Monkey*. The first part was a sociolinguistic survey that provided information on the participants' profiles. The second part consisted of a vocabulary test (Appendix 1) that included two sets of ten [V+N]_N and ten [N+N]_N compounds presented in isolation. The first set investigated headedness while the second set examined transparency/opacity. These on-line questionnaires, explained in Section 3 and presented in Appendix 1, were designed to select and categorize the participants and to examine their interpretation of the various types of compound words.

In order to provide an analysis of the speakers of fastest-growing minority language, an overview of the Hispanic population is presented in this section, including a brief history of Laredo and the Laredo-Nuevo Laredo Metropolitan Area. Most importantly, this section provides an overview of the profile of bilingual heritage language speakers in the United States. It discusses the linguistic characterization of bilingual heritage speakers, including research on their grammatical competence. This

section establishes the necessary theoretical framework to the central goal of this research, which is the interpretation of compound words in Spanish.

1.2. Demographics of U.S. Spanish

A snapshot of the Hispanic or Latino population in the United States is presented in the Census Briefs by Ennis, Ríos-Vargas, & Albert (2011). 2010 Census figures show that 308.7 million people resided in the United States on April 1, 2010, of which 50.5 million (or 16 percent) were of Hispanic or Latino origin. The Hispanic population increased from 35.3 million in 2000 to 50.4 million in 2010, accounting for over half of the 27.3 million increase in the total population of the country. Between 2000 and 2010, the Hispanic population grew an overwhelming 43 percent, while the growth in the total population was 10 percent.

In 2010 the people of Mexican origin comprised the largest Hispanic group, representing 63 percent of the total Hispanic population in the country, up from 58 percent in 2000. The Mexican origin population increased by 54 percent and had the largest numerical change, growing from 20.6 million in 2000 to 31.8 million in 2010. Mexican-origin Hispanics accounted for about three-quarters of the 15.2 million increase in this ethnic group from 2000 to 2010. Table 1.1 shows the change from 2000 to 2010 in the total Hispanic or Latino population compared to the Mexican population in the United States (cf. 2010 Census for a detailed account of the Hispanic population for the United States, regions, and states). The Hispanic population is projected to nearly triple to 132.8 million by the year 2050 and its share of the nation's total population is projected to double, from 16 percent to 30 percent. Thus, nearly one in three U.S.

residents would be Hispanic. These figures are based on the assumption that Spanish speakers will continue to migrate to this country.

Table 1.1. Hispanic or Latino origin population by type: 2000 and 2010
Source: 2010 U.S. Census Bureau

	2000		2010		Change 2000 to 2010	
Hispanic Latino by type	Total	%	Total	%	Total	%
Total	35,305,818	100.0	50,477,594	100.0	15,171,776	43.0
Mexican	20,640,711	58.5	31,798,258	63.0	11,157,547	54.1

Spanish is the second most used language in the United States. Even if the Spanish language has become more visible in the United States over the past decade, the reality is that Spanish has been used by Hispanics for more than four centuries in this country, not only by immigrants, but also by Hispanics born within U.S. borders. In parts of the Southwest, for example, there are Hispanic communities where varieties of Spanish co-exist with English. The divergence in the input received by heritage language learners and the influence of English as the societal majority language, combined with differences in literacy and formal education, can result in what on the surface seems to

be *incomplete acquisition* of the heritage language or attrition in adult bilingual knowledge. The presence of numerous non-English language speakers and diverse Spanish-speaking communities thriving in the United States and the intergenerational transmission of Spanish is an accurate indicator of Spanish's future in the country and warrants the growing interest in the scholarship on Spanish in the United States.

1.3. Laredo, Texas

Laredo was founded on the north bank of the Río Grande on May 15, 1755. It is considered the oldest independent settlement in Texas. In 1767 the city was laid out, and in the years to follow a colonial community began to write its history. Laredo officially became part of Texas under the Treaty of Guadalupe Hidalgo (1846-1848). The treaty gave the United States the Rio Grande boundary for Texas. Mexicans living in the annexed area had the choice of relocating to Mexico or receiving American citizenship with full civil rights. For these people, remaining in the United States meant assuming a bicultural and bilingual identity. English became the official language of the government as Anglos began to settle in an area that promised great trade and industry opportunities. The language contact that had always been present in this geographical area increased as a result of the annexation and the transformation of Laredo from a *villa* to a flourishing gateway city with the arrival of the railroads in the 1880s. And so Laredo evolved from a small Spanish settlement to a lively metropolitan city part of the United States of America where zigzag border crossing and migration never comes to an end (Green, 1991; Hinojosa, 1983).

With a tumultuous history, characterized by different waves of immigration from Mexico, Laredo is known today as the “City under seven flags”, and has become as the principal port of entry into Mexico. This border city is characterized by its urban core that continues to be revived, as commercial and industrial districts make the "Gateway City" their headquarters. Many of Laredo’s old neighborhoods or *barrios* such as *La Ladrillera*, *El Trece*, *La Guadalupe*, *El Canta Rana*, *Los Amores*, *El Sal Si Puedes*, *El Chacon*, and *El Santo Niño* developed in the periphery and represent the community identity as they co-exist with Laredo's elite suburban downtown development of European, Jewish, and Mexican emigrants that also settled in Laredo (cf. Hickey, 2012 for a detailed analysis of the area).

Countless people legally and illegally cross the river annually and many of them do so several times a week. Some people commute across the border for work, business, and pleasure or to attend school. The United States-Mexico border sees such large volume of traffic because Laredo is the main U.S. port of entry into Mexico (see Figure 1. 4). Nevertheless, the region has changed quite a bit over time. In 2010, the city’s population was 236,091, making it the tenth most populous in the state of Texas, and the third most populated on the United States-Mexican border, after San Diego, California and El Paso (U.S. Bureau of Census 2010). The 2011 population stands at 241,935 people in Laredo. With over 500,000 people living just across the river in Nuevo Laredo, the area has a combined population of over 741,000. Laredo is comprised of 95.4% Hispanic and 4.6% Non-Hispanic, and the median age of the residents is 26.9 (Laredo Development Foundation, 2012).

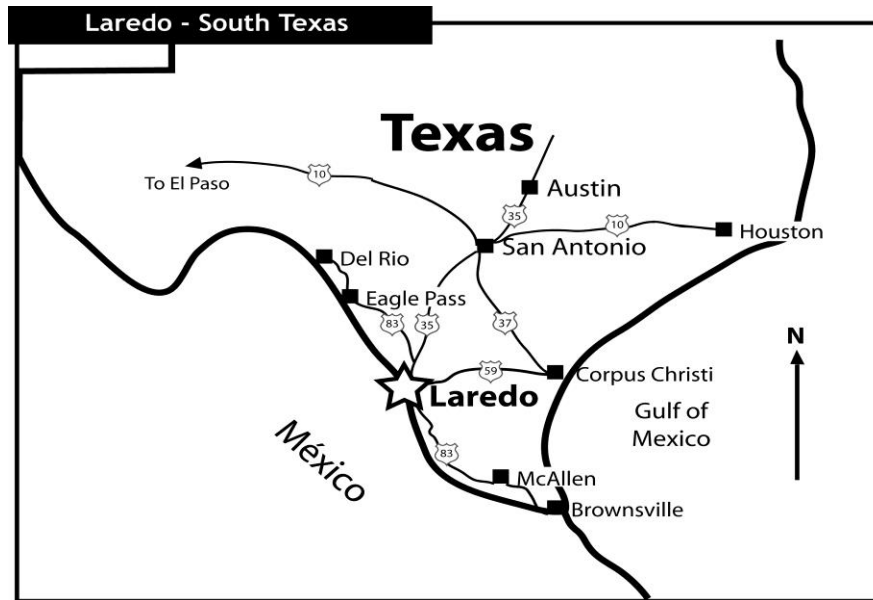


Figure 1.4. Map of Laredo, Texas and the Texas-Mexico Border
 Source: Texas A&M International University
www.tamui.edu/gradschool/environment.shtml

As reported by the U.S. Bureau of the Census, the population size in Laredo increased from 91,449 in 1980 to 122,899 in 1990, and the city accounted for more than 90 percent of the population of Webb County. According to Census figures, the population of Laredo continued to increase from 176,576 in 2000 to 236,091 in 2010. Persons of Hispanic descent formed the largest ethnic group with almost 94 percent. Bilingual Education programs were serving the students who spoke a minority language and whose English language skills were weak. Laredo became the largest inland port in the United States and Nuevo Laredo the largest port in Latin America, making it a gateway to Mexico. Legal and illegal migration has never stopped, as documented and undocumented Mexicans still cross the U.S.-Mexican border in search of the American Dream, bringing different Spanish dialects along.

The main significance of the information of the Mexican-American population in Laredo, Texas is the fact that it has always been ethnically Hispanic. Hispanics make up 96 percent of the metropolitan area, in the least diverse area in the United States. In 2011, of the 24,680 students in Laredo schools, 99.5 percent were Mexican-Americans (US2010 Project). In this population we find immigrants who are fluent or near-native speakers of the dominant language that experience L1 attrition, and their children, who experience cases of incomplete acquisition as they were exposed to two languages either simultaneously or early in their childhood. In addition, we find families of recent émigrés, who are late bilinguals. The different groups of bilinguals found in Laredo are compared in this study. Their performance is then contrasted to that of Spanish-dominant monolinguals living on the Mexican side of the border.

Laredo, a bilingual and bicultural community, offers opportunities for research in areas of language contact. My study, specifically, addresses Spanish compound words interpretation. My investigation focuses on three different types of bilingual profiles found in this area, namely, heritage speakers who are simultaneous acquirers of both English and Spanish against heritage speakers who are early and late non-simultaneous acquirers of English. Furthermore, the results of these three bilingual groups are then compared to a Spanish-dominant group found on the Mexican side of the border. To my knowledge, there has been no study to compare the interpretation of Spanish compounds in these groups of Spanish speakers.

1.4. Implications of the Laredo-Nuevo Laredo Metropolitan Area demographics

Laredo's sister city across the Rio Grande, has a population of more than 373,725 (INEGI 2010 Census). Laredo has historically always been conjoined with Nuevo Laredo and the two are often referred to as "Los Dos Laredos," or simply Laredos. As a result of this situation, there are many issues with legal and illegal immigration across the border. According to Ríos (2011), Mexican immigration to United States cities located on the border has actually increased. In border cities, it is now common to see commuters cross into Mexico to work and come back to the United States at night and during the weekends, to the safety of the newly constructed gated communities that shelter them. The latest Mexican immigrants are businessmen that used to live in Mexican border cities and have decided to legally change their residency to the United States. Bunker (2013) calls this phenomenon a "Mexodus to Texas". In a city long known for its successful hybrid of American and Mexican cultures, the schools, businesses, churches are struggling to prepare these Mexican émigrés, a population with a very different profile from their largely impoverished illegal compatriots. Laredo's situation mirrors, at the community level, an evolution that is occurring nationwide. Circumstances of cultural hybridization that have been present in the region for centuries suggest that immigrants of Mexican origin will continue to add new waves of Mexican Spanish to the Laredo-Nuevo Laredo Metropolitan area.

1.5. Heritage language speakers: A linguistic characterization

A definition of HLS that is widely used in different fields was proposed by Valdés (2000a, 2000b), inspired by the Spanish language development background. Valdés

refers to a HLS as "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 is to some degree bilingual in that language and in English" (Valdés, 2001:38). Two crucial components for this definition are (1) that the HL was first in the order of acquisition but was not acquired completely because of the speaker's switch to another dominant language and (2) the continua of proficiencies that reflects the tremendous variation in HLS. In order to understand the variability that typifies bilingual acquisition a common approach is comparison with a target monolingual norm that would be an *uninterrupted L1 speaker*.

Generally speaking, the term HLS is used by linguists to describe individuals whose first language is no longer their dominant language. The term refers to an individual who has some proficiency in or a cultural connection to the first language. Heritage language speakers (HLS) are a vast assortment of individuals whose linguistic capacity cannot be easily explained based on the native/nonnative speaker dichotomy (Valdés and Figueroa, 1994). These speakers, along with their individual lects, do not correspond to fixed dichotomies of the type "compound-coordinate" or "balanced-unbalanced" either (Silva-Corvalán, 2012).

Proposed definitions, identified by Polinsky and Kagan (2007) include a broad and a narrow conception. The broad conception of heritage language speakers (HLS) emphasizes possible links between cultural heritage and linguistic heritage, but these aspects are not sufficient to provide criteria for identifying them. As an illustration, consider a member of an indigenous community (e.g., Navajo, Hawaiian) who would be

considered a HLS regardless of the level of HL proficiency. Polinsky and Kagan point out that culturally motivated learners who learn their HL from scratch as adults, are second language speakers whose HL is equivalent to a second language in terms of linguistic competence. For such roughly defined heritage speakers, a second language typically begins in adulthood, in a classroom setting, and therefore these culturally motivated L2 learners are very different from the HLS in the narrow sense of the term. HLS are individuals who have been exposed to a particular language in childhood but did not subsequently acquire it fully because another language usurped the original language (Polinsky & Kagan, 2007).

Another typical profile of a heritage speaker, defined by Benmamoun, Montrul and Polinsky (2010) is that of a child who was born outside the parents' home country or left the home country before the age of eight. For the most part, heritage speakers are usually the children of immigrants born in the host country or immigrant children who arrived in the host country some time in childhood, in what can be described as a *second generation phenomenon* (Montrul 2012). The development of L1— in a monolingual context— is very different from L1/L2 development in bilingual contexts. In bilingual contexts, someone in the family speaks with the child in the heritage language, but the child is more likely to speak English or is more comfortable in English; this level of comfort in English increases as the speaker goes through middle and high school, usually at the expense of the home language (Cho *et al.* 2004). From a purely linguistic point of view, an individual qualifies as a heritage speaker if and only if he or she has some command of the heritage language acquired naturalistically (Valdés, 2000a). HLS

are early bilinguals due to their upbringing, because they are exposed to the heritage language and the majority language since birth or in childhood. Spanish heritage speakers typically fail to demonstrate age-appropriate levels of proficiency in the heritage language.

In the United States, heritage speakers are bilingual speakers of languages other than English who encompass a range of degrees of command of their L1 or family language, ranging from receptive competence in the first language to balanced competence in the two languages. Such speakers, who end up controlling two or more languages but are dominant in the language they acquired later (L2), are referred to as “incomplete learners” (Polinsky, 2004). Once in adulthood, and if compared against late bilinguals or monolingual speakers, HLS are characterized by both attrition (Silva-Corvalán, 1991, 1994/2000, 2003; Montrul, 2008; Polinsky, 2005, 2008a, 2008b) and incomplete acquisition (Bolonyai, 2007; Montrul, 2002; Polinsky, 1997) in their L1, defined as follows by Montrul.

In my view, incomplete acquisition and L1 attrition are specific cases of language loss across generations. What I broadly refer to as *incomplete acquisition* (for lack of a better term), is a mature linguistic state, the outcome of language acquisition that is not complete or [of] attrition in childhood. Incomplete acquisition occurs in childhood, when some specific properties of the language do not have a chance to reach age-appropriate levels of proficiency after intense exposure to the L2 begins. Although L1 attrition can also occur in childhood, I consider attrition as the loss of a given property *y* of the language after property *y* was mastered with native-speaker level accuracy and remained stable for a while, as in adults (Montrul, 2008:21).

Polinsky (2008) also states that HLS have different profiles from *uninterrupted L1 speakers*, *L2 speakers*, *balanced (or stable) bilinguals*, and from “*forgetters*”, speakers that stopped using L1 in adulthood. *Uninterrupted L1 speakers* or native speakers are individuals who, having learned the language in question from birth, have fully acquired and have full competence in that language. A monolingual speaker who learns only one language from birth is an uninterrupted L1 speaker of his/her only one language (Gass and Glew, 2008). *L2 speakers* are persons who speak a language other than the native language. The term *second language* means any language other than the first and focuses on the chronological order of learning. These individuals learned a second, third, or maybe a fourth language after having learned the first, but it does not necessarily entail that the person is still a learner.

The question in such cases is what the final stage of learning can look like in “non-primary language acquisition, that is, whether such a state is quantitatively and/or qualitatively different from the monolingual steady state” (Sorace, 2003:130). In like manner, a *balanced (or stable) bilingual* is someone whose language is in a steady state, who has learned and knows two languages. “The term bilingual implies not only the ability to use two languages to some degree in everyday life, but also the skilled superior use of both languages at the level of the educated native speakers” (Valdés, 2001:40). The *balanced or stable bilingual* is mythical, according to Valdés, and argues that it is more appropriate to think of bilingualism as a continuum with different levels of knowledge of the L1 and L2. Regarding *forgetters* and to better understand the different profiles, Polinsky (1997) clarifies the notion of language attrition as it refers to two

related phenomena. The first is the notion of L1 loss as a result of forgetting the language system by a non-aphasic speaker, – with aphasia defined as language loss or disorder following brain damage. In immigration contexts, language loss would be due to the influence of the dominant language. The second is the process whereby a given grammar system undergoes a significant reduction when it is passed from one generation to the next, usually under conditions of immigration as well. Both experiences may lead to language loss, given that insufficient access to a given input language (L1) is usually the case in such scenarios. Polinsky further argues that both conceptions “can be represented by different populations of speakers and may have different language internal manifestations” (371). Based on the distinction between the two phenomena sketched out by Polinsky, she distinguishes between *semi-speakers* that she characterizes as “forgetters” and those that she considers “incomplete learners”. Incomplete acquisition and language attrition (forgetting) will be discussed in detail on section 5.4.

Heritage language speakers are both similar and different from L1 speakers and L2 learners (Kondo-Brown, 2005; Montrul, 2006; Montrul, et.al., 2008; Valdés, 1995). HLS are similar to L1 speakers because there is early exposure to language in both circumstances. Just like L1 speakers, HLS are exposed to the heritage language at home from birth and receive naturalistic input from caregivers. In such a setting, the auditory input leads to good control of features acquired early in life, such as phonology, lexicon, and some grammatical structures (e.g. inflectional morphemes such as plural *-s*, *-es*), with developmental errors also present. On the other hand, HLS are different from L1 speakers because there is a lack of continuous and abundant input as well as complex

grammatical and pragmatic structures that results in unsuccessful and incomplete outcomes. Fossilization, a characteristic of L2 learning in which the learner reaches a plateau and is not capable of acquiring some property of the L2 grammar, is never present in L1 acquisition, whereas it may be found in heritage language acquisition. Depending on when exposure to the majority language begins and on the amount of exposure the child received in both L1 and L2, HLS may develop basic knowledge of the heritage language at a young age.

Two other distinctions must be considered in order to classify HLS more strictly: the distinction between first (L1) and second (L2) language and the distinction between primary and secondary language. L1 and L2 are distinguished by the temporal order of acquisition, while the primary and the secondary language are distinguished by the prevalence of usage. If an individual learns a language (L1) and speaks this language throughout adult life, this language is both L1 and primary language. However, if an individual drastically reduces the use of L1 and switches to using L2 for communication in every domain, then the L1 is the L1/secondary language while the L2 develops into L2/primary language.

These bilingual speakers go through predictable stages in their linguistic development, just like monolingual children, but they also share many features with adult L2 learners (cf. section 5.1 for a detailed discussion). HLS are similar to L2 speakers because of the varying amount of input. The input HLS receive in their L1 depends on whether members of the family speak the heritage language to the child. Thus, the resulting grammar is usually incomplete, presenting developmental errors and

transfer effects. The proficiency of both HLS and L2 speakers is variable and fossilized errors can be found on both groups as well. At the same time, because L2 learners receive late exposure to the target language in an academic setting they may present problems with phonology and speak with an accent. Since the HL is usually their L1, HLS often have little or no accent in that language. Both L1 and L2 speakers usually have experience with academic literacy and formal instruction and this critical difference sets them apart from HLS. L1 speakers normally attend school in their native language and as a consequence develop literacy and metalinguistic skills. L2 learners typically are taught the L2 in the classroom setting, with an emphasis on reading and writing, and often lack opportunities to speak. By contrast, HLS are regularly schooled in the majority language, English in this case. As a consequence, Many HLS lack literacy experience in their L1 until later in life, usually when they enroll in classes to relearn the heritage language (Montrul, et.al, 2008).

1.5.1. First and second language acquisition

A child is introduced to language at birth and does not require explicit language instruction. Children do need exposure to language in order to develop normally. It is assumed that child L1 acquisition is constrained by Universal Grammar (UG), so that children use this language-specific innate system of knowledge to acquire language (Chomsky, 1981). The question is what role UG plays in the L2 acquisition process (cf. White 2003 for a detailed account). The efficiency, rapidity, inevitability, and completeness of L1 acquisition in the face of impoverished data is accounted for by the fact that children do not start from scratch, since UG provides them with a head start

(Fromkin, 2011). Language acquisition is the development of the ability to speak and understand a language by learning a complex set of sounds and symbols. First language acquisition takes place at remarkable speed, without overt instruction, and in spite of differences in a range of social and cultural factors. In the first two to three years, a child growing up needs interaction with others in order to learn any language. Several cases of abandoned children suggest that their language skills remained severely limited even after language instruction (Curtiss, 1977). All normal children's language development follows a predictable sequence of universal stages (cf. Yule 1985 for an overview). Under normal circumstances, the child is helped in his or her language acquisition by the typical behavior of the adults in the home environment. As the linguistic repertoire of the child increases, constructions are tried out and tested, but children never make errors that violate the innate principles and properties of Universal Grammar.

It is assumed that bilingual children develop their grammars along the same lines as monolingual children (cf. 1.5.1). They go through a babbling stage, a holophrastic stage, a telegraphic stage, and so on. During the telegraphic stage the bilingual children show the same characteristics in each of their languages as the monolingual babies. A second language can be acquired under diverse circumstances: it can be learned in school, in another country or in a bilingual environment.

Childhood bilingualism brings about theories of bilingual development. It is thought that children learning two languages simultaneously during infancy undergo a stage when they are not able to differentiate either language (Genesee, 1989). The Unitary System Hypothesis (USH) states that children initially construct only one

lexicon and one grammar for both (or all) languages being acquired. In due course the lexicon splits into the two languages, but the grammatical rules remain together. On the other hand, the Separate Systems Hypothesis (SSH) proposes that the bilingual child builds a distinct lexicon and grammar for each language (De Houwer 1995, Paradis & Genesee 1996). Most studies of bilingual development have shown that bilingual children mix elements from the two languages as a result of two grammars operating simultaneously. These mixed utterances suggest lexical gaps and/ or codeswitching. Genesee (1989) claims that bilingual children develop differentiated language systems and are able to make contextually appropriate language choices.

Along with bilingual language development, the issue of bilingual memory seeks to explain the manner in which the two languages are stored in the mind. By the 1980s, bilingual hierarchical models such as the word association and the concept mediation models were introduced to explain bilingual memory (cf. Heredia 2008 for a detailed overview). These hierarchical models distinguish between a general level (i.e. the conceptual system) and language specific mental lexicons. These models assumed that bilinguals organize their languages into one general conceptual level that is shared by the two languages and a lexical level that is particular to each language. Furthermore, this shared conceptual level supposedly contains general abstract information that is language-free. An assumption of these models is that the L1 lexicon is larger than the L2 lexicon. As a result of findings based on these hierarchical models, a revised hierarchical model (RHM) was introduced (Kroll & Sholl, 1992; Kroll and Stewart, 1994). This model proposes a bilingual lexicon that is interconnected via lexical links. It is assumed

that during L2 acquisition bilinguals learn to associate every L2 word with an L1 equivalent (e.g., house - *casa*) leading to a lexical-level association that remains active and strong. If every L2 word is mapped onto its L1 equivalent, for these bilinguals it would be easier to translate house into *casa* than vice versa. The connection from L1 to L2 lexicon is expected to be weaker because of a lack of translation practice. Moreover, the conceptual store and the lexicons are connected via conceptual links. It is plausible that the conceptual link from the L1 is stronger than the link to the L2, since the L1 is the native language. Research shows, however, that the language used more frequently, regardless of which language was learned first, will most likely become dominant (Heredia & Brown, 2004).

1.5.2. Age of acquisition

Age of acquisition of L2 is a determining factor in the study of L2 acquisition and L1 loss in bilingualism, as it is related to the type of linguistic knowledge and behavior that emerges in the two languages under different environmental circumstances (Montrul, 2002; Polinsky, 2006; Rothman, 2007). L2 researchers question the suggestion that a learner whose exposure to an L2 begins early in life eventually attains higher levels of proficiency than one whose exposure begins in adolescence or adulthood (Singleton, 2003).

Montrul (2008) utilizes *age of acquisition* as a connection between L2 acquisition and L1 attrition. She makes reference to “the empirical evidence that shows that bilingual children can lose linguistic competence in the L1 quickly and easily, particularly during the age of early language development (birth to age 3-4), and

especially when the family language is not supported” (2008:265). In other words, the earlier a child comes in contact with English, the dominant language in the community, and starts to use this language more than Spanish, the HL, the more compromised his knowledge of the HL will be. It has been argued that this occurs because contact with the dominant language diminishes access to input in the HL during the “critical period” for language acquisition (see 1.5.5). If input is diminished before the closing of this period somewhere between the ages of 8 and 10, the child’s HL grammar will not develop to a mature state and it will be susceptible to attrition. Montrul (2002) found that Spanish-speaking children who learned English before the age of 7 manifested signs of incomplete acquisition and attrition of tense/aspect distinction in Spanish, while those who learned English between the ages of 8 and 12 performed like monolingual speakers of Spanish.

1.5.3. Sequence of acquisition

A general distinction drawn in relation to individual bilingualism in the early literature is the dichotomy ‘compound’ vs. ‘coordinate’ bilingualism (Weinreich, 1953/1968:9).

Weinreich considered that the way in which the concepts of a language were encoded in the brain resulted from the way in which the languages had been learned. In ‘compound’ bilingualism the individual learns the two languages in the same context and therefore, as the languages are used concurrently, their representation is fused in the brain. For example, a child who acquired both English and Spanish in the home would know both English *book* and Spanish *libro* and both labels are interdependent because they would be attached to one single concept in the brain. In contrast, in ‘coordinate’ bilingualism

the individual learns the languages in separate environments and the words are kept separate, with each having its own precise and independent meaning. An example would be a person whose first language is Spanish who learned English later in school. The Spanish term *libro* would have its own meaning, and the English word *book* would also have its own meaning. Consequently, the compound-coordinate distinction emphasizes “how” the languages are learned in contrast to the “when” in relation to age of acquisition.

The terms ‘simultaneous’ and ‘sequential’ have been used since the 80s to explain the different conditions under which bilingualism develops incorporating the age of acquisition component. Two parameters demarcate sequence of acquisition: (1) age of acquisition (early in childhood versus late after puberty) and (2) order or sequence of acquisition in childhood (two languages acquired simultaneously versus one language acquired after the other). The different types of bilingualism are based on two premises: the context in which languages were learned matters (compound and coordinate bilingualism) as do the age and sequence of acquisition (simultaneous and sequential bilingualism). Figure 1.5 is based on the typical language development milestones that children undergo as their phonological, semantic, syntactic, morphological, and pragmatic linguistic systems develop. Simultaneous bilingualism or bilingual first language acquisition (BFLA) occurs in early childhood, before the foundations of language are in place. In this type of bilingualism, both L1 and L2 develop together as two L1s. For monolingual acquisition, the development of L1 is considered to take place approximately at the age of 3–4. Sequential bilingualism happens after the speaker has

acquired basic command of the first language (cf. Genesee and Nicoladis, 2005; Montrul, 2008; Heredia and Ciešlicka, 2013).

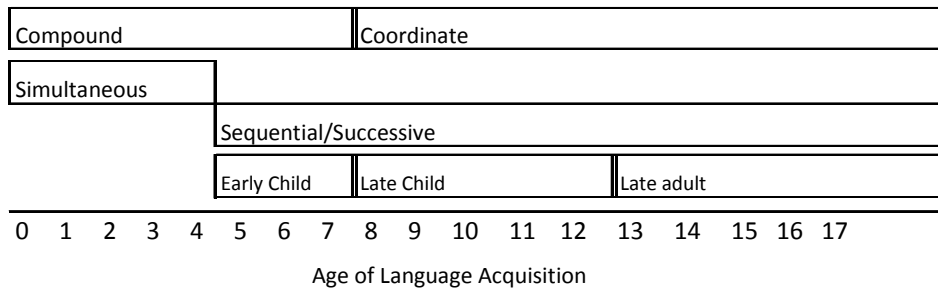


Figure 1.5. Types of bilingualism by age and sequence of acquisition.
Source: Heredia and Ciešlicka (2013)

Simultaneous bilinguals are children who are exposed to two languages from birth or before the age of 3, while sequential bilinguals are children who learn their second language sometime after the age of 4 or 5 (de Houwer 1995; Silva-Corvalán 2003; Montrul 2008). The sequential bilinguals learn the second language after acquiring the structural foundations of the first language. It is believed that the difference between simultaneous and sequential bilinguals may stem from the fact that sequential bilinguals receive more input to the L1 in the home environment than simultaneous bilinguals and therefore acquire more complete L1 grammatical systems. Early child L2 acquisition is believed to occur between the ages of 4–6 when spoken language is fully developed but the children have not yet received formal schooling. Late child L2 acquisition comprises the elementary school years. Typically, by the age of 7

children are skilled language users and are capable of using language in different domains, such as home and school. Depending on their sociolinguistic circumstances, children at this stage may be receiving instruction in one or in the two languages. Therefore, acquiring a second language before the age of 7 results in compound bilingualism and learning a second language after that same age results in coordinate bilingualism. More precisely, early sequential bilingualism occurs during childhood, whereas late child and late adult bilingualism occurs after puberty and adulthood respectively. Late bilingualism can be considered adult L2 acquisition. In this situation the L1 has been fully acquired. The L1 syntax and phonology of these native speakers are assumed to remain stable all through adulthood, unlike the vocabulary size which can vary depending on domains of use throughout the years (Sigelman and Rider, 2014; Montrul 2008, 2012).

1.5.4. Incomplete acquisition and L1 attrition

Incomplete learners are defined as *unbalanced bilinguals* who may not have fully acquired or stabilized their L1 in early childhood –such as monolingual native speakers are assumed to do – as a result of living in an L2-dominant environment. This includes young early bilinguals (i.e., children exposed to two languages before the age of 3) in immigrant contexts, whose knowledge of the minority L1 may begin to diverge from that of monolinguals once they enter school and become dominant in the majority L2 (Polinsky, 1995; Silva Corvalán, 2003). De Houwer talks about *bilingual first language acquisition* (BFLA), referring to situations where exposure to two languages is regular within the first month of birth and *bilingual second language acquisition*, referring to

situation where exposure begins later than one month after birth but before the age of two (de Hower, 2009).

As adults, bilingual speakers may be more fluent in the community language than in the family language. There may be different reasons for these outcomes, either because the HLS acquired the family language incompletely, or because they might have lost aspects of it at some point in late childhood or early adolescence. On the one hand, Montrul (2008) argues that the morphosyntactic difficulties HLS regularly face are more likely the result of incomplete development during early childhood primarily due to reduced input and diminished use of the heritage language. Other researchers (Polinsky, 2011; Rothman, 2007), on the other hand, disagree with the view of incomplete development to explain heritage speakers' competence divergence. For methodological reasons, Pires and Rothman (2009: 213) propose to formally distinguish incomplete acquisition from language loss or attrition. They assume that in *incomplete acquisition* a learner fails to acquire grammatical properties that are arguably present in the childhood linguistic input, whereas in individual *language loss* or *attrition* the learner can be taken to lose (or fail to make full use of) grammatical knowledge previously acquired. However, these authors also argue that the term *incomplete acquisition* needs to be subdivided into two sources of competence divergence: (1) true incomplete acquisition of properties clearly available in HS input, and (2) a source they define as *missing-input competence divergence* by which HLSs do not acquire properties that are part of the educated monolingual speakers because monolingual speakers, differently from HLS, had sufficient exposure to a standard dialect that is distinct in certain respects from their

colloquial dialect (14). This breakdown minimizes any ‘social implication’ of the encompassing label *incomplete acquisition*, which, according to Pires and Rothman could never apply to source (2) given earlier because the word ‘incomplete’ implies that the acquisition input provided sufficient data to trigger the acquisition of a property that ends up not being acquired for other reasons. Rothman (2007) argues that the competence divergence between heritage speakers and monolingual speakers is the result of the complete acquisition of the contact variety to which the speakers have been exposed. This variety may exclude specific linguistic structures from the input. Therefore, if incomplete acquisition is directly linked with all divergence of HLS grammars in comparison to adult monolingual norms, incomplete acquisition subsumes *missing-input competence divergence*. Another proposal in the characterization of HLS’ competence views the deficits as the L1 attrition of properties established during early childhood (Polinsky, 2011).

Research has shown that both the production and comprehension of heritage speakers is different from that of native speaker controls, whose full and ‘stable’ linguistic competence constitutes the baseline of comparison (Montrul, 2004a, 2006; Polinsky, 2006, 2008b). Typical outcomes of the HL acquisition process by the time bilingual children reach early adulthood are non-native-like and resemble patterns attested in second language acquisition. HLS had not received enough attention in the theoretical linguistics literature until recently (Polinsky 1997, 2006, 2008a, 2008b; Montrul 2002, 2004b, 2008). Montrul proposes that because of the very nature of bilingualism, it encompasses different types of speakers: adult bilinguals include adult

L2 learners and adult early bilinguals (2008:8). It is therefore important to make a distinction between simultaneous or BFLA and sequential bilingualism, based on sequence of acquisition of the two languages (cf. 1.5.2 and 1.5.3 for types of bilingualism by age and sequence of acquisition). These different types of adult bilinguals differ in the age of acquisition of their L1 and L2 and many other sociolinguistic circumstances. Based on the distinctions proposed by Polinsky (1997), including the functional dimension (L1/L2 language use) of the languages (primary vs. secondary language), and those proposed by Montrul (2008), based on age of acquisition (first vs. second language), Spanish-speaking immigrants in the United States must be divided into different categories. Another aspect that must be considered as well is the sociopolitical dimension, that is, the role of minority vs. majority language.

In a typical monolingual situation, when a child is learning the majority language at home and school and later learns a second language, the first language is also the stronger, dominant or primary language, while the second language is the secondary language, used less frequently. Figure 1.6 illustrates the non-interrupted development of a first language and a second language learned after puberty in a majority language context.

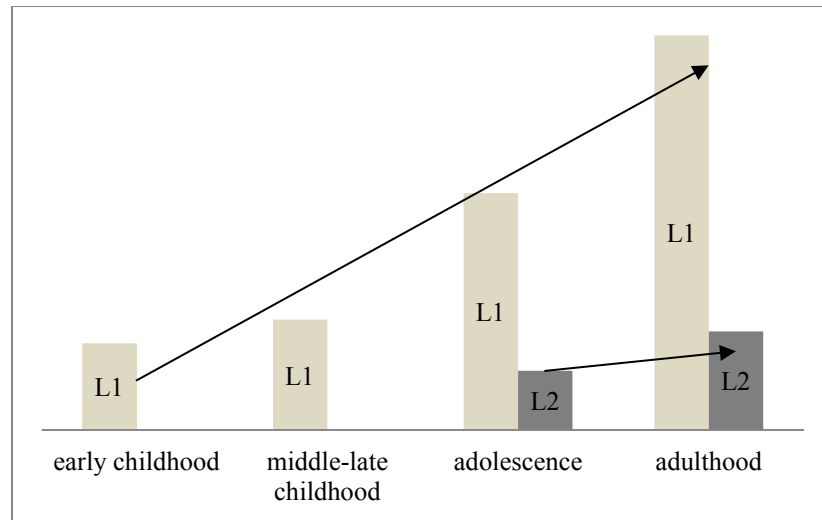


Figure 1.6. Typical development of a first (L1) and second language (L2) (after puberty) in a majority language context.
Source: Montrul (2012)

In such a case, the order of acquisition, the functions of both languages and the sociopolitical status are aligned for both languages –English being the L1, primary and majority language and Spanish is the L2, secondary and minority language. But in the case of heritage speakers, when the first language is a minority language, there is a shift in the functional dimension of the languages as the child grows up, with the first and primary language eventually becoming secondary in language use. This functional shift affects the linguistic competence and fluency in the heritage language, which ends up resembling a second language.

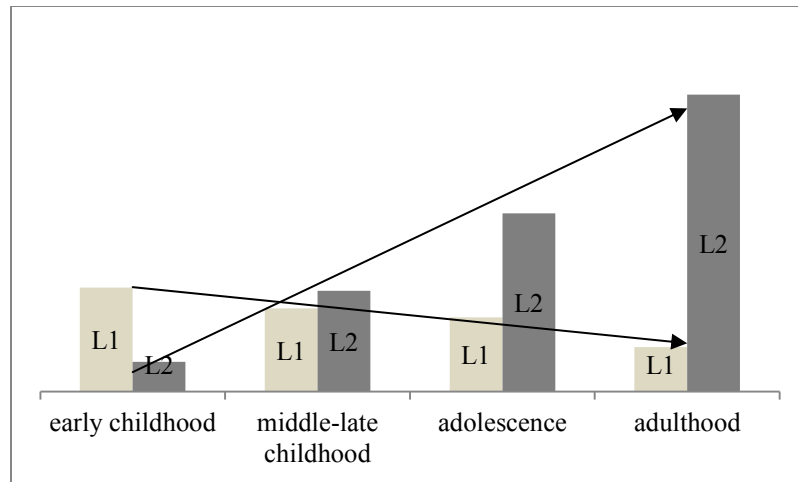


Figure 1.7. Typical development of a heritage language (L1) in a majority language context.
Source: Montrul (2012)

Figure 1.7 illustrates the typical development of a heritage language in a majority language context. Montrul (2012) explains that in the acquisition of Spanish as a HL, Spanish is the L1, but it is also the secondary and minority language, with English being the L2, and also the primary and majority language. These particular sociolinguistic, functional, and sociopolitical factors seem to come into play in the outcome of HL acquisition.

1.5.5. Critical periods in language acquisition and language attrition

Age is a significant factor in L2 acquisition. There is a common assumption that L2 attainment is primarily or even exclusively a function of age, and that native-like performance is not attainable unless the L2 is acquired during early childhood (Johnson & Newport 1989, 1991). The issue of the critical period hypothesis for language

acquisition has been the focus of vast research (Birdsong 2006 provides a detailed overview).

The term Critical Period Hypothesis (henceforth CPH), is used with two different meanings. The first meaning proposes that there is a biologically based period ending around the onset of puberty, beyond which complete/native-like mastery of a second language is no longer possible. In other words, humans are more efficient at learning a language in the first years of life. Since the existence of a biologically circumscribed period for L2 acquisition was first hypothesized by Lennenberg (1967), there have been many reformulations of this CHP. According to the second meaning, the ability to acquire and to produce the L2 in a native-like manner is maturationally constrained, begins to decline sometime in childhood, and disappears by puberty. That is, the earlier an L2 is learned, the higher the possibility of becoming a proficient speaker in L2 (Singleton, 1995, 2003). The differential outcomes in L1 and L2 ultimate attainment are due the sensitive period for L2 acquisition. Hyltenstam and Abrahamsson (2000) claim that “younger learners acquire second languages automatically from mere exposure, while older learners have to make conscious and labored efforts” (152). The notion of a critical period for language in Lennenberg’s sense supports the idea of post-pubertal L2 learning being more effortful than pre-pubertal learning.

There is a debate as to whether the hypothesized critical period applies only to L1 acquisition or whether it is also a factor in the acquisition of a successive language. Evidence for a critical period with respect to L1 development comes from studies of deaf subjects who are deprived of language input in their early years and who then acquire

sign language as their L1 at a later stage (Singleton, 2003). The later acquisition of sign language as L1 is characterized by various types of deficits. The question is whether the linguistic means and products of L1 and L2 acquisition are the same after a given age. Research shows that even if other factors, such as the period of exposure and amount of use of an L2 influence the final level of proficiency, age of acquisition is the strongest predictor of ultimate achievement.

The CPH assumes that the ability to learn a native language develops within a fixed period, from birth to middle childhood. The dilemma is what age to use as a fair cut-off to consider speakers who still might be within their alleged 'critical period'. Lennenberg (1967) identified the end of the critical period for L1 acquisition at around 13 years or puberty. Nevertheless, age of puberty has been dropping in subsequent decades and the notion that age related changes in the brain may play a role in L2 acquisition looks less plausible. Singleton (2003) concludes that there is a misconception of 'an age factor' and that 'various age-related phenomena...probably result from the interaction of a multiplicity of causes' (18). Since children are entering puberty at a younger age, any cut-off age may be haphazard to explain age effects in L2 learning. Therefore, the claim that younger L2 learners have an advantage over older learners must be considered for empirical purposes.

Montrul (2008) explains that while early and middle childhood is the optimal period in which children are biologically equipped to learn a language effortlessly, this same period is also the most vulnerable to language loss in the absence of appropriate input and language use. She goes on to suggest the ages of 8 through 10 as the time

during which is it more likely to attain L2 native-like results and less likely to undergo L1 attrition (24).

Considering age of acquisition as a unifying factor in the study of L2 acquisition and L1 attrition in bilingualism, Montrul (2008) claims that just as there are age effects in L2 acquisition, there are also age effects, or even perhaps a critical period, in L1 attrition. She argues that while the existence of a critical period is uncertain in adult L2 acquisition, it is an absolute for L1 attrition in a bilingual setting. Moreover, she argues that the critical period for acquisition and loss applies to the grammar (computational system) but not to the lexicon.

This section has provided some of the major concepts required to understand first language acquisition as well as bilingual acquisition. In concordance with the notion that unless L1 development begins during the critical period it may not happen at all, the view that perhaps there is also a critical period for L1 attrition was considered.

1.6. Research on heritage language speakers' grammatical competence

There are many variables among HL speakers that warrant the study of their bilingualism. The recent developments in the field of SHL (outlined in Montrul, 2008 and Carreira, 2012a) draw attention to the extraordinary progress made in recent years. Research on the grammatical competence of HLS provides the opportunity for linguists to understand the structure of bilingual grammars and the factors that affect the acquisition and attrition of minority languages. For practitioners, it provides the opportunity to develop a theory of heritage language teaching along with materials, methodologies, and placement tools. Research enumerates two factors that must be

considered for theoretical implications of HLS grammatical competence: the language(s) they speak at home, and the amount of schooling and other input received in the HL. Muller Gathercole (2002) found that Spanish-speaking children from the Miami-Dade area enrolled in two-way bilingual programs had a better grasp of gender than those in English-immersion programs. Other input-related factors that have shown a relationship with a better control of grammatical structures include having two or more years of schooling abroad, traveling abroad, and speaking the first language outside the home (Fairclough, 2005, 2006; Montrul 2008; Montrul & Potowski 2007).

1.6.1. Language(s) spoken at home

The languages HL bilinguals speak at home influence their grammatical competency. Silva Corvalán (2003) reports that children who spoke only Spanish at home had a better command of specific aspects of grammar, such as gender, aspect, and mood, than those who spoke both English and Spanish. The HL speakers' parents have also been found to have an effect on language maintenance. Au and Oh (2005) demonstrate that the language spoken by parents in the home, as well as parents' attitudes (e.g. ethnic pride) towards the home language and culture are correlated with the children's later abilities in their heritage language. According to Montrul (2006), "the patterns of language choice and use in bilingual families vary greatly, and these patterns have an effect on how proficient bilingual children become in the family (minority) language" (39). Some families, convinced that speaking English will result in more opportunities for success at school and work, encourage their children to acquire this language and disregard the heritage language. In contrast, other families preserve the heritage language and promote

its use at home. As a result, heritage language speakers' linguistic proficiency reflects "the complexities of class and access", since the linguistic repertoire of upper-middle class individuals will differ from that of middle-lower class individuals (Valdés, 2001: 9). Trudgill (1983:101) defines the concept of linguistic registers as varieties that are linked to occupations, professions or topics. Registers are a case of a particular kind of language being produced in the different social situations that reflect the class and access Valdés talks about. The broad range of registers usually found in upper-middle class socially dominant individuals cannot be compared to the repertoires of lower-rank groups. These bilingual speakers usually function with different registers in public and private domains, with English usually spoken in formal situations and Spanish in the informal situational contexts.

An additional factor that must be considered along with the sequence of acquisition to better diagnose heritage language proficiency is related to the manner and length of exposure to the baseline language, i.e., the language that the speaker was exposed to as a child (Polinsky 2007). The manner of exposure affects speakers, because those that grow up surrounded by the baseline language in the overall community will differ in some way from those who grow up in an immigrant community in the United States, for example, a country where a different language is dominant. The exposure to language of a heritage speaker who spent her first 5 years of life in Korea gives her an advantage over an American-born Korean heritage speaker and puts her at a smaller risk for poor heritage language skills during adolescence. It makes sense that the longer the exposure to the baseline, the greater the baseline input for the HL speaker, and so the

speakers that have exposure to the baseline language until the end of the critical period have a distinct language advantage (Au and Oh 2005; Au et al., 2002).

1.7. Research on effects of stabilized incomplete acquisition on different properties

So far, no clear-cut answers have been proposed to the many issues concerning the stability of early childhood language acquisition in a bilingual environment. Different studies aim to determine how long it takes for a native language to be acquired and solidified so that it is not forgotten (1) once a second language is acquired, and (2) with fluctuations in input. The HL population continues to raise questions about the role of age in the acquisition and loss of language in a bilingual setting, the role of input, and the potential linguistic patterns they exhibit.

Research on the type of linguistic knowledge HLS have retained from childhood has theoretical and practical implications. For years the study of HLS had been the area of bilingual education and sociolinguistics. Nowadays, other disciplines are undertaking these issues with added approaches: psycholinguistics, second language acquisition, bilingualism, language education, and language disorders. Documenting the long-term effects of incomplete acquisition in adult HLS is a challenge. It is not realistic to design a longitudinal study following the same individuals and documenting changes in their linguistic behavior. With this in mind, many of the available studies use competent monolingual speakers who speak the full variety as the control group. The language of these monolingual speakers is compared to the family language of the heritage speakers. If significant differences are found between these groups, then incomplete acquisition is assumed for the HLS. Other researchers have used first-generation immigrants as the

control group because the degree of loss is more severe in second and third generations (Silva-Corvalán, 2004).

Something that has received significant attention is the resilience versus the vulnerability of different aspects of grammatical knowledge as a function of age of acquisition. Current studies of adult HLS compared against monolingual norms have documented competence differences for phonological processes (Au, Knightly, Ju & Oh 2002; Godson, 2003, 2004; Knightly, Au, Oh & Ju 2003), inflectional morphology and syntax, including gender agreement in nouns (Montrul, Foote, & Perpiñan, 2008; Polinsky, 2006, 2008b) tense, aspect and mood (Lynch, 1999; Montrul, 2007; Polinsky, 1997; Silva-Corvalán, 1994; Zentella, 1997), null subject pronouns and word class (Montrul, 2004; Polinsky, 1997; Silva-Corvalán, 2004) and inflected infinitives (Rothman, 2007) among other properties. Other studies show that some areas of grammatical knowledge appear to be more vulnerable to comparative competence difference than others. To evaluate the nature of the outcome of bilingual competence, research on effects of stabilized incomplete acquisition in different properties is presented in the following sections.

1.7.1. Phonological processes

Studies of language perception and production show that HL speakers retain a good control of phonemic contrasts in their L1. Even passive exposure to a language in childhood results in perceptible phonetic and phonological benefits as an adult heritage speaker, even after a long period of non-use.

A study of phonetic changes as a result of incomplete acquisition was done by Godson (2004). She investigated how the age at which English becomes dominant in Western Armenian immigrants in the United States affects their production of vowels in their L1. The participants included 10 early bilinguals who learned English before the age of 8 and 10 late bilinguals who learned English in adulthood. Godson refers to the bilinguals exposed to English before the age of 8 as “incomplete language learners” and to the late bilinguals as “uninterrupted acquirers”. The subjects in the experiment were asked to read out loud 86 sentences containing words likely to be acquired by age 5 in Western Armenian. These words contained the target vowels in stressed closed syllables. Responses were recorded and submitted to acoustic analysis. Results showed that the Western Armenian vowels were influenced by English in all the bilingual speakers, but more so in the bilinguals exposed to English before the age of 8. The study shows that incomplete adult grammars show signs of simplification, restructuring, and probable L2 influence at the phonetic and phonological levels. It also confirms that the age at which the family language becomes subordinate to the L2 is a determining factor in the degree of divergence from the fully acquired systems in immigrants who moved to the L2 environment much later in life.

In a different manner, Au *et al.* (2002) and Knightly *et al.* (2003) conducted research of incipient L2 learners of Spanish and Spanish heritage speakers with what they describe as *receptive knowledge* of the language (overhearers). Participants, who were enrolled in second year Spanish language classes, were asked to complete a production task aimed at eliciting VOT measurements of the Spanish stops /p, t, k, b, d,

g/. Fifteen U.S.-born heritage speakers who had been exposed to Spanish in childhood but spoke Spanish poorly were compared to 15 late L2 learners of Spanish. Findings show that the HLS were significantly more native-like on the pronunciation measures than the L2 learners and thus, the conclusion was that early input as predicted by critical period accounts brings advantages for phonology in HLS. Early L1 acquisition by heritage learners, regardless of early or late onset of bilingualism, leads to phonetic production benefits in adulthood when compared to L2 learners.

Montrul (2008) states that it is problematic to compare L2 learners and heritage bilingual speakers using proficiency measures – such as oral, written or self-report, usually developed for L2 learners, since HL speakers cannot be placed in these proficiency categories. However, she adds that these measures of proficiency are at least a starting point because to conduct empirical studies the same measure must be used with the different experimental groups.

1.7.2. Nominal and verbal morphology

The investigation of morphological deficits in HL speakers has included various linguistic subdomains of their grammars. In a study that addresses nominal morphology, Polinsky (2006) presents a description of morphological deficits in heritage Russian. Russian nouns are marked for gender, number and case. Both gender and case morphology are affected under incomplete acquisition in children exposed to English, and the outcome persists into adulthood. All 20 participants in her study immigrated to the United States from Russia: 16 participants arrived in childhood, ranging from birth to 10 years of age, and the other four came to the country between 11-18 years old.

Polinsky shows that the Russian case system is severely reduced in speakers of American Russian and that the degree of grammatical mastery is shown to correlate with lexical proficiency.

Polinsky (2008b) also conducted two experiments to examine whether adult heritage speakers would show the same problems with gender as young Russian-acquiring children who have not completed their language learning process. The first experiment tested twelve speakers of American Russians (average age 27) brought up in Russian-speaking families. Nine participants were born in the United States and the other three arrived between the ages 3 and 5. The control group consisted of five monolingual Russian speakers. Participants were given a list of inanimate nouns that included canonical and non-canonical endings for all masculine, feminine and neuter gender categories. Participants heard each word and were asked to use a possessive pronoun or an adjective. The results show that the control group performed at almost 100% correct while the HLS showed errors from 5% with masculine nouns to more than 20% with feminine and neuter nouns. Polinsky concludes that adult incomplete L1 grammars are simplified versions of the full grammars, as the three-way gender classification was reduced to a two-way classification. The same participants were tested in a comprehension measure in the second experiment. Masculine, feminine and neuter nouns were presented with a correctly or incorrectly inflected adjective. The words were presented orally through a computer and participants were asked to press YES if the words heard were an acceptable combination in Russian. The control group showed above 97% accuracy while the HLS showed errors that ranged from 11% with masculine

to 30% with feminine and neuter. Polinsky (2008b:55) concluded that heritage speakers have difficulty with the gender system. The loss of marked forms and over-application of regular rules points to a reduced grammatical system altogether. This study shows how incomplete acquisition and child L1 attrition affect linguistic competence.

In another study, Montrul, Foote and Perpiñan (2008) investigated whether early exposure to the language gives an advantage in linguistic ability to HLS over L2 learners in syntactic knowledge of gender agreement. The speech, written comprehension and written recognition of 69 heritage speakers, 72 L2 learners and 22 native Spanish speakers was analyzed to observe any differences of gender agreement in noun phrases. The experiment included a comprehension task, a written morphological recognition task, and an oral production task. The native speakers performed at 100% on all tasks, while the two experimental groups were less accurate. The results, however, revealed task effect: the L2 learners were significantly more accurate on the written tasks than the oral production task while the HLS were more accurate on the oral task. Since the results of the oral task are more representative of implicit linguistic knowledge, then the results of the study suggest that the HLS have more native-like ability for aspects of morphosyntax.

In a seminal study of Spanish heritage speakers, Silva-Corvalán (1994) found effects of *incomplete acquisition* in the verbal system of three generations of Mexican-American bilinguals that included adults and adolescents living in Los Angeles. The participants were divided into two groups. Silva-Corvalán classified first generation speakers as Group I and included speakers that were born in Mexico and had immigrated

to the United States after age 11. Of importance here is the fact that these late bilingual speakers had native command of Spanish and a poor to near-native range of their command in English. Speakers included in Group II had either arrived in the United States before the age of 11 or were U.S.-born. All U.S.-born bilinguals were classified as simultaneous bilinguals, had native command of English and near-native to poor abilities in Spanish. Participants were asked to complete fill-in-the-blank questionnaires to elicit their choice of tense. Silva-Corvalán documented the future perfect, the conditional and the present subjunctive as the forms most affected or lost from the grammars of speakers in groups I and II. She also found simplification of the preterite and imperfect tenses in the indicative mood from two forms to one. The results of the study show that under incomplete acquisition the subjunctive mood is more affected than the indicative mood. This is due to reduced access to language input in the non-dominant language.

Lynch (1999) followed Silva-Corvalán's methodology working with 30 participants that included first to third generation Cuban-Americans living in Miami, and confirmed her claim that the subjunctive mood is affected more than the preterite-imperfect aspectual contrast. The frequency of subjunctive use was reduced in optional contexts by second and third generation speakers, who used mostly indicative in those contexts. In his conclusions, Lynch explains that there is semantic simplification of the subjunctive in second-generation speakers, and the subjunctive is clearly lost in all bilinguals born in the United States, exposed to both languages since early age, and schooled in English. In an effort to probe not only whether bilinguals produce or fail to produce but also whether they understand or fail to understand morphological forms,

Montrul (2007) investigated the interpretations adult HLS assign to subjunctive and indicative forms. Twenty Spanish-English bilinguals and a control group of 15 native speakers participated in the study. They were presented with two tasks: a morphology recognition task that tested knowledge of subjunctive and indicative forms in obligatory contexts, and a sentence conjunction judgment that focused on the interpretation of subjunctive/indicative morphology in variable contexts. The results of this experiment show that second generation speakers do not have the ability to discriminate semantically between subjunctive and indicative in variable context, pointing out to incomplete acquisition affecting comprehension as well as production.

1.7.3. Syntax

Various aspects of syntactic competence in heritage speakers have been addressed, for example, in a study by Polinsky (2006). She explains that Russian is a null subject language. By contrast, null subjects in English are typically not possible. She adds that the agreement system in American Russian speakers is severely reduced, with consequences for the interpretation of pronouns. Polinsky (1997) reports that American Russian speakers overuse overt subjects instead of the corresponding null subject in discourse. Research indicates that Spanish heritage speakers show these same tendencies in their incomplete grammars, although not as severely reduced as the American Russian speakers.

Along the same lines, Silva Corvalán (1994) found comparable overuse of overt subjects in the Spanish of the Los Angeles speakers. Additionally, second and third generation speakers overused SVO and SV order in violation of semantic and discourse

rules of the Spanish language. Additional evidence for overuse of overt subjects in HLS comes from a study by Montrul (2004a). She looks at how the incomplete grammar of Spanish HLS shows convergence toward English by losing the pragmatic and semantic layers that regulate the use of subjects in Spanish. It was hypothesized that if incomplete acquisition affects the interface areas of language (semantics and pragmatics) more than the syntactic domain, the HLS should display robust knowledge of null subjects, even though English does not share these syntactic properties and is the dominant language of these speakers. The HLS in the study displayed robust knowledge of the syntax of subjects. All heritage speakers produced overt and null subjects, but the performance of the low proficiency HLS was different from advanced HLS and monolinguals. The low proficiency HLS produced more overt subjects than null subjects. The advanced HLS performance was similar to the monolinguals, producing similar rates of both overt and null subjects.

Håkansson's (1995) study of verb placement (V2 principle) and nominal agreement in the DPs (gender, number and definiteness) in spoken language, written tests, and free composition compared the performance of five expatriate Swedes (who returned to Sweden) and six L2 learners of Swedish. The findings revealed that the Swedish heritage speakers did not violate the V2 rule that allows any major constituent to occupy the first position as long as the second position is occupied by the finite verb, although they had several problems with grammar and vocabulary. The L2Ls, on the other hand, were highly inaccurate on V2. Håkansson concluded that syntax resists attrition in the Swedish heritage speakers. On the other hand, regarding the nominal

agreement in the determiner phrases, the Swedish HLS were more inaccurate than the L2Ls.

The studies presented in this section show that core syntax is acquired solidly even with reduced input in childhood. This is relevant to the present research because of the syntactic configuration of the compound words included in the experiment (cf. 2.13).

1.7.4. Lexical knowledge

Lexicon is a language component that remains unexplored in heritage language speakers. It is highly dependent on the context of acquisition and language use (Gorsjean, 2008) and therefore the following studies on these types of learners are very relevant to my research on interpretation of Spanish compounds as we continue to study how different variables influence performance on lexical decision tasks.

In a study that looks at lexical recognition and translation by Russian heritage speakers Polinsky (2005) found selective retention and forgetting of words by lexical category. The results show that the HLS were more accurate and faster in recognition of verbs than nouns and adjectives. Montrul and Foote (2012), working with Spanish HLS and L2 learners of Spanish, investigated the role of age of acquisition of words in lexical access, that is, words acquired early in the L1 and L2, words acquired late in the L1 and early in the L2, and words acquired early in L1 and late in L2. Results of a visual lexical decision task and an English-Spanish translation judgment task failed to show statistical effects of lexical class. Both groups, however, were more accurate and faster on nouns than on verbs and adjectives. There was an effect of age of acquisition of words: the HLS were faster and more accurate than the L2 learners with words acquired early in the

L1 and late in the L2, while the L2 learners were faster and more accurate on words acquired late in L1 and early in L2. These findings suggest that L1 and L2 learners differ in their knowledge of vocabulary, which is highly dependent on the context of acquisition and language use.

In a similar study that looks at lexical access in production and comprehension in Dutch heritage speakers in New Zealand, Hulsen (2000) compared three generations of Dutch speakers. She found that second-generation differed significantly in speed and accuracy of lexical retrieval from both first-generation and a control group of Dutch speakers in the Netherlands. Third-generation Dutch-speakers were able to perform the picture-naming task for comprehension but were unable to perform the picture-naming task for production.

1.8. What studies have in common, why study compound words

To summarize, I have examined whether and how different areas of linguistic knowledge are affected in Spanish heritage language speakers. Some studies have considered whether the sequence of acquisition (early versus late) contributes to different outcomes in linguistic performance; others have concluded that getting early input, as predicted by the Critical Period Hypothesis CPH, brings advantages to the HLS. The majority of studies comparing the grammatical abilities of HLS and L2L have focused on phonological processes, morphology, and morphosyntax phenomena of divergent populations. Different methods were used to analyze data, and different conclusions were reached. Since one of the central claims of this work is that Spanish compound interpretation by three different bilingual groups is affected by years of contact with

English, the following section establishes a theoretical word formation framework, reviews existing research on compounding, compounding acquisition, processing, and interpretation.

1.9. Section summary

The introduction has established the premise that was examined in the study: that the years of contact with English affect the interpretation of Spanish compound words. This section provides an overview of the profile of bilingual heritage language speakers in the United States. It features a theoretical framework that offers a linguistic characterization of bilingual heritage speakers and discusses interrelated concepts such as incomplete acquisition and L1 attrition, first and second language acquisition, critical period in L2 acquisition, and critical period in L1 attrition. In addition, this section includes research on heritage language speakers' grammatical competence. It establishes the necessary theoretical framework to the central goal of this research, which is the interpretation of compound words in Spanish. Laredoans in a bilingual and bicultural community provide an excellent opportunity for research on Spanish compound words interpretation.

1.10. Subsequent sections

This dissertation consists of this introduction and four subsequent sections. Section 1 features a theoretical overview that presents a linguistic characterization of bilingual speakers and discusses related concepts such as incomplete acquisition and L1 attrition, first and second language acquisition, critical period in L2 acquisition, and critical period in L1 attrition. Moreover, this section covers research on heritage language speakers' grammatical competence, and deals with specific factors that must be

considered for theoretical implications, such as age and sequence of acquisition among others. Section 2 offers an overview of previous studies on compounding as well as research on acquisition of compounds. Section 3 discusses the methodology, that is, the data sources and methods of collection used in the study. It describes the sociolinguistic profile of the populations studied. In a general discussion, this section also explains how the data were treated in order to arrive at the results. Section 4 presents the results, discussion and analysis of the sociolinguistic questionnaire and the interpretation task. Finally, Section 5 presents an evaluation of the study, along with conclusions and recommendations for further research.

1.11. Significance of study

This study is of interest to areas such as psycholinguistics, language pedagogy, and language acquisition because it presents a descriptive analysis of the different profiles of bilingual population who acquired Spanish and English simultaneously and sequentially in early childhood. As adults, their grammar may diverge from the grammar of late bilinguals and native speakers in the less dominant language, even though Spanish was learned first and is used in most private (family, friends) and some public (school, work) domains. As a result, these speakers can understand the home language and may be able to speak it to some degree, but because of the sociolinguistic circumstances they feel more at ease with English, the dominant language of the society.

In the area of psycholinguistics, age of acquisition and sequence of acquisition (simultaneous or sequential) are two important factors that determine routes of lexical processing (Kroll and de Groot, 1997). Even though lexical processing is the means by

which single words are recognized, and it is a retrieval task, in this study of lexical knowledge these same factors –age and sequence of acquisition – must be considered. Lexical access is the point at which lexically-stored information becomes available during processing (i.e. morphological and semantic) and the integration that follows, where the meaning of the word is worked into the overall meaning of a compound word is of interest to evaluate the lexical knowledge –including the conceptual knowledge –of different bilinguals.

This study provides quantitative data of three different types of bilinguals' transfer errors involving the structure and lexical content of 40 Spanish compound words. More specifically, it contributes to understanding the factors that influence the representation and processing of Spanish compounds among bilingual adults. This study can be used to understand the nature of incomplete acquisition, attrition, and bilingualism in childhood and adulthood. The findings can be compared with the research currently available on the differences in compound interpretation across languages. Typically, models of language processing are mostly based on data collection from English (Carreira, 2012a). This research, carried out in Spanish, adapts Libben's (1998) model of compound representation and processing to distinguish degrees of transparency and is applied to the task of interpretation.

In the area of language pedagogy, language acquisition, and psycholinguistics, this study can be used to inform pedagogical practices to help gain understanding of the factors that underlie the interpretation of compound words in a bilingual environment. The target interpretation of compound words points out to language proficiency.

Beyond academia, this study also has possible relevance as regards language policy and the recognition of Spanish in the United States as crucial when it comes to dealing with the presence of the growing and diverse Hispanic population in contexts such as immigration and education, particularly on the U.S.-Mexico Border.

2. LITERATURE REVIEW

Language is a process of free creation;
its laws and principles are fixed,
but the manner in which
the principles of generation are used is free
and infinitely varied.
Even the interpretation and use of words
involves a process of free creation.

Noam Chomsky

2.1. Section overview

This section discusses preliminary notions regarding compounding and a characterization of the properties, structure, and meaning of compounds. It also presents a specific analysis of the Spanish $[N+N]_N$ and $[V+N]_N$ patterns, as these are the sole targets of this investigation. This is followed by a review of some of the important findings in monolingual and bilingual acquisition of compounds. I will discuss what bilinguals have to learn about compounds and take a brief look at some important cross-linguistic variation in compounds.

2.2. Previous studies on compounding

Compounding has been traditionally defined as the creation of new words by combining two or more existing words (Booij, 2005; Bustos Gisbert, 1986; Dressler, 2006; Fabb, 1998; Libben, 2006; Moyna, 2011; Olsen, 2000; Spencer, 1991; Val Alvaro, 1999). In this work, I will examine regular, that is, rule-governed productive compound formations. For example, *blackboard* is formed by free forms *black* and *board*, and the Spanish word *bocacalle* “intersection,” lit. ‘mouth street’ is formed by *boca* and *calle*. Compound words are present in many languages; they are considered fundamental in the

word formation process and the easiest way to add new lexical items to any language. They are exceptionally practical and versatile because “when a new compound is formed, we already know the meaning of its constituents, and the only task we face is to find out about the semantic relation between the two parts” (Booij, 2005: 75). However, we must keep in mind that the interpretation of compound words is also based on each language user’s knowledge of the possible rules of combination, their knowledge of the world, and the context in which the words are used. The new word is a lexical unit from a semantic, phonological, and functional point of view (Varela, 2012).

Olsen (2000) explains that the interpretation of N+N compounds, in particular, often depends on an element of meaning that is not explicitly expressed in the combination of the constituents. As a consequence they are potentially ambiguous semantically, as in *sun spots* ‘spots in the sun’ or ‘spots in the shape of the sun’. In addition, “the first constituent does not refer to an entity distinct from the reference of the second constituent but rather serves as an indefinite or generic specification that further restricts the set of possible denotations of the second constituent” (898).

2.3. Definitional properties of compounds

Let us now focus on the definitional properties of compounds. Unlike sentences “which we assume cannot be profitably stored *en masse*”, compounds are assumed to be stored in the mind (Libben, 2006:16). According to Libben, compounds must be represented in the mind in a relatively stable form, but he suggests that the morphological structuring of compounds might depend on ordering, headedness, constituent category, and hierarchical structure. Since it is possible to combine existing words into new structures

in a variety of ways, Moyna (2011:20) argues that to define compounding it is necessary to delimit (a) its possible constituents; (b) its possible outputs; and (c) the range of syntactic operations that might be present within them. In what follows, I outline compounds types, the particular properties of compounds, why the preceding constituent in a compound changes the original meaning of the following constituent, and the degree to which both constituents become an inseparable structure.

2.3.1 Compound types

Compounds may be seen as the result of a simple merging of two elements, with the exact relations between constituents being highly variable (Libben, 2006:2). The result of this merge operation, or output, is a compound word labeled with a lexical category that may not be the same of the lexical categories of the constituents. It has been established (Booij, 2005) that compound constituents belong to the major lexical categories, in particular nouns and adjectives. In English the constituent at the right end of the compound is usually the head and, thus, Booij (2005) proposes the following schema to indicate that compound words are usually classified as the word class of the head: $[X Y]_Y$, $Y = N, A, V$. As examples, the following are the structures of the A+N > N English compound *blackboard* and of the Spanish A+N > N compound *buenaventura* ‘good fortune’.

- (1) a. $[black]_A [board]_N = [[black]_A [board]_N]_N$
 b. $[buena]_A [ventura]_N = [[buena]_A [ventura]_N]_N$

In example (1a) the input categories are adjective and noun while the output is a noun (a kind of board). In the example (1b) the input categories are adjective and noun and the output is a noun as well (a kind of fortune or luck).

2.4. Characteristics of compounds

2.4.1. Phonological features

A criterion that allows for the establishing of lexical compound status involves phonological processes. According to Fabb (1998:78) stress assignment is the phonological property most often considered to distinguish compounds from phrases. English compounds are often marked by distinctive stress assignment of the first word (see 2a) while Spanish and Italian (2b-c) compounds are stressed on the second word. In 2a, the stress pattern assignment in the English compound *blackboard* distinguishes it from the phrase *black board*, because in the former only one stress is applied to the first constituent *black*. In 2b, and 2c, both the Spanish compound *casa cuna* and the Italian compound *apribottiglie* happen to have one minor stress in the first constituent and one major stress in the second one. However, the stress pattern does not always constitute a criterion to distinguish compounds from phrases. For example, compounds with a non-hierarchical internal structure, such as *writer-director*, do not show de-stressing.

- (2) a. bláckbòard
b. càsa cúna (‘nursery’ lit. ‘house+crib’)
c. apribottíglie (‘bottle opener’ lit. ‘open+bottle’)

For Spanish, Rainier and Varela (1992) list two main stresses, a secondary word stress on the left constituent and a main stress on the right constituent or only one main stress and regular trochaic secondary stress (124). In this language, different compound types show different stress patterns. A single main stress is a feature of the [V+N]_N patterns (*pisapapéles* ‘paperweight’ lit. ‘step-papers’) but it is not categorical for all compounds: *cámpo* ‘field’ + *sánto* ‘holy’ > *camposánto* ‘cemetery’. Concatenative compounds can have more than one stressed syllable (*directór-actór*) and in other cases there is variation of the same pattern, such as [N+A]_N *agua fuérte* (‘etching,’ lit. ‘water strong’) but *águá régia* (‘hydrochloric and nitric acid solution’ lit. ‘water regal’) (cf. Hualde (2006) for a detailed analysis of the issue of stress in Spanish).

2.4.2. Orthographic features

An issue with the orthographic criterion is that not all compounds are spelled as one word (Moyna, 2011:81; Hualde, 2007; Levy, et al. 2006:140) Compounds can be written as single words, as hyphenated words, or as two monomorphemic words; in some languages, all three variations may be found. The conventions for writing compounds are illustrated in (3a-c) following the OED and the DRAE:

- (3) a. as combined words (closed form)
blackboard, bocacalle (‘intersection,’ lit. ‘entrance street’)
- b. as words separated by a hyphen (hyphenated form)
house-hunt, actor-bailarín (actor-dancer)
- c. as separated words (open form)
black hole, hombre rana (‘frogman,’ lit. ‘man frog’)

The presence of a space or a hyphen between the constituents (as in examples 3b and 3c above) does not by itself indicate if a sequence of words constitutes a compound. In Spanish, alternations and inconsistencies are found in some forms (for example, *arco iris* and *arcoíris* ‘rainbow’, lit. ‘arc + rainbow’). In English, too, whether a compound is spelled with a space between the two words, with a hyphen, or with no separation at all depends on the idiosyncrasies of the specific compound (Fromkin, et al., 2011:101). However, hyphenation may in some cases aid in establishing the grammatical and semantic relationships among words in compounds. In English, we all distinguish that a *top-hat rack* and a *top hat-rack* are not the same thing – and this shows that hyphenation may in effect represent meaning. The structural ambiguity of a compound like *top hat rack*, shown in the comparison of the two structures in tree diagrams (see Figures 2.1 and 2.2), can be cleared with the use of hyphens. In Figure 2.1 the compound can mean “a rack for top hats” while the “highest hat rack” corresponds to Figure 2.2.

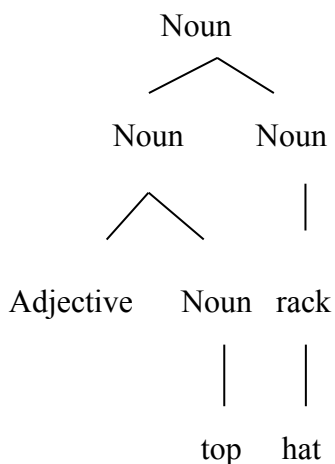


Figure 2.1. Morphological tree of *top+hat rack* meaning “rack for top hats”

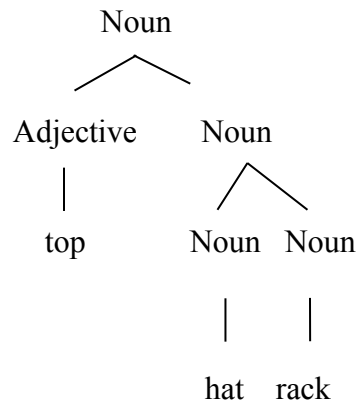


Figure 2.2. Morphological tree of *top hat+rack* meaning “highest hat rack”

In Spanish, however, since hyphenation is a lot less common, we sometimes experience difficulty in deciding how best to express the inter-connectedness of compounds –especially when dealing with sometimes opaque compound modifiers. Moyna (2011) argues that if a clear progression from two-word to one-word spelling is documented, the complex word has become compounded. For example, the adjective *mal acostumbrado* ‘spoilt’, lit. badly-accustomed’ can be a phrase or a compound, but the widespread use of the spelling *malacostumbrado* helps identify the compound word.

2.4.3. Morpho-syntactic features

A reliable criterion that contributes to determining compound status is morpho-syntactic. Languages differ in terms of the morphology allowed within compounds. With some exceptions, Germanic languages normally do not allow regular plurals in non-head position, while Romance languages do, as in *lavaplatos* ‘dishwasher’, lit. ‘wash-plates’(Lardiere, 1995). However, regular plurals can occur in the English language if

the plural marks a different meaning from the singular form (e.g. parks commission). On the other hand, in Spanish and French [V+N]_N compounds the noun takes a generic –s marker (e.g. *pisapapeles* ‘paperweight’ lit. ‘step+papers’, *ouvre-boîtes* ‘can opener’ lit. ‘open+cans’). In some languages a morpheme is inserted between the two constituents. Boundaries between compound members may be marked by linking elements of interfixes (Dressler, 2006; Jarema, 2006). For example, in German, the interfixes *-s-* or *-(e)n-* may be inserted, like in *Schwan-en-gesang* ‘swan song’ and in English *gas-ometer*, the interfix *-o-* goes back to a thematic vowel in Latin and Ancient Greek. In Spanish the linking element *-i-* indicates compounding. For instance, the lexeme *pel-* ‘hair’ followed by *-i-* and the lexeme *roj-* combine to form the adjective compound *pelirrojo* ‘red-haired.’ Varela (2012:217) explains that in compounding by means of Greco-Latin stems the origin of the second constituent determines the kind of linking vowel appearing between them. For example, if the second constituent is of Greek origin, the linking vowel is usually *-o-* (*mareógrafo* ‘tide-graph’); if the second constituent is of Latin origin the linking vowel is usually *-i-* (*granívoro* ‘grain-eater’). Interfixes do not contribute to the meaning of the compound and thus morphosemantic transparency is reduced (Dressler, 2006:42). Furthermore, phonological truncations reduce the phonological transparency of compounds and ease of parsing, because “the less a word changes, the simpler it is” (Clark and Berman, 1984:548).

Compounds may modify their internal morphological structure over time to acquire more compound-like structure. Moyna (2011:8) illustrates this process highlighting how the early right-head compound *gallocresta* ‘wild sage,’ lit. ‘rooster-

comb' underwent different structural modifications. At the outset, the word class marker of the non-head element *gallo* is replaced by a linking vowel as in *gallicresta*. Later, this compound is then restructured as *cresta de gallo*, and soon after loses its internal preposition and results in *crestagallo*. In this case, the structural modifications make this a left-headed compound, which is preferred in Spanish.

Syntax is considered the concatenation of words to form phrases, while compounds are prototypically the concatenation of words to form other words (Spencer, 1991). Yet, Spencer enumerates a set of characteristic properties that makes compounds resemble syntax. The first is the syntactic process of recursivity, the second is the constituent structure, where bracketing are assigned on the basis of meaning (cf. 2.5.2) A third property of compounds similar to syntax is that the elements of a compound may hold relations to each other which resemble the relations held between the constituents of a sentence (310). These relations, according to Spencer, are head-modifier, predicate-argument, and apposition. For Spanish, Moyna (2011) explains that syntactic constituents may be separated (4) or moved from base-generated positions (5) whereas lexeme-internal syntax may not (6). In a sentence, compounds behave as one word.

- (4) Robert Redford es actor y además director.
'Robert Redford is an actor and also a director'.
- (5) ¿Qué sacaste? El corcho.
What did you remove? The cork

- (6) *el abre-rápidamente-latas
 the open-quickly-cans
 ‘the fast can-opener’

The relations between compound constituents can be described with syntactic labels such as coordination, apposition, complementation, and modification. Data from Moyna (2011:28) categorizes lexeme-internal (7) syntax as follows:

- (7)
- a. coordination *coliflor* ‘cauliflower,’ lit. ‘cabbage-and-flower’
 - b. apposition *escritor-director* ‘writer-director,’ lit ‘writer-director’
 - c. modification *cara larga* ‘long-faced,’ lit. ‘face-long’
 - d. complementation *abrelatas* ‘can opener,’ lit. ‘open-cans’

These syntactic relations define two basic types of compounds, hierarchical (i.e., compounds with a head and a dependent constituent as in 7c - d) and concatenative (i.e., those that are not hierarchical compounds as in 7a - b).

2.5. Properties of compounds

2.5.1 Fixity and atomicity

The simple syntactic criterion of separability distinguishes compounds from syntactic phrases (Dressler, 2006:24). Specifically, Dressler points out the impossibility vs. the possibility of changing linear order and inserting another word between the constituents of a compound vs. a syntactic phrase. Thus, in English, the adjective *big* may be inserted within the phrase *a high school* (cf. 8) but not within the compound *high-school* (9).

(8) a high school → a high, big school

(9) high-school → a *high-big-school

→ a big high-school

These criteria indicate that compound internal structure is typically inaccessible to syntax and remains fixed; in other words, these naming units, like lexemes, exhibit syntactic atomicity. Compounds are ‘anaphoric islands’ or atoms (Scalise, 1992:95) and therefore, no other linguistic elements can be placed between the constituents (e.g., the Spanish V+N *abrecartas* (‘letter opener,’ lit. ‘open letters’) cannot be modified with the quantifier *muchas* (‘many’) in **abremuchascartas* (*lit. ‘open many letters’). Compound constituents cannot be either replaced or switched around, since doing so results in a different compound with different meaning (e.g., *house dog* vs. *dog house*) or in a word that is not an equivalent compound (e.g., **dog mansion*). In Spanish, for example, the

constituents in *casacuna* ('orphanage,' lit. house-crib) cannot be replaced or switched around either: **cunacasa* ('crib-house) or **casa-cama* ('house-bed).

Another manifestation of atomicity is that no syntactic anaphoric reference can be made to either of the compound internal constituents. For example, the sentence “**Truck_i* drivers do not fill **them_i* up” is ungrammatical if the anaphoric pronoun *them* refers to the noun *truck* (Dressler, 2006). These features of compounds show that compounds behave as a block immune to syntactic operations, just like single lexemes (Moyna, 2011:32).

2.5.2. Productivity and recursivity

Dressler (2006) defines productivity following H. Schultink as: ‘the possibility for language users to coin, unintentionally, a number of formations which are in principle uncountable.’ The novel combination of existing words creates neologisms. Booij (2005) illustrates the productivity of compounding with the newly coined *butt call*. It is a [N+N]_N compound word that denotes an unintended cell-phone call placed as a result of sitting with a mobile phone in one’s back pocket. Surprisingly, we all understand this contextual compound. At the time of this writing, *butt call* generated 91,600 hits on Google and was included in some on-line dictionaries. In Spanish, the pattern [V+N]_N produces new terminology (e.g. *salvapantallas* ‘screen saver,’ lit. ‘save screen’) and nonce neologisms (e.g. *sacasustos* “scary thing” , lit. ‘something that causes fright’). Although *sacasustos* was created as a nonce compound simply to illustrate the process of productivity, it does happen to have generated 26 hits on Google at the time of this writing, and in context, it refers to a benign tumor, a suspicious vehicle, a vicious dog,

and an April's fool joke. These new contextual compounds are easily interpreted by native speakers.

Spencer (1991: 310) states that compounding is similar to syntactic processes in that it is recursive. Recursion is the process of compounding based on previous outputs of compounding. In English, recursive compounding may result in left-branching, for example in bracketing notation [[three-star] general], or right-branching, as in [family [[drug-store]]] (Dressler, 2006). In general, left-branching compounds appear to be preferred in English. The following exemplifies the left-branching process in Spanish: [[limpia] [[para][brisas]]] 'windshield wiper' lit. 'clean-stop-breezes.'

2.6. Compound structure

In every compound there is normally a head constituent (Fabb, 1998). The head represents the core meaning of the compound. Thus, a *dog house* is a kind of *house*. The head is the most important constituent of the compound since it assigns its relevant semantic, syntactic, and morphological properties to the whole compound. Compounds are classified as *endocentric* and *exocentric*. Compounds that have a head are called *endocentric*. On the other hand, *exocentric compounds* refer to something that is not named by either of the constituents of the compound (Olsen, 2000). Unlike N+N endocentric compound nouns, such as *dog house*, where the modifier element has the role of attributing a property to the head, English synthetic or verbal compounds have as their heads a derived word consisting of a verb plus an affix. In English, the morphological structure of [[N][V]er]] pattern uses a head and a complement to name someone or something. Thus, the deverbal compounds [object + verb + -er] (e.g., *truck*

driver) and [verb + -ing + noun] (e.g., *chewing gum*) are also *endocentric*. Some *exocentric* compounds involve a possessive relationship. For example, a *birdbrain* is not a kind of *brain* but “someone with the brain of a bird.” The highly marginal English [verb + object] compounds are also *exocentric* (e.g., *pickpocket* or *lazybones*) (Spencer, 1991). In most languages, endocentric compounds are preferred to exocentric compounds because they allow easier access to the head (Dressler, 2006:33).

In Spanish, the head position is not categorical, particularly in the case of nominal compounds (Moyna, 2000), which may follow head-initial and head-final patterns. The following examples show that the distribution of the head is not fixed for all types of compounds. Endocentric compounds (see 10a and b) have their head within the compound, so *hombre_lobo* ‘werewolf’, lit. ‘man wolf’ is a kind of man and *organoterapia* ‘organ therapy’ is a kind of therapy. The non-head is semantically and structurally subordinate to the head (Dressler, 2006).

The Spanish [V+N]_N pattern nominal construction may be analyzed depending on the approach to word-formation. In this nominal construction (e.g. *lavaplatos* ‘dishwasher,’ lit. ‘wash-dishes’) neither of the two constituents is responsible for the category of the compound, since it is neither a verb nor a plural masculine noun. The syntactic-semantic features of the compound must come from ‘outside the compound’, hence the term *exocentric* (Moyna, 2011). In exocentric compounds (see 11) the head has to be inferred, so in the N+N compound *puntapié* ‘kick,’ lit. ‘point-foot’ is neither noun (point or foot) but a ‘kick’ while in the V+N compound *abrelatas* ‘can opener’, lit. ‘open cans’ is neither a verb (‘open’) or a noun (‘cans’) but a ‘can opener’.

- (10) Endocentric
- a. Left headed [N+N] *hombre lobo* ‘werewolf’, lit. ‘man wolf’
 - b. Right headed [N+N] *organoterapia* ‘organ therapy’
- (11) Exocentric
- [N+N] *puntapié* ‘kick,’ lit. ‘point-foot’
 - [V+N] *abrelatas* ‘can opener’, lit. ‘open cans’
- (12) Concatenative
- Identificational [N+N] *actor-director* ‘actor-director’
 - Hybrid [N+N] *falda-pantalón* ‘skort’, lit. ‘skirt-pants’

There are also compounds where both constituents share head-like characteristics, and these are called *concatenative* (see 12). Consider, for example, *student-prince*, both a student and a prince (Fabb, 1998). There are different types of concatenative compounds. For instance, the two constituents in a *concatenative identificational* compound contribute all their semantic content to the compound (e.g., *actor-director*) while in a concatenative hybrid compound both constituents contribute partially to the meaning of the compound (e.g., *falda-pantalón* ‘skort’, lit. ‘skirt-pants’) (Moyna, 2011:219).

2.6.1 Spanish [N+N]_N and [V+N]_N patterns

Only Spanish compounds with the patterns [N+N]_N and [V+N]_N are considered in this investigation because of their structural differences with their English counterparts.

- (13) a. [N+N]_N *pájaro mosca* ‘hummingbird’, lit. ‘bird fly’
b. [V+N]_N *espantapájaros* ‘scarecrow,’ lit. ‘scare birds’

Therefore, the description of compounds is limited to these two particularly productive formations (see 13). In the Spanish [N+N]_N structure presented in (13a), the leftmost head is a nominal, which percolates its nominal features to the entire compound.

Furthermore, these endocentric head-initial [N+N]_N compounds in Spanish have no equivalent in English. The English endocentric [N+N]_N compounds are categorically head-final.

The Spanish [V+N]_N pattern is the equivalent of the English synthetic compounding which also produces agentive (*cuidacoches* ‘car watcher’), instrumental (*lavaplatos* ‘dish-washer’) or locative nouns (*guardamuebles* ‘furniture repository’). This pattern constitutes the largest subgrouping of Spanish compounds, as well as the most productive and frequent (Moyna, 2011:206; Varela, 2012:219). It has great vitality as a means to name any object of human thought.

To sum up, the [N+N] head-final compounds are frequent and highly productive in English. The Spanish [N+N] compounds have a head nominal on the left and are also frequent in colloquial registers (Moyna, 2011:164). On the other hand, few compounds

of the [V+N]_N pattern are found in English (e.g., *pickpocket*) while the Spanish [V+N]_N compound pattern (as in 13b) is very productive (cf. Section 12.3). These differences make the act of interpretation (i.e., meaning prediction) fairly challenging to HLS with greater exposure to English.

2.7. Meaning of compounds

Compounds are often lexicalized and, therefore, subject to semantic drift. If compound words are lexicalized all properties of their constituents may be opaque to speakers and have no influence on the perception of the word as a whole (Desrochers, Licerias, Fernández-Fuentes & Thomson, 2010). The meaning of a new compound may be compositional, but it often becomes idiosyncratic over time. Once the meaning of the whole word is known, it is often possible to understand how the parts contribute to that meaning (Fabb, 1998; Katamba, 2005; Spencer, 1991). However, compound meanings are not predictable, according to Fabb (1998), because they are “(a) subject to processes of semantic drift, which may include metonymy, so that a *redhead* is a person who has red hair and (b) there are many possible semantic relations between the parts of a compound, as between the parts of a sentence, but unlike a sentence, in a compound, case, prepositions and structural position are not available to clarify the semantic relation” (66).

Relations of constituents are important for the representation and use of compound words. To illustrate these relations, Gagné and Spalding (2006b:146) compare the terms *teapot* and *coffeepot* that distinguish two types of pots. These authors add that the modifiers *tea* and *coffee* indicate the type of substance for which the pot is

designed. To create the subcategory, the head noun *pot* could be modified in other ways other than its function, as in *plastic pot* (material) or *office pot* (location). In these examples, there is a relation that denotes the manner in which the head noun is modified as in (14).

- | | | |
|------|-------------|----------------------------|
| (14) | teapot | head noun FOR modifier |
| | plastic pot | head noun MADE OF modifier |
| | office pot | head noun LOCATED modifier |

The relation FOR, MADE OF, or LOCATED that links the constituents of a compound emphasizes the meaning of the compound.

2.7.1. Transparency

Libben, Gibson, Yoon, and Sandra (2002), Libben (2006), and Dressler (2006) describe morphological transparency as the extent to which a morpheme's semantic characteristics in a multimorphemic word correspond to its semantic characteristics as a free-standing lexical item. These authors propose that semantic transparency is related to the manner in which multimorphemic words are represented and processed. They point out that morphologically opaque words resist activation through prelexical decomposition. In the case of compounds, semantic transparency requires an additional consideration of whether the meaning of all, one, or none of the constituents is related to that of the whole word. Their findings suggest that semantic transparency of a compound

as a whole is related to the transparency of its individual morphemes, their position in the word, and their morphological and semantic roles in the word's meaning.

Dressler (2006) defines “an actual transparent compound as one whose meaning is a subset of the set of potential meanings of the compound as constructed grammatically via the combination of the meanings of the two members (41). Let us consider *doorbell* as a simple example. It is a fully transparent compound because the meaning of the entire string can be straightforwardly inferred from the parts. Libben (2006) argues that if all compounds were semantically transparent and if the meaning of the whole word were predictable from the meaning of the constituents, all words could be represented in a decomposed form (32). The problem with interpretation would then be the high degree of semantic opacity after the semantic drift that sometimes occurs over time. Less lexicalization means more transparency, more lexicalization, more opacity (Dressler, 2006:40). However, it should be noted that when transparent compounds are of low frequency (e.g. *lemon picker*) retrieval is most likely reliant upon decomposition, because it is implausible for such words to have achieved whole-word status in an individual's lexicon (Levy, Goral & Obler, 2006).

Libben (1998) proposes a model of compound representation and processing that distinguishes three levels of representation: the stimulus level, the lexical level and the conceptual level. At the stimulus level, a compound word such as *pie-berry* would promote attention to the constituents and make possible its identification as a novel compound. However, although its constituents may be activated just like in *blueberry*, it cannot be comprehended through lexical representation, since it is not stored in the

lexicon. At the lexical level, we find compounds which already exist, such as most members of the *berry* family, e.g., *blueberry*. This model of compound representation also distinguishes between semantically transparent compounds (i.e., *blueberry*) and semantically lexicalized bimorphemic units which are assumed to be stored in the mind (i.e., *strawberry*). This difference in semantic transparency is captured at the conceptual level. Libben assumes that speakers comprehend *strawberry* as a monomorphemic concept because the meaning of *straw* is not contained within the string and it is unlikely that the meaning of this constituent contributes to the meaning of the whole word.

Furthermore, Libben also distinguishes two types of semantic transparency: constituency and componentiality. Constituency refers to the use of constituents in the original/shifted meaning, that is, the semantic relationship between the meaning of a morpheme within a compound and the independent meaning of that same morpheme. For example consider *shoehorn* – a tool used to ease shoe onto foot – where *shoe* is transparent because and is used in its original meaning and *horn*, the head of the compound, is opaque. Componentiality, at the conceptual level, is the transparency associated with the compound as a whole. The underlying idea of componentiality is that the semantic value of the compound as a whole is brought about by the meaning of the first constituent, the meaning of the second constituent and the principle by which one is related to the other. On one side, *doorbell* is componential because the meaning of the word is understood from the meaning of both the head and the non-head. On the other side, *bighorn* is non-componential because the meaning of this word – a large-horned sheep – cannot be understood from the meaning of its constituents.

Compounds can feature different degrees of morphosemantic transparency, a characteristic that can be used to classify them. Libben (1998) differentiates the fundamental degrees of transparency for compounds, assuming that the transparency of the head is more important for interpretation than that of the non-head. Thus, based on Libben's model of compound representation and processing, Dressler (2006:41) distinguishes four degrees of morphosemantic transparency of compounds (As in 15 a-c):

(15) a. Fully transparent:

TT - transparency of both members, e.g., 'doorbell'

b. Partially transparent:

TO - transparency of the head member, opacity of the non-head member, e.g., 'strawberry'

OT - transparency of the non-head, opacity of the head member, e.g., 'jailbird'

c. Fully Opaque:

OO - opacity of both members, e.g., 'humbug'

It is conjectured that type 15a is the most suitable and type 15c the least suitable in terms of meaning predictability. Semantic transparency and opacity affect the interpretation of compound words, as they determine whether one or both constituents are interpreted at the conceptual level and/or the lexical level (Gagné and Spalding,

2006). For example, the compound *blueberry* is linked to *blue*, *berry*, and *blueberry* at both the lexical and conceptual levels, whereas *strawberry* is linked only to *berry* and *strawberry* at the conceptual level, but not to the concept *straw*. In both examples, the compound's lexical entry is connected to its respective conceptual representation. The issue of how novel compounds are processed is relevant, because it is assumed that compound words start out as novel compounds and then become lexicalized at some point. Since all compounds start as novel combinations, it is possible that novel compounds are processed using the same method used to understand familiar compounds.

The distinction between the conceptual and lexical level might explain the different processing of transparent and opaque compounds. A hypothesis proposed by Libben (1998) suggests that lexical representation of semantically transparent compounds is linked to their constituents but relational information must be incorporated into this view. A semantically transparent compound (e.g., *snowball*) is represented in the lexicon in terms of the constituents as well as in terms of the whole word. But because this view is based on compounds that already have representation in the lexicon, it does not provide information about how the conceptual representation for a novel compound is formed. The conceptual level plays a large role in how compounds are represented and accessed.

Gagné and Spalding (2006) propose that novel compounds, such as *pie-berry*, do not have a representation either at the lexical or conceptual level and therefore the meaning of these items must be computed by other means. The meaning of a novel

compound such as *pie-berry* might be determined by the relation of the modifier and the head noun and the modifier's past usage. According to Gagné and Spalding, a better understanding of how modifier-noun conceptual combinations are formed and interpreted will help us understand how complex words are processed and represented. Conceptual combination is the process in which two or more concepts are combined to form a new concept. For example, the conceptual representation of the existing word *snowball* is formed by the concepts *snow* and *ball*. The complex conceptual representation of the novel word *pie-berry* allows us to recognize that compound words are connected to combined concepts in the conceptual system. As reported by Gagné and Spalding (2006), in the area of conceptual combination, this new concept is more than a hybrid of its parts.

2.8. Studies on semantic transparency effects

This section examines some studies that are centered on semantic transparency effects on constituent activation. In a study on English compounds, Libben, Gibson, Yoon & Sandra (2003) found priming effects from both constituents, as facilitation occurred for compounds that were transparent (as in each constituent of *doorbell*) or opaque (as in each constituent of *humbug*), opaque/transparent (such as *strawberry*), and transparent/opaque (such as *jailbird*). The fact that reaction times overall were longest for compounds in which the head (second constituent in English) was opaque, suggests that overall transparency is related to the transparency of the constituents as well as their position in the compound word. Since English compounds are right-headed, it was unclear whether priming was due to morphological headedness or position in the

compound. In two primed lexical experiments, Jarema, Busson, Nikolova, Tsapkini & Libben (1999) examined the processing of compounds in French and Bulgarian to test the relative importance of first-position in the string vs. headedness. Using a primed lexical decision task, comparing French (a language with both right-headed and left-headed compounds) and Bulgarian (a language with right-headed compounds only, just like English) priming effects were found throughout in both French and Bulgarian, except opaque-opaque compounds in Bulgarian. Libben's (1997) four-way classification for transparency (cf. 17 a - c) was employed with French compounds, such as TO *garçon manqué*, 'tomboy' (left-headed) and OT *grasse matiné*, 'sleep-in' (right-headed) and also with Bulgarian compounds, such as TT *pəlnolunje*, 'full moon' and OO *xladnokr vje*, 'cold-bloodedness'. The finding that first-constituent primes yielded significantly greater extent of priming when compared to second-constituent primes for left-headed compounds reflected the combined effects of both position-in-the-string and headedness. These findings suggest that processing of compounds involves the interaction of semantic transparency, position in the string, and morphological headedness. The claim that morphological headedness and position of the head interact was confirmed by the fact that, in French, right-headed opaque-transparent compounds (the category that was tested) failed to yield the differential pattern obtained for left-headed compounds, when first- and second-constituents primes were compared. In Bulgarian, a right-headed language like English, differential priming was not found. Contrary to French, differential priming was not found for Bulgarian, a language that is right-headed.

Sandra (1990) found that primes that were semantic associates of compound constituents facilitated response times to transparent compounds, but not to semantically opaque compounds. His study compared lexical decision latencies for semantically transparent compounds (e.g., *birthday* primed by *death*) to those for semantically opaque compounds (e.g., *Sunday* primed by *moon*). Priming effects are calculated by comparison of an unrelated prime-target pair (e.g., *cloud-birthday*). He concluded that morphological decomposition occurred with semantically transparent compounds, but not with compounds with an opaque constituent. Based on these findings, it appears that semantic transparency plays a role in lexical retrieval, in that compound recognition relies more on decomposition if constituents are transparent, and more on whole word representation if compounds are opaque. Compounds with at least one opaque constituent (e.g. *butterfly*) are likely to be accessed as a whole unit since it is not possible to derive the meaning from the constituents alone (cf. Libben, 1998).

Levy *et al.* (2006) argue that it has been presumed thus far that lexical items have translation equivalents in another language. The assumption that a French-English bilingual's lexicon is expected to include *fromage* and *cheese* as parallel lexical items is challenged when compounds are introduced. For example, bilinguals may have the word *niche* (*doghouse*) in their French lexicon, but the equivalent, the transparent compound *doghouse* might be expected to be stored in decomposed form. Therefore, it is of interest how bilingual speakers handle compound words that are transparent in one language but not in the other.

2.9. Research on acquisition of compound words

Acquisition provides a piece of evidence for how compounding morphology is best described relative to the rest of language (Nicoladis, 2006). When children create novel compound words they name things. Children also have to notice and learn what can be named with a compound in their language. In order to establish a connection between compounds and whether they are acquired like similar syntactic forms or not, the processes of language acquisition in children must be analyzed. Also, patterns in children's acquisition of compounds across languages must be reviewed. A number of studies in English, Spanish, French, and Hebrew explore and compare monolingual and bilingual children's compound noun acquisition (Berman & Clark, 1989; Clark 1981; Clark & Berman, 1984, 1987; Clark, Gelman, & Lane, 1985; Clark, 1993; Gagné & Spalding 2004, 2006a; Nicoladis, 1999, 2002a, 2002b, 2006, 2007; Nicoladis & Murphy, 2002; Murphy and Nicoladis, 2006; Levy et al., 2006). Compound L2 acquisition by Spanish adult native speakers has also been studied (Lardiere, 1997; Lardiere & Schwartz, 1995, 1996). This literature review describes available findings on the acquisition of compounds. It allows us to examine possible patterns in acquisition on the basis of: (1) frequency and productivity in the input, (2) acquisition of compound meaning, and (3) order of the constituents within compounds.

2.9.1. Studies of compound acquisition by bilingual children

A difficult problem in the acquisition of compounds is that there are no cross-linguistic universals for what can be described by compounds, and children (as well as L2 learners) have to learn what can be named with a compound in each language (Nicoladis,

2006). Nicoladis (1999, 2002a) further addresses the issue of bilingual acquisition as she examines crosslinguistic transfer in compound nouns. Nicoladis defines crosslinguistic transfer as the phenomenon of structural influence of one language on another.

Cross-linguistically, Nicoladis (2006) identifies morphological headedness direction as a major distinguisher of compound structure and, therefore, proposes that for bilingual children the challenge must be the different order of the linguistic structure in the language being acquired. She illustrates with the example of a French-English bilingual child calling blue soap 'requin savon' (lit. 'shark soap'), a novel French compound with the English compound structure. Results of Nicoladis' studies show that while bilingual children can differentiate the morphology of their two languages, they show signs of crosslinguistic transfer in the production of N+N compounds. Nicoladis (2002a) also found that French-English bilingual children who were asked to form a compound with novel objects, such as chairs with flowers on them (the target was "flower chairs"), were more likely to reverse compounds than English monolingual children of the same age. Nicoladis' (2002a) findings also show that French-English bilingual children were equally correct when comprehending compounds in both languages, even though compounds are right-headed in English and left-headed in French.

Turning now to the V+N pattern, When Nicoladis (2003) compared the production of deverbal compounds in French-English bilingual children and

monolingual English-speaking children, she found that the bilingual children produced more V-O compounds, which are ungrammatical in English (cf. 2.10).

2.9.1.1. Comprehension and production

It has been established in studies of child language acquisition that comprehension precedes production when acquiring a language (Clark & Hecht, 1983). However, children's abilities to comprehend and produce novel compound nouns appear quite early in development, as young as two years of age for English-speaking children (Clark, 1981). Results of a study by Clark, Gelman and Lane (1985) suggest that comprehension and production of N+N compound nouns by 3-year-olds occur together in the development of English. On the other hand, Berman and Clark's (1989) study found that Hebrew-speaking 3-year-old children cannot produce compounds as well as they can comprehend them, and attribute this difference to the infrequency of compounds in Hebrew.

Regarding comprehension of novel N+N compounds, Nicoladis (2003) worked with English-speaking children as young as three years old. In order to examine their comprehension abilities, children were asked to select the referent of a compound like "fish shoes" from four pictures that included only the head (shoes), only the modifier (fish), head and modifier juxtaposed (shoes next to fish), and head and modifier interacting (fish on shoes). Because four-year-olds were less likely than three-year-olds to choose juxtaposed objects as the meaning of compounds, Nicoladis (2006) argues that children's understanding of the meaning of NN compounds develops over the preschool years and into the school years. Children's difficulty with comprehension may be due to

the fact that the relationship between two nouns in compounds varies. For example, the word “mountain” has a different meaning in “mountain goat” and “mountain bike.”

On the subject of production, Clark and her collaborators examined children’s semantic abilities in creating compounds to determine if they knew that compounds name objects with some intrinsic relationship. They found that English-speaking children produce compound nouns starting at around the age of two (Clark, 1981; Clark et al., 1985). They asked 2- and 3-year-old English-speaking children to name objects that were inherently related (a house made out of a pumpkin), semi-inherently related (a block decorated with the decal of a banana), and accidentally related (a chair with a spider on it). Most children named inherent and semi-inherent pictures using compounds. In another study by Levy, Goral and Opler (2006), the reverse transfer by a five-year-old of the English right-headed compound “doghouse” to French *chien-maison* exemplifies how a bilingual child produced a right-headed compound in a language in which compounds are generally left-headed (Levy et al. 2006). Levy et al. concluded that if a language contains compounds that are generally left-headed, transfer might occur in a bilingual child’s L2.

2.9.1.2. Order of elements within compounds

To understand compound acquisition, researchers have focused on children’s understanding of words to determine if they organize concepts in hierarchies while acquiring meaning. To determine if English-speaking children understand the subcategorization role of compound nouns early in development, Clark et al. (1985) gave children between the ages of 2 and 6 years a novel N+N compound (e.g., *apple*

knife) and asked them to select the picture of it from four choices: an apple, a knife, an apple tree, and an egg beater. If children understood that an apple knife was a kind of knife, they would go for the picture of the knife among the pictures. While the youngest children in the study found the task difficult, the 3-year-old children showed improvement. The results suggest that English-speaking children at a very early age understand the concept of hierarchies in the subcategorization role of compounds.

2.10. Studies of deverbal compound acquisition by monolinguals

A number of studies have examined children's ability to form Object-Verb-*er* (O-V-*er*) compounds. This form is of interest because it does not follow the typical Verb-Object order in the English language. The suffix *-er* is added to verbs to make nouns and can be used to name both instruments (e.g. *can opener*) and agents ('truck driver'). Children who speak V-O languages like English go through developmental stages during which they produce ungrammatical V-O (e.g., *hug-kids* for someone who hugs kids) or V-ing-O structures (*washing-people* for something that washes people). They may have trouble with the structure O-V until age five or six (Clark, Hecht & Mulford, 1986). Studies by Clark *et al.* show that the V+N pattern emerges naturally around age three or four but is unlearned by the end of preschool when children acquire the O-V+ *-er*, *-ing* pattern. In English, O-V-*er* compounds are difficult to acquire because of their high morphological complexity and, Clark (1984) argues, because children have already acquired the S-V-O order in English.

A series of stages have been proposed in the formation of compounds (Clark et al., 1986). Table 2.1 describes how a child in each stage may refer to someone who cuts grass.

Table 2.1. Stages in the acquisition of agentive/instrumental deverbal compounds in English (Data from Clark et al. 1986)

Stage 1	verb + noun (e.g., <i>cut man</i>)
Stage 2	verb + object (e.g., <i>cut grass</i>) verb + ing + object (e.g., <i>cutting grass</i>) verb-er + object (e.g., <i>cutter grass</i>)
Stage 3	object + verb-er (e.g., <i>grass cutter</i>)

According to research on lexical acquisition (Murphy & Nicoladis, 2006), children first nominalize the VP (Stage 1) and then arrange compounds in V-O by treating the verb as the head (Stage 2). Even if no adult input is present, the V-O pattern appears naturally in child language. For instance, they might use a *break-window*, a *breaker-window*, or a *breaking-window* to describe a person or an instrument for breaking windows. Around the age of four, English-speaking children pass through a stage when they think that novel O-V-er compounds refer to the object doing the action specified by the verb or someone doing the action specified by the verb to the object. For example, they might think a *can crusher* refers either to a *can* crushing something or to someone crushing a *can*. During stage 3, children around age four and five “unlearn the

canonical order of verbs and objects in order to create correctly ordered compounds” (Nicoladis, 2006: 112).

For their part, French children acquiring V-O compounds go through similar stages until they reach Stage 2, at which stage they start producing $[V+N]_N$, the target adult form, since that is the pattern frequent in the input (Nicoladis, 2006). Table 2.2 shows the stages in the acquisition of agentive/instrumental deverbal compounds in French proposed by Nicoladis (2007).

Table 2.2 Stages in the acquisition of agentive/instrumental deverbal compounds in French (date from Nicoladis 2007)

Stage 1	Head-initial $[N+N]_N$: <i>machine-boutons</i> “button-machine,” lit. “machine-buttons”
Stage 2	$[V+N]_N$: <i>vide-ordures</i> “garbage-chute,” lit. “empty-trash”

Of interest is the rate of production of Stage 2 forms. French-English bilingual children hear grammatical V-O forms in French and consequently produce more V-O forms in English than monolingual children (Nicoladis, 2003).

In the same vein, Nicoladis and Murphy’s (2002) comparative study found that British English children produced more V-O forms (Stage 2) than Canadian English children. They attributed that to the fact that British English allows some forms like “answer-phone” that are not allowed in Canadian English. These results suggest that the

existence of the V-O compound form in the language encourages its production by children. Frequency and productivity in a child's input play a central role in how early in development and how often they produce compounds (Nicoladis, 2006: 101).

2.10.1. Role of frequency and productivity in the acquisition of compounds

English-speaking children produce compound nouns at around 2 years of age because compound nouns are highly frequent and highly productive in English (Clark, 1981). On the other hand, compound nouns are infrequent and not very productive in French, and thus five- and six-year-old French speaking children hardly ever produce compounds as novel lexical structures (Clark, 1998). In the same way, Nicoladis (1999) found that a French-speaking boy used only lexicalized compounds before the age of three, and novel compounds appeared after that age. In contrast, the study of a French-English bilingual child showed that he produced novel compounds in both languages before the age of three (Nicoladis, 1999, 2002a). Nicoladis argues that "frequency differences alone seem to account for the differences in acquisition patterns in English (produced at 2 years of age) and French noun-noun compounds (produced at 3 years of age) since there is little difference between the complexity of the construction in the two languages" (102). The findings suggest that exposure to a language in which compounds are frequent might change the frequency with which children produce compounds in a language in which they are infrequent (Nicoladis, 2006).

English compounds are created of two root nouns while French compounds are typically formed with a preposition between the two root nouns or two root nouns. However, Nicoladis (2006) suggests that frequency may interact with morphological

complexity in acquisition. The evidence Nicoladis is referring to comes from studies of Hebrew-speaking children by Berman (1987). Compounds in Hebrew require stem-changes, affixes or can be formed with two roots; they are of low frequency in the input. Novel compounds are used by Hebrew-speaking children at around 4 years of age. Evidence suggests that the late production may be due to the difficulty in morphology, since comprehension of complex forms appears earlier than production (Clark and Berman, 1987).

2.11. Studies of deverbal compound processing by L2 learners

Furthermore, findings by Lardiere (1995, 1997) and Lardiere and Schwartz (1996) show transfer of the characteristics of Spanish V+N compounds into Spanish native speakers' representations of English compounds at early stages of English L2 acquisition. These studies report an "apparent attempt at nominalization via inflection of the verb" since speakers were employing Spanish canonical V-O order (e.g., *catcher-mice*, *catcher-mouses*, or *catching -mice*) (Lardiere, 1997: 367). Also, pluralized objects were frequently found, suggesting that the feature values associated with Spanish compounds were transferred into English (e.g., *catcher-mouses*). Regarding adult L2 learners, Levy *et al.* (2006) assume that when individuals learn a second language, compounds (and other lexical items) will be closely associated with their translation equivalents in L1. Of interest is how the adult L2 learners are applying a strategy used by L1 children in the earlier stages of acquisition.

2.12. Section summary

Since this study compares the structural and semantic representation of compounds in different populations of Spanish speakers, ranging from English-dominant to Spanish dominant, this section examines research that deals with compounding. It presents a definition of compounding including characteristics, types, and structure, as well as the meaning of compounds. Two specific patterns of Spanish compounds are examined: hierarchical noun + noun $[N+N]_N$ (e.g., *hombre rana* ‘frogman,’ lit. ‘man frog’) and verb + noun $[V+N]_N$ (e.g. *rompenueces* ‘nutcracker,’ lit. ‘crack nuts’) nominal patterns. An overview of previous studies on compounding acquisition is also discussed. Lastly, research into language acquisition of these two patterns in children and adults has also been examined in this section.

This section aim is to establish the main assumption of the present study: that the interpretation of Spanish N+N and V+N compounds by heritage speakers relies on their bilingual type. The first hypothesis states that the amount of exposure heritage language speakers have to English determines whether these speakers are more likely to consider the right constituent the head of the compound. The second hypothesis states that that heritage language speakers will interpret $[V+N]_N$ more accurately than $[N+N]_N$ compounds regardless of their degree of English-dominance. Because Spanish heritage language speakers have acquired the V-O order at a very young age, they are familiar with the conventional mechanism of word formation with the V-N configuration and it is hypothesized that they will interpret the $[V+N]_N$ Spanish patterns correctly (e.g., *abrelatas*, ‘something to open cans ,’ lit. ‘open cans’). The third hypothesis states that

semantic transparency/opacity will play a role in accurate interpretation. It was hypothesized that bilingual speakers will correctly interpret transparent compounds, such as *espantapájaros*, ('scarecrow,' lit. 'scare' + 'birds') while opaque compounds, such as *ahorcaperros* (a type of sliding knot, lit. 'choke' + 'dogs') might be interpreted literally.

The following section contains the methodology used to gather the data to test the hypotheses that the years of contact with English influence the speaker's interpretation of two compound types, both in terms of (a) their headedness and (b) their degree of semantic transparency. It explains how the participants were selected and classified, and provides sociolinguistic information on the study subjects. Furthermore, it offers a discussion of the norming studies, and an explanation of the statistical methodology used to analyze the resulting data.

3. METHODOLOGY

For of course the true meaning of a term is to be
found by observing what a man does with it,
not by what he says about it.
P.W. Bridgman

3.1. Section overview

I now turn to the application and verification of the theoretical considerations presented in the preceding section, by means of an experiment. This section describes the methodology used to gather the necessary data for the present study among heritage bilingual speakers. It provides information about the participants' characteristics, the sampling procedures, the type of design, and the statistical techniques used. Briefly, the participants are all Hispanic Spanish-English bilinguals who either learned Spanish as their first language (L1) and then acquired English as a second language (L2) or acquired both Spanish and English simultaneously. Data collection in this research was conducted online using *Survey Monkey* (surveymonkey.com).

As part of the sampling procedures, all participants answered a two-part on-line questionnaire and their responses were analyzed to determine groups and patterns in responses. To test the research hypotheses about the interpretation of compound words in Spanish, Analyses of Variance (ANOVA) were performed by subjects (F_1) and by items (F_2), as typically performed in psycholinguistics research. The purpose of this section is to present the research strategy and the empirical techniques applied in the study, including the scope of the research design and its limitations.

3.2. Participants

Three hundred and twenty-nine participants volunteered to take part in the study, 299 bilingual speakers on the American side and 30 Spanish-dominant speakers on the Mexican side of the Texas-Mexico border. Out of the 299 questionnaires that were started by the bilingual participants, 275 were completed. Of those, 30 had to be discarded because the speakers declared having learned English first and Spanish as an L2, for a total of 245 usable tests. Out of the 30 questionnaires that were started by the Spanish-dominant participants that comprised the control group, 27 were completed. Altogether, the study included a total of 272 respondents.

3.2.1. Bilingual participants

For the study, 245 bilingual participants were selected and categorized in groups according to years of contact with English. The groups included 31 late bilinguals, 60 early bilinguals, and 154 simultaneous bilinguals. Their mean ages were very similar and all under 30 (28.39, 24.08 and 23.21, respectively). The main independent variable of the study is age of acquisition of English, either as a second language or in bilingual first language acquisition (cf. 3.2.1 for details about the classification of bilinguals into the different groups). All respondents were drawn from the subject pool of students enrolled in Psychology and Linguistics courses at Texas A&M International University (TAMIU), who participated in exchange for extra credit or to fulfill a class requirement.

3.2.2. Control group

Because it is difficult to find Spanish-dominant native speakers in Laredo, the control group was recruited via the Internet from speakers who lived in Mexico. Twenty-seven

participants (mean age 51.61) were selected as the control group (cf. 3.2.2). These participants were living in different states in Mexico, such as Tamaulipas, Nuevo León, Guerrero, Michoacán, Coahuila, Aguascalientes, and Mexico City. This group was used to compare and assess heritage speakers' competence, as is standard practice in other studies of incomplete acquisition or language attrition in bilinguals (Montrul, 2008).

3.3 The computerized questionnaire

The process of data collection in this research was carried out online using *Survey Monkey* (surveymonkey.com). Two questionnaires were designed for the study. Consent forms and instructions in the questionnaire were provided in English for the bilingual participants and in Spanish for the Spanish-dominant participants. The interpretation task was the same for both the bilingual and the control groups. In the first place, the survey web link to the questionnaire intended for the bilingual participants was provided via TAMIU's online resources. Students who agreed to participate had the option to work at school or at home. Then, the link to the questionnaire intended for the control group was emailed to participants living on the Mexican side of the border, who were asked to recruit additional participants among their acquaintances living in any part of Mexico. This chain-referral sampling allowed for the gathering of enough data in an otherwise difficult population to access. For the participants living in Mexico, the requirements to participate in the study and to be included in the control group were to be Spanish dominant and have access to a computer.

A Web-ready design like *Survey-Monkey* has been shown to be valid, safe and accessible. Studies using the internet have replicated findings from laboratory

experiments. As a general principle, “because many laboratory experiments are conducted on computers anyway, nothing is lost when an experiment is designed Web-ready: it can always also be used in the laboratory” (Reips, 2002). The use on the online questionnaire has numerous documented advantages, such as asynchronism, alocality, flexibility, and automation. (Reips, 2000). Granted that many studies may not be done on the Web, results from Web and laboratory studies are often identical (Gosling, Vazire, Srivastava and John, 2004; Krantz & Dalal, 2000). Among the advantages of the present study, I was able to access a large number of bilingual participants as well as a specific population for the control group, since the experiment was brought to the participants instead of the opposite. Another key point is the fact that different organizational problems, such as time constraints and scheduling difficulties were avoided.

Of course, the disadvantage in web-based studies is the unknown setting, but it was controlled by assessing multiple submissions and checking for incomplete questionnaires. There is evidence that multiple submissions are rare in Web experiments (Krantz & Dalal, 2000; Reips, 1997, 2000). In any case, the *Survey-Monkey* program was effective in collecting highly detailed information about individual answers in the questionnaires as the participants were part of a controlled group of university students. The absent interaction with participants during the experiment may sometimes be an issue, since instructions may sometimes be misunderstood (Reips, 2000). This issue was solved with the pilot studies that asked participants for feedback and provided the opportunity to improve the design before the link to the final survey was distributed.

The link to the online survey was distributed once the layout and design of the experiment as well as the functionality of the materials were verified. The study followed standard IRB procedures to obtain informed consent. Once they agreed to take part, all the participants answered an on-line questionnaire consisting of two parts. The first part was a sociolinguistic survey that included questions about their language history and patterns of language use. The second part consisted of an interpretation task. In this vocabulary test, participants were asked to select the correct definition for 40 compound words in Spanish in a dichotomous response choice. The respondents had the option to answer as well as the option to skip the question. As this section seeks to explain in detail both the sociolinguistic survey and the interpretation task, an overview of the questionnaire is given first, followed by an in-depth discussion of specific questions (cf. Appendix 1).

3.3.1. The sociolinguistic survey

The sociolinguistic survey consisted of 22 questions presented on page 1 of the online survey. In the first section, the questions measure variables of interest needed to identify the three groups of bilinguals (cf. Appendix 1). The questionnaire begins by asking respondents' basic demographic information, including academic major/department, gender, race or ethnicity, birthplace, age upon arrival in the United States as well as their present chronological age (questions 1, 2, 3, 4, 5, and 8). This information was used to ensure the homogeneity of the participants. Questions 6 and 7 asked participants to state how old they were when they started speaking English and Spanish respectively, by providing them a range to select age. The survey data was used to place respondents in

different groups, according to age of acquisition of English and Spanish. Questions 9 and 10 asked about the place of birth of both the mother (or stepmother) and the father (or stepfather), and the three options available, (*United States, Mexico, and Other country*) allowed for the screening of the participants so that only Mexican-Americans were included. Question 11 addressed language use with the family members, and the options available (*English, Spanish, English or Spanish are spoken at different times, Both English and Spanish are intermixed while talking, and Other*) also allowed respondents to claim specific preference. The next set of questions (questions 12 through 16) concentrate on countries where the participants have lived at different ages, the issue of border-crossing, and the place of residence at the present time. Question 16 addressed school level attended by country and included the following four choices: (*United States, Mexico, Other Spanish-speaking country, and Other*). This was done to corroborate data about the age when participants started speaking either language.

Subsequently, a set of questions addressed language dominance and proficiency. Respondents had to complete questions about language skills and language use in different domains (questions 17 through 21). In question 19 they were asked to rate their overall proficiency in reading and writing both English and Spanish on a scale ranging from 1 (Poor) to 6 (Excellent). These rating scales were included in the survey to compare their skills in both languages. The self-assessment ratings can also be taken as a corroboration of information about language dominance in particular abilities such as speaking and reading (cf. Altarriba & Heredia, 2001; Heredia, 1997; 2008; Heredia & Brown, 2004). The data from the language history and language use questionnaire were

taken into consideration to determine groups, to analyze patterns in responses, and to describe the unique scenario that characterizes border towns such as Laredo. Question 22 addresses confidence levels. Participants were asked to indicate how competent they felt (very competent, somewhat competent, not at all competent) using each compound word, presented on a list before the vocabulary test was administered.

3.3.2. The interpretation task

The second part of the questionnaire presented a vocabulary test consisting of 40 Spanish compounds. Two different patterns of compounding in Spanish were included in the vocabulary test: twenty [N+N]_N (e.g., *hombre rana* ‘frogman,’ lit. ‘man frog’) and twenty [V+N]_N (e.g., *rompenueces* ‘nutcracker,’ lit. ‘crack nuts’). The interpretation task items were presented on the second page of the online survey listed on dichotomous questions 1 through 40 (cf. Appendix 1 for further details).

Questions 41 through 45 were designed to corroborate confidence levels. After the vocabulary test was done, question 41 asked participants whether they were frustrated while answering the vocabulary test. Question 42 asked participants to indicate how +difficult (very easy, easy, hard, very hard) it was to use each individual word. The aim of question 43 was to find out whether participants considered it acceptable to create new words/phrases in Spanish while question 44 asked them to create a new word or phrase in Spanish if they had answered yes to Question 43. Lastly, in an open-ended question, participants were offered the possibility to leave further comments in either English or Spanish. This last question was designed to elicit spontaneous comments on the study.

Assessments were performed for the structural analysis and the semantic interpretation (cf. Sections 3.3.2.1 and 3.3.2.2 respectively) of four subsets of compound words included randomly in the vocabulary test. These four subsets are presented in Table 3.1.

Table 3.1. Subsets of compound words included in the interpretation task

First Subset	structural analysis	[V+N] _N pattern
Second Subset	structural analysis	[N+N] _N pattern
Third Subset	semantic interpretation	[V+N] _N pattern
Fourth Subset	semantic interpretation	[N+N] _N pattern

The first subset includes ten [V+N]_N compounds that are formed by a verbal stem and a complement (a noun). The second subset includes ten [N+N]_N compounds. In these nouns the modifier element on the right has the role of attributing a property to the head on the left. The first and second subsets were used in the structural analysis task (cf. Table 3.2).

Table 3.2. Compound words used in the structural analysis task

First Subset [V+N] _N pattern			
	Term	Literal translation	Actual Translation
1.	limpiabotas	clean+boots	shoe shiner
2.	arrancaclavos	tear out+nails	nail claw
3.	atrapamariposas	catch+butterflies	butterfly net
4.	montacargas	get on+load	fork lift
5.	abrecartas	open+letters	letter opener
6.	sacacorchos	remove+corks	corkscrew
7.	pintalabios	put on make-up+lips	lipstick
8.	tapabocas	cover+mouths	scarf, muffler
9.	espantapájaros	scare+birds	scarecrow
10.	aguafiestas	spoil+parties	party pooper
Second Subset [N+N] _N pattern			
1.	campo turista	camp+tourist	tourist camp
2.	cartón piedra	cardboard+stone	papier mache
3.	día puente	day+bridge	holiday between two working days
4.	coche bomba	car+bomb	car bomb
5.	episodio piloto	episode+pilot	pilot film
6.	abeja reina	bee+queen	queen bee
7.	papel cebolla	paper+onion	tracing paper
8.	perro policía	dog+police	police dog
9.	sombrero hongo	hat+mushroom	bowler hat
10.	hombre araña	man+spider	spider man

The third subset includes ten [V+N]_N compounds that are formed by a verbal stem and a complement (a noun). This set was used in the semantic interpretation task.

The fourth subset included 10 [N+N]_N compounds. In these nouns, the modifier element has the role of attributing a property to the head. These sets were used in the semantic interpretation task (cf. Table 3.3).

Table 3.3. Compound words used in the semantic interpretation task

Third Subset [V+N] _N pattern			
	Term	Literal translation	Actual Translation
	1. metepatas	meddle+foot	inopportune
	2. crecepelo	grow+hair	hair tonic
	3. picapleitos	prick+lawsuits	litigious person
	4. comemierda	eat+crap	worthless person
	5. buscapiés	search+feet	firecracker
	6. tornaboda	return+wedding	day after the wedding
	7. guardameta	keep+goal	goal-keeper
	8. paracaídas	stop+falls	parachute
	9. pasatiempo	pass+time	pastime
	10. pelagatos	peel+cats	nobody
Fourth Subset [V+N] _N pattern			
	1. balónmano	ball+hand	handball
	2. canción protesta	song+protest	protest song
	3. hombre rana	man+frog	frogman
	4. premio consuelo	prize+consolation	consolation prize
	5. puntapié	tip+foot	kick
	6. hora pico	hour+peak	peak hour
	7. bocamanga	mouth+sleeve	cuff, wristband
	8. obra cumbre	work+summit	summit work
	9. bienes raíces	properties+roots	real estate
	10. bocacalle	mouth+street	intersection

As stated above, the four subsets of ten compound words each were presented in the vocabulary test in random manner and context-free. For each compound word, participants had to choose from two possible options. One of the options conveyed the target meaning and the second one conveyed a distractor. The interpretation of isolated complex words, in this case compounds, “avoids any contamination by discourse referents” (Murphy, 1988:531) since the contribution of context may establish the necessary preconditions for the interpretation of these words. Since the interpretation task is a cognitive process, the context-free presentation “makes sense to first identify how the meanings of the constituents (i.e., prior knowledge) affect interpretation of the compound” (Wisniewski, 1996:450). The structural analysis task and the semantic interpretation task are discussed in the following sections. For ease of exposition, I have divided the presentation into Study 1 and Study 2. Study 1 focused on the structural analysis task that deals with headedness and Study 2 was used to ascertain the semantic interpretation task dealing with transparency.

3.3.2.1. Study 1: The structural analysis task

The structural analysis task dealt with morphological headedness. As will be recalled from Section 2.6, the head of the compound is the constituent that represents the core meaning of the compound as a whole. The aim of Study 1 was to assess the bilinguals’ performance in the recognition of the head of the compound word. That is to say, out of two possible options, participants had to decide whether the definition that denoted the left constituent or the right constituent of the compound was the correct one. In the vocabulary test, each word was followed by two possible definitions, one based on an

interpretation of the compound word as right-headed, as is typical in English, and one based on a left-headed interpretation, as is more common in Spanish. See examples (16) and (17) below and cf. the questionnaire in Appendix 1.

- (16) [V+N]_N **espantapájaros** ‘scarecrow’, lit. ‘scare+birds’
- a. pájaros que se espantan fácilmente
‘birds that can be easily scared’
 - b. mono de paja que se usa para espantar pájaros
‘straw dummy used to scare birds’

- (17) [N+N]_N **campo turista** ‘tourist camp’, lit. ‘camp+tourist’
- a. campo para turistas
‘camp for tourists’
 - b. turista en el campo
‘tourist in the countryside’

Participants were provided with the compound word, such as *espantapájaros* or *campo turista*, and they were asked to choose between responses (a) or (b), as in examples (16) and (17). The first subset of 10 words included exocentric [V+N]_N compounds, in which the head is not one of the constituents and has to be inferred. For example, *espantapájaros* is neither the verb *espantar* ‘to scare’ nor the noun *pájaros* ‘birds’ but something else, and the meaning has to be arrived at by converting the verb phrase into a noun. Of the second subset, the 10 words contain the head within the compound themselves; thus, they are endocentric left-headed [N+N]_N compounds. As

an illustration for the structural interpretation task, see example (18), where the target definition is choice (b).

- (18) [V+N]_N **espantapájaros** ‘scarecrow’, lit. ‘scare+birds’
- a. pájaros que se espantan fácilmente
‘birds that can be easily scared’
- b. mono de paja que se usa para espantar pájaros
‘straw dummy used to scare birds’

If the participants choose the right constituent as the head, it is assumed they are interpreting the compound as an English compound.

3.3.2.2. Study 2: The semantic interpretation task

The aim of Study 2 was to assess bilinguals’ performance with the recognition of transparent and opaque compound words. As discussed earlier in Section 2.7, in a fully transparent compound the meaning of the entire string can be straightforwardly inferred from the parts. In contrast, in an opaque compound, speakers may identify the constituents but fail to recognize how they contribute to the meaning. Participants were asked to decide whether a figurative or a literal definition of the compound word was the correct one. To interpret an opaque compound, for example *metepatas* ‘inopportune’, lit. ‘meddle+foot’, the independent meaning of both constituents –*mete* (‘put’ or ‘meddle’) and *patas* (‘one’s foot’ or ‘feet’)— has to be inhibited.

Similar to the set used in Study 1, the second set of 20 compound words in Study 2 also included two subsets of nouns: [V+N]_N and [N+N]_N patterns. Each word was

followed by two possible definitions, one based on a literal (transparent) interpretation of the compound word and one based on a figurative (opaque) interpretation. See examples (19) and (20) below and Appendix 1.

- (19) [V+N]_N **metepatas** ‘inopportune’, lit. ‘meddle+foot’
- a. chanclas tipo pata de gallo
 ‘flip-flops’
 - b. persona inoportuna
 ‘person who is always making blunders’

- (20) [N+N]_N **puntapié** ‘kick’, lit. ‘point+foot’
- a. golpe que se da con la punta del pie
 ‘blow given with the tip of the foot’
 - b. un paso clásico del ballet
 ‘classic ballet step’

To assess semantic interpretation, participants had to decide whether the literal (transparent) definition or the figurative (opaque) definition of the compound was correct, and select the answer accordingly. Each word was followed by two possible definitions, one based on a literal interpretation from the meaning of one or both compound constituents, and a second one based on a figurative interpretation, where the meaning of the word could not be derived from the meaning of the constituents. In other words, out of two possible options, participants had to decide whether the definition that

made a literal or a figurative reference was the correct one. See Example 21, where the target definition is choice (b).

(21) [V+N]_N **metepatas** ‘inopportune’, lit. ‘meddle+foot’

-
- a. chanclas tipo *pata de gallo*
‘flip-flops’
- b. persona inoportuna
‘person who is always making blunders’
- transparent
- opaque

If the respondents choose the literal (transparent) definition, they are interpreting the compound incorrectly, assuming that the meaning of *metepatas* ‘inopportune’, lit. ‘meddle+one’s feet’ can be ‘flip-flops’ because of the literal interpretation of ‘mete’ (‘put’) and ‘patas’ (‘one’s foot’ or ‘feet’).

The 40 compounds included in the questionnaire were selected after conducting several pilot tests prior to the current research project. To ensure the effectiveness of the test, the words were vetted by Spanish native speakers. The results of the pilot were only used to design the test and were not included in those of the main study (cf. Appendix 1). The following section describes the word selection process.

3.4. Materials and design

3.4.1. Stimuli

The four subsets of compounds words that serve as the critical stimuli in the experiment were chosen after a series of norming studies. Given that any compound word presented

without context might be as complex to interpret as the next, the processes and outcomes from these pilot tests were critical in the selection. The compound words used in this study are limited to those that were recognized by speakers of the language varieties in contact, in this case Mexican Spanish and U.S. Border Spanish. This process provided the opportunity to exclude words that students did not understand, or ambiguous words that made them feel uncomfortable, such as *sacapotras* ('bad surgeon', lit. 'remove+mares') and *sacaperras* ('con artist', lit. 'take away+coins'). The process also involved administering the instrument to different groups of volunteer participants.

3.4.1.1. Stimuli for Study 1

In order to examine the morphological headedness interpretation, the ten [N+N]_N compounds included in the study are endocentric, while the ten [V+N]_N compounds are exocentric. An endocentric compound contains a semantic head, so *hombre rana* ('man' + 'frog,' lit. 'frogman') is a kind of man. Exocentric compounds do not have a head. In *abrecartas* 'letter-opener,' lit. 'open-letters', as noted above, neither the verb nor the non-head noun is responsible for the compound. There were no limitations on the nominal forms included.

3.4.1.2. Stimuli for Study 2

Libben's Model of transparency features different degrees of morphosemantic transparency (cf. section 2.7.1). Libben's (2006) degrees of morphosemantic transparency was adapted to the Spanish compounds used in Study 2, considering that any figurative meaning of a constituent hampers the interpretation process. For example, the V+N *matamoscas* (*fly swatter*, lit. 'kill' + 'flies') is a semantically

transparent (TT) compound (see example 22a), at the lexical and conceptual level, and its meaning, because of componentiality, can easily be inferred from its associated predication (*mata las moscas*, “kills flies”). In a semantically transparent word such as *matamoscas* (*fly swatter*, lit. ‘kill’ + ‘flies’), the interaction of the two independent morphemes contributes to the meaning of the word: ‘an object to kill flies’ or *fly swatter*. In contrast, let’s look at a semantically opaque (OO) compound. The word *metepatas* ‘inopportune,’ lit. ‘meddle+ feet’ is opaque because native speakers may recognize the constituents but fail to recognize how they contribute to the meaning (see example 22b).

(22) a. Fully transparent

TT – transparency of both members, e.g., *matamoscas*, ‘fly swatter’, lit. ‘kill flies’

b. Fully opaque

OO – opacity of both members, e.g., *metepatas* ‘inopportune,’ lit. ‘meddle+ feet’

To interpret this compound, the independent meaning of both constituents – ‘*mete*’ (‘put’ or meddle’) and ‘*patas*’ (‘one’s foot’ or ‘feet’) – has to be inhibited. The opacity of such a compound, according to Libben (1997) is related to the fact that the meaning of *metepatas* ‘inopportune’, lit. ‘meddle+one’s feet’ is non-componential – in other words, it cannot be understood as ‘foot-putter.’ It is important to point out that each constituent is transparently related to its independent morpheme (*meteI* and *patas*). Thus, *metepatas* may be described as a T-T non-componential compound.

Componentiality is represented at the conceptual level in the same way that morphological constituency is represented at the lexical level. Compounded constituents at times acquire denotation not contained in the individual constituents. Consider, for example, the Spanish compound *metepatas* ‘inopportune,’ lit. ‘meddle+ feet.’ This opaque compound has a metaphoric meaning listed in the dictionary; however, it is possible for native speakers to analyze it literally at the original componential lexical level as ‘steamroller’ because its constituents can be accessed independently (de Almeida & Libben 2005). Whether the compound meaning is atomic or compositional depends on the possibility of decomposing the whole word into constituents. A compound like *metepatas* ‘inopportune,’ lit. ‘meddle+ feet’ was therefore classified as OO. TT compound types are the most fitting in terms of meaning predictability, while OO types are the least fitting; therefore, the stimuli selected includes only these two classifications. For the two sets of ten $[V+N]_N$ and $[N+N]_N$ compounds included in Study 2, five are TT and five are OO.

3.4.2. The norming studies

The first two norming or pilot tests were paper and pencil tests and the other two were conducted online via *Survey Monkey*. The participants included a group of 20 students that belonged to either the Spanish Club or the Spanish Theater Troupe, while the second group included ten students that were members of the community and were enrolled in English as a Second Language classes. The first group of university students had similar characteristics to the target population, since they were bilingual, while the second group

of adult English Language Learners was similar to the control group, because they were Spanish dominant professionals.

In preparation for the major study, a questionnaire was designed that presented 96 compounds as a vocabulary test, and where the respondent had four unordered options for each word (cf. example 23 and Appendix 2). The results of pretesting allowed me to select the set of 40 words. The four subsets of ten words each for V+N and N+N patterns were selected, thus reducing the number of words that were ultimately included in the actual test.

(23) **abrecartas**

- a. cartas que se abren solas
- b. cartero que abre la correspondencia
- c. cartas que se usan para jugar la primera ronda
- d. instrumento que sirve para abrir cartas

letter opener

- a. letters that open by themselves
- b. mailman that opens the correspondence
- c. cards that are used to play the opening round
- d. instrument that is used to open letter

The vocabulary test was designed to measure lexical knowledge performance in bilinguals, as each word presented two options, the first conveying the target meaning and the second a distractor. Careful consideration was given to the words used as stimuli, and word frequency is a factor that was well thought out during the different phases of the norming studies. On the issue of frequency for Spanish compound words,

in this study different sources were used for lexical frequency information. One is the subjective ratings of lexical frequency provided by a sample of respondents using a Likert scale, just as it was done in the norming studies that led to the preparation of the vocabulary test. Compound words are not frequent in Spanish, and the concatenation of distinct lexemes with different frequency of occurrence is a feature that raises important theoretical issues. It has been argued (Desrochers et.al, 2010) that both objective and subjective frequency norms should be used in the selection of stimuli, regardless of whether word frequency is being experimentally controlled. However, while objective frequency may be considered an indicator of the occurrence of words in a lexical environment and subjective frequency reflects the impression left by the occurrences on the speaker or reader, for the purposes of this study the subjective frequency was used.

The pilot tests were designed in three phases. During the first phase, two mini pre-tests were done on paper and pencil. These pre-tests provided the opportunity to confirm accuracy of the definitions included for each word, and to cut down the items to a comfortable number for the participants. In this process, some volunteer students defined the compound words themselves. These definitions were taken into account to discard ambiguous words, such as *ahorcaperros* ‘choke+dogs, lit. type of sliding knot’(cf. Appendix 3). Once a list of definitions was compiled, some other students were asked to work on an elicited production task. Students were asked to fill in the blanks answering with one word only, in an effort to test accuracy of definitions (cf. example 24 and Appendix 4).

(24) Un instrumento que se usa en el salón de belleza para cortar callos se llama _____.

An instrument that is used at the beauty shop to trim calluses is called _____.

Since the majority of the volunteers answered *tijeras* ‘scissors’ for this specific example, not the targeted compound *cortacallos* ‘corn removal instrument,’ which would be the expected answer in Spanish, the latter compound was not included in the final questionnaire. Taking the elicited production test one step forward, I asked some of my own heritage language students taking intermediate Spanish classes to draw the mental representation for some of the words used as stimuli. This was a manipulation check to corroborate how these speakers activated the constituents of compounded forms during lexical access. For example, for the word *hombre rana* ‘frogman,’ lit. ‘man frog,’ I questioned how the concepts of the constituents ‘man,’ would be represented. As Dressler (2006) states, we must choose carefully among available compounds for establishing test stimuli, since “the multiplicity of patterning informs our understanding of compound processing across languages, the acquisition of compounds, and the representation and processing of these stimuli in bilinguals, who must develop a single system that can represent disparate patterns in one mind” (43). Figure 3.1 illustrates the mental representation of the N+N *bocacalle* ‘intersection,’ lit. ‘mouth street’ literally interpreted as “be quiet” by a simultaneous bilingual.

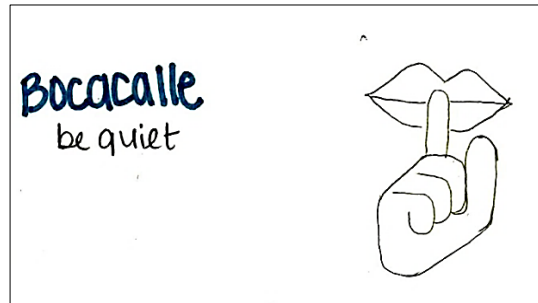


Figure 3.1. Mental representation of the N+N compound *bocacalle* ‘intersection,’ lit. ‘mouth + street’

The second phase of the pilot testing involved a focus group to confirm the interpretation of each compound to be addressed in the large-scale questionnaire survey. A group of 20 students volunteered to work on the 40-word vocabulary test design via *Survey Monkey*. Questions were examined in an interactive group setting, where participants had the opportunity to talk with each other about the test design and content. The purpose was to test accuracy of definitions and check the time it would take to complete the questionnaire in order to make it a short and manageable test, as suggested by Reips (2000, 2002). This warm-up testing was helpful to prevent participants from dropping out during the final experimental stage.

During the third phase, data was collected on-line with the pilot test design uploaded on *Survey Monkey*. The link to the same questionnaire on *Survey Monkey* was sent to three different groups of student volunteers in different trial-runs of how data was going to be collected when the instruments were administered to the target population. These questionnaires presented the 40 compound words that were chosen and had only

two definitions as options for each one in the finalized form. This online design was the most workable layout according to the volunteers (cf. Appendix 2). The responses I got from the pilot testing also demonstrated that the instruments were capable of collecting reliable data. None of the pilot participants took part in the main project.

3.5. The statistical computer program

To test the research hypotheses, Analyses of Variance (ANOVA) were performed in a design with the two random variables *participants* and *items*. It is typical for the psycholinguistic literature to report the analysis by subjects (F_1) and by items (F_2). That is, the F_1 analysis treats the subject as a random variable and the F_2 treats the item as a random variable. In other words, F_1 and F_2 are performed to determine the extent to which the analyses can be generalized to both subjects and items. So, since both participants and items have been incorporated as random factors, the results obtained can be generalized to both the population of subjects and the populations of items simultaneously.

ANOVA analyses were performed using STAT Statistical Data Analysis, Free Data Analysis Programs for UNIX and DOS (Perlman & Horan, 1986) that can be obtained at <http://oldwww.acm.org/perlman/stat/>. To control for Type I error (i.e. the incorrect rejection of a true null hypothesis), the Least Significant Difference (LSD) multiple comparison statistical technique (Cohen & Cohen, 1983) was used, to compare across means and conditions for statistical main and interaction effects, but only when the null hypothesis is rejected or the F test is significant. In other words, LSDs can be thought of as independent t-tests performed after the F test has been performed and

found statistically significant. LSDs were computed using GLSD, a multi-platform Open Source Statistical Procedure that can be downloaded at <http://www.tamtu.edu/~rheredia/glsd.zip>. Throughout all analyses in this dissertation, $p < 0.05$ is used as the statistical significance level, unless otherwise specified. The probability level $p < 0.05$ was used as a criterion and it simply means that the probability of a relationship as strong as the observed one being attributable to sampling error alone is no more than 5 in 100.

The first step in the statistical analysis was to code participants' responses in terms of correct (1) and incorrect (0), in order to calculate percentage accuracy for each subject and for each item. Thus, analyses were performed on percentage of correct responses. The statistical analysis is divided into two parts. One analysis was performed on morphological structure (headedness) and another one was performed on semantic transparency (literal vs. figurative) for compound words of the patterns V+N and N+N.

3.5.1 Analysis of morphological structure

The analysis of morphological structure considered recognition of the head of the compound. For example, for the word *montacargas*, of the V+N pattern, participants selected the definition of the compound word, (a) *vehículo para montar cargas en plataformas* 'vehicle to lift loads onto a platform' vs. (b) *cargas que se an he una plataforma* 'loads that are loaded onto a platform' in which (a) would be the correct response. The procedure conformed to *mixed repeated measures*. Thus, in the mixed-design ANOVA model, one factor (Control and Bilingual Type – Late, Early, and Simultaneous) is a between-subjects variable and the other factor (morphological

headedness – N+N vs. V+N) is a within-subjects variable. The comparison was used to test the performance and compare results across the different language groups (bilingual vs. control). The performance of the monolingual control was compared to the performance of the three different groups of bilingual populations. Furthermore, the within-subject design was used to measure the performance of the same group interpreting the morphological structure (headedness assignment) of two different types of compounds, V+N and N+N. Thus, because this study incorporates both between-group variables and within-subject variables, results were analyzed as a mixed 4X2 mixed repeated ANOVA. Assumptions of normality were met. Data analyses were performed for both *subjects* and *items*. The statistical analysis compared the percentage of accurate production on the task by the four different groups of participants.

3.5.2 Analysis of semantic transparency

The analysis for transparency separated N+N and V+N compound words into transparent vs. opaque. For example, for the word *pelagatos* ‘poor man,’ lit. ‘peel+cats’ participants selected either (a) *persona insignificante* “insignificant person” or (b) *tijeras para gatos* “cat scissors,” in which (a) would be the correct response. This analysis conformed to *mixed repeated measures*. Accordingly, in the mixed-design ANOVA model, one factor (Control and Bilingual Type – Late, Early, and Simultaneous) is a between-subjects variable and the other factor (semantic transparency – N+N vs. V+N) is a within-subjects variable. The between-subject design was used to test the performance and be able to compare results across the different groups. The performance of the monolingual control was compared to the performance of the three

different groups of bilingual populations. Furthermore, the within-subject design was used to measure the performance of the same group interpreting the semantic transparency of two different types of compounds, V+N and N+N. Thus, because this study incorporates both between-group variables and within-subject variables, results were analyzed as a mixed 4X2 mixed repeated Analysis of Variance (ANOVA). Data were screened for normality. Assumptions of normality were met. Data analyses were performed for both Subject (F_1) and Items (F_2). The statistical analysis compared the percentage of accurate production on the task by the four different groups of participants.

3.6 Section summary

This section has detailed the methodology used to gather the data among three different groups of bilinguals in Laredo and a control group on the Mexican side of the border. The point of departure in this study was the classification of bilingual participants into three groups according to years of contact with English. The participants' characteristics and the sampling procedures were examined. The methodology is comprised of a two-part computerized questionnaire: 1) a sociolinguistic questionnaire and 2) an interpretation task. In addition, the sampling procedures were described, along with variables of interest necessary to classify the participants. The type of design was also discussed, as well as the statistical techniques used to test the research hypothesis about the interpretation of compound words in Spanish.

In the next section, I discuss the results obtained from the implementation of the sociolinguistic questionnaire and experimental tasks among the population described. It

discusses and analyzes the data derived from the sociolinguistic survey and the results of the experimental task investigating both the structural analysis and the semantic interpretation of Spanish compound words.

4. DATA ANALYSIS AND RESEARCH RESULTS

Whenever agreement or assent is arrived at in human affairs... this agreement is reached by linguistic processes, or else it is not reached.

Benjamin Lee Whorf

4.1. Section overview

First, this section examines the data obtained from the sociolinguistic questionnaire, including the following areas: age variables associated with L1 and L2 acquisition; demographic variables (i.e. place of birth, place of residence, schooling); environmental variables in language history (i.e. frequency with which L1 is spoken at home and other domains; and language dominance and language use as well as self-evaluated L1 and L2 proficiency. Participants were classified into different bilingual types using the methods described in the preceding section. Then, this section discusses the results of the experimental task investigating both the structural analysis and the semantic interpretation of Spanish compound words. Finally, a summary of the findings obtained by tabulating the data is presented, followed by an in-depth discussion of this data.

4.2. Analysis of the sociolinguistic questionnaire

This section details the composition of the bilingual population that participated in the study. It contains an analysis and discussion of the data obtained from the sociolinguistic questionnaire. The main independent variable of the study is age of acquisition of English as an L2 or as an L1 in bilingual first language acquisition (BFLA), most commonly known as simultaneous bilingualism, since the principal objective of this study is to determine the effect of years of contact with English on the

comprehension of Spanish compound words. These bilingual populations are broken down in three groups according to the age of acquisition of English: simultaneous, early, and late bilinguals.

The data was also broken down by social variables (i.e., age, education, and place of residence). The data from the language history and language use questionnaire were taken into consideration to confirm the homogeneity of each group of participants and to determine bilingual groups according to age of acquisition of English as a second language or simultaneous acquisition of English and Spanish. The effects of participants' competence regarding the Spanish compound words included in the interpretation task are also analyzed. The following section begins with a description of the speakers in the study.

4.3. Composition of the groups of participants

Based on Montrul's (2008) claims that just as there are age effects in L2 acquisition, there are also age effects, or even perhaps a critical period, in L1 attrition, the cut-off ages for sequential bilinguals in the study are based on age of second language acquisition milestones combined with migration patterns. The cut-off point to distinguish between simultaneous and sequential bilinguals was based on the following patterns of emigration to the United States usually found in a Mexico-U.S. border town such as Laredo (See figure 4.1). The first group includes late adult bilinguals who acquired Spanish monolingually in Mexico and learned English after age 12, when they emigrated to the United States. The second group includes early child bilinguals who acquired

Spanish monolingually in Mexico or at home but came in contact with English when they started school in the United States at approximately age 6.

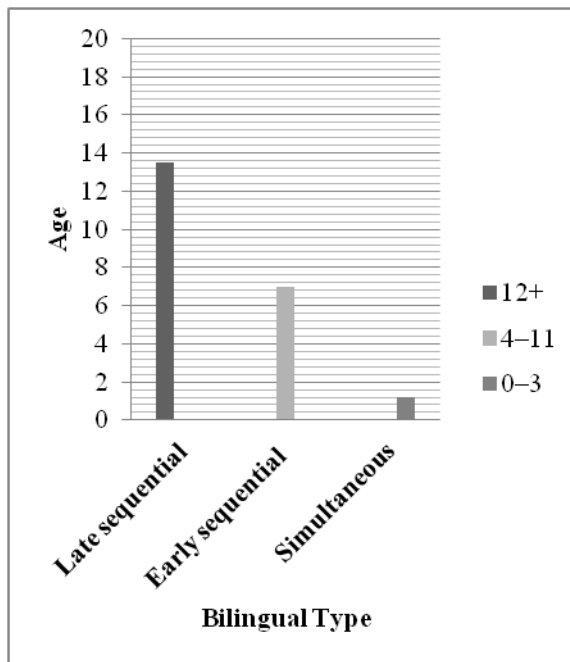


Figure 4.1. Onset of bilingualism cut-off points to classify participants

The third group was made up of simultaneous bilinguals whose two languages had been acquired as first languages. This group includes speakers who acquired Spanish and English simultaneously at home and for whom English has always been the language of instruction and dominant in most social contexts. No agreed-on cutoff point has been established to distinguish between the early sequential and the simultaneous acquisition of two languages (McLaughlin, 1978; de Houwer, 1995). Thus, if the respondents claimed to have learned both languages before the age of 3, have lived in

Laredo at all times and attended school on the U.S. side exclusively, they were considered simultaneous bilinguals.

All of the participants in the study were drawn from the subject pool of students enrolled at Texas A&M International University (TAMIU) in Laredo, Texas (cf. 3.2). Questions 6 and 7 in the sociolinguistic questionnaire address age of acquisition of both English and Spanish. As illustrated on Table 4.1, the data allowed me to classify respondents into different bilingual groups according to claims of (a) bilingual first language acquisition and (b) age of sequential acquisition of English as a second language.

Table 4.1. Percentage of respondents classified by age of English and Spanish acquisition

Age of Acquisition	English	Spanish
0-3	154 (62.85%)	245 (100%)
4-11	60 (24.50%)	0
12 or older	31 (12.65%)	0

The three groups of bilinguals were classified as follows: 154 simultaneous Spanish-English bilinguals who acquired both languages before the age of three; 60 early Spanish-English bilinguals who acquired English after the age of three and before

the age of 11; and 31 late Spanish-English bilinguals who acquired English after the age of 12.

Table 4.2 shows the place of birth of the participants. Notably, 80.4 percent of the participants were born in the United States and the rest were born in Mexico.

Table 4.2. Percentage of respondents classified by place of birth.*

	Born in the United States	Born in Mexico
Participants	197 (80.4%)	45 (17.9%)

*These figures do not represent all respondents as one or more failed to provide information

Furthermore, more than 53 percent of respondents (131), including 28 late bilinguals, 39 early bilinguals, and 64 simultaneous bilinguals, claimed that both parents were born in Mexico. More than 30 percent of the participants classified as simultaneous bilinguals claim that both their parents were born in the United States. Less than 15 percent of the participants claim that their mother was born in Mexico while their father was born in the United States. None of the participants classified as late bilinguals claimed to be in these same circumstances. Finally, less than 12 percent of the respondents claimed that their mother was born in the United States while the father was born in Mexico. Table 4.3 shows in detail the place of birth of the participants' parents.

In a geographical situation such as Laredo, these figures cannot be taken into account by themselves to determine exposure to language. The majority of these individuals cross the border several times a week and some are born in the United States but raised on the Mexican side and vice versa. These figures highlight, however, a homogeneous Mexican-American population.

Table 4.3. Place of birth of participants' parents.*

	Both parents born in Mexico	Both parents born in the U.S.	Mother born in Mexico Father born in the U.S.	Mother born in the U.S. Father born in Mexico
Late n=31	28 (90.32%)	1 (3.23%)	0 (0%)	2 (6.45%)
Early n=60	39 (64.99%)	1 (1.67%)	13 (21.67%)	7 (11.67%)
Simultaneous n=152	64 (41.29%)	46 (30.26%)	23 (15.13%)	20 (13.15%)

*These figures do not represent all respondents as one or more failed to provide information

Ninety-three percent of participants declared Laredo as the primary place of residence, while 2.1 percent lived in another Texas location. About 4 percent of participants lived in Nuevo Laredo or another Mexican location. Some participants claimed to have lived on both sides of the border at different ages and almost 32 percent of respondents claimed to be “border crossers,” who still cross the U.S.-Mexico border regularly. Figure 4.2 shows where participants have lived in a 20-year lifespan. The figures demonstrate the negative correlation between age and Mexico as a place of residence. Students living on the Mexican side of the border have emigrated to the American side as they have become older. A steady decrease from 36.3 percent of the

total participants who lived in Mexico at age 0-1, to a low of 2.5 percent by age 20 or more is concomitant with an increase from 62.9 to 96.7 percent of participants who lived in the United States between the ages of 0 and 20 or more.

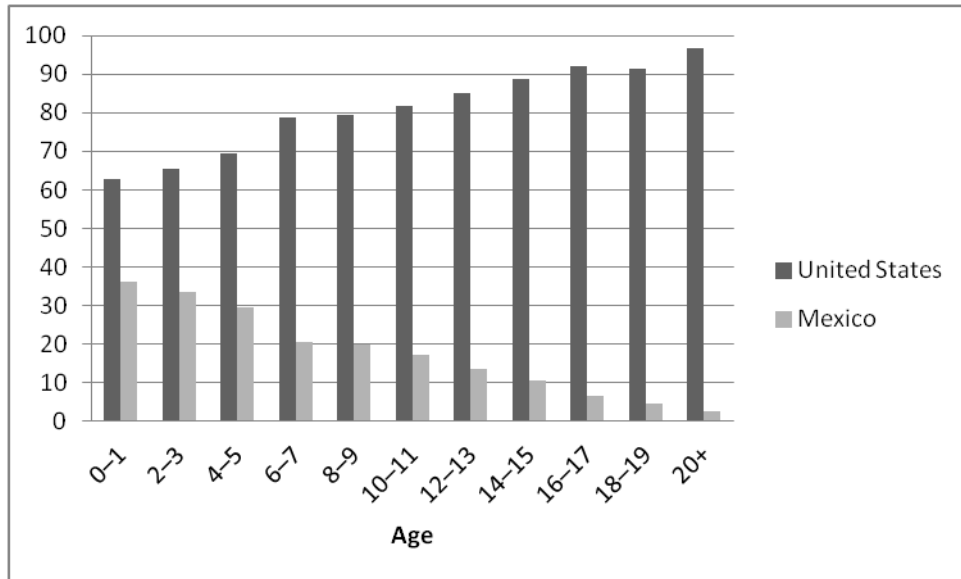


Figure 4.2. Percentage of respondents classified by countries where they have lived according to age*
 *These figures do not represent all respondents as one or more failed to provide information

In addition, participants were asked about schooling in either Mexico or the United States. A negative correlation was also found between grade level at school and Mexico as the place where participants attended school. Figure 4.3 shows how 99.3 percent of participants attended college on the American side of the border, while only 0.4 percent attended college on the Mexican side.

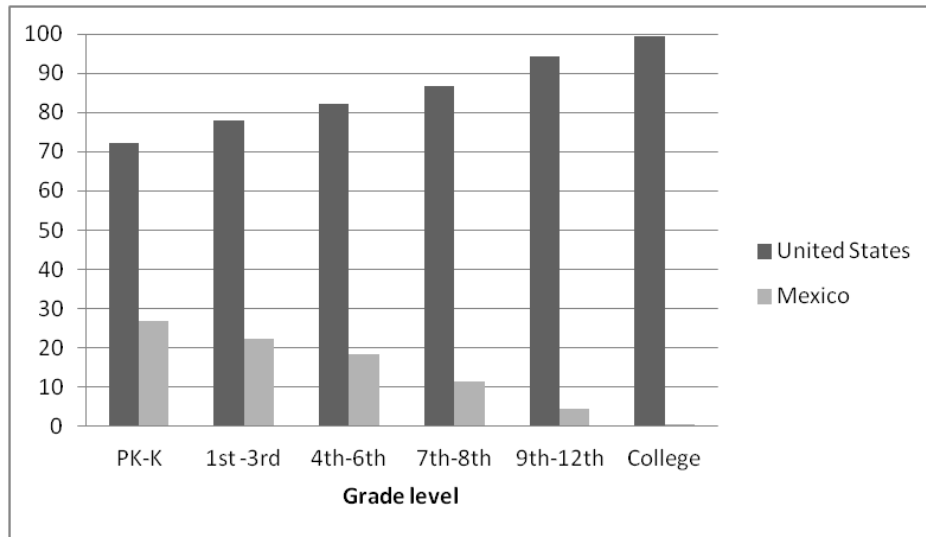


Figure 4.3. Percentage of respondents by details of schooling on either side of the Texas-Mexico Border.*

*These figures do not represent all respondents as one or more failed to provide information

4.3.1. Language dominance and language use

The results shown on Figure 4.3 point to English dominance in the academic setting, because as the percentage of participants who attend school in Mexico decreases, the percentage of these same students attending school on the U.S. dramatically increases. Approximately 26.7 percent of participants attended pre-kindergarten and/or kindergarten in Mexico. Regarding elementary school, 22.3 percent of participants attended 1st through 3rd grade in Mexico, and 18.2 percent also attended 4th through 6th grade in Mexico. Similarly, percentages decreased to 11.4 percent in 7th through 8th grade, 4.4 percent in 9th through 12th grade, and 0.4 percent in college in Mexico. In contrast, 72.2 percent of respondents attended pre-kindergarten and/or kindergarten in the United States. Approximately 78 percent of participants attended 1st through 3rd

grade in the US, and 82.2 percent attended 4th through 6th grade in the United States. A large majority of participants attended 7th through 12th grade and college in the United States. As predicted, the majority of these speakers have been exposed to academic English as they have attended school in the United States. Based on the low percentages of participants that claim to have attended school on the Mexican side (shown on Figure 4.3) only a few may have been exposed to academic Spanish as well.

Roughly, 71 percent of participants claim English as the dominant language and 46.2 percent claim Spanish to be the dominant language. Merely 17.5 percent of respondents claimed that they consider themselves balanced bilinguals. In such a context, even if Spanish was the L1 of these speakers, English becomes the dominant language, because it is supported by the educational system. In the question that addresses fluency, also meant to corroborate language dominance, 88.4 percent of the respondents reported being fluent in English while 71.8 percent reported fluency in Spanish. Approximately 60 percent of the respondents claimed to be equally fluent in both languages. Spanish is maintained in both the formal and informal domains but is not always developed formally by these speakers. In the case of simultaneous bilinguals, they acquire two L1s, but generally, only English has been supported by the educational system and most of the social domains.

Table 4.4. Percentage of respondents classified by languages spoken in different domains.*

	English	Spanish	English or Spanish are spoken at different times	Both English and Spanish are intermixed while talking
At work	145 (59.0%)	13(5.3%)	82 (33.5%)	24 (9.8%)
At school	137 (55.8%)	14 (5.8%)	87 (35.6%)	31 (12.6%)
At social events	127(51.8%)	29 (11.9%)	82 (33.5%)	23 (9.7%)
With siblings	102 (41.6%)	52 (21.2%)	59 (24.2%)	43 (17.8%)
At church	93 (38.0%)	97 (39.5%)	47 (19.2%)	17 (7.1%)
With parents	52 (21.1%)	147 (59.9%)	30 (12.2%)	29 (12.2%)
With grandparents	25(10.6%)	187 (76.2%)	20 (8.3%)	14 (6.0%)

*These figures do not represent all respondents as one or more failed to provide information
 Note: The highest percentages for each category are in boldface.

Table 4.4 shows the use of both languages in different contexts. In the work domain, 59.0 percent respondents claim to use English, while only 5.3 percent claim to use Spanish; 33.5 percent of respondents claim to speak both languages at different times and 9.8 percent claim they intermix both languages while talking. At school, the trend is similar to the work domain: 55.8 percent of respondents claim to speak English, while only 5.8 percent claim to use Spanish, 35.6 percent speak both languages at different times, and 12.6 percent claim that both languages are intermixed. As a matter of fact, more than fifty percent of respondents claim they use English only in the work, social, and school domains while a little bit over 30 percent claim they use both languages but at different times. In the home domain, Spanish is spoken with parents

(59.9%) and grandparents (76.2%) more often than English, whereas English is spoken with siblings (41.6%). Interestingly, very few respondents claim they use Spanish only in the work, social, and school domains or that they code-switch between both languages in any of the domains.

Table 4.5 analyzes the language use of each family member, as described by the respondents. More than 50 percent of participants claim that their parents speak mostly Spanish at home, while 40.5 percent claim they use both Spanish and English at different times, and 25.1 percent claim their siblings also speak both languages at different times. Only 13.3 percent of participants claim to use only Spanish at home and 18.6 percent claim to use only English at home.

Table. 4.5. Percentage of respondents classified by language use of each family member at home. *

	English	Spanish	English or Spanish are spoken at different times	Both English and Spanish are intermixed while talking
Mother	20 (7.3%)	155 (56.8%)	51(18.7%)	44 (16.1%)
Father	19 (7.3%)	145 (56.0%)	53 (20.5%)	39 (15.1%)
Other family members	33 (15.8%)	77 (36.8%)	48 (23.0%)	47 (22.5%)
Participant	52 (18.6%)	37 (13.3%)	113 (40.5%)	74 (26.5%)
Siblings	63 (24.3%)	39 (15.1%)	89 (34.4%)	65 (25.1%)

*These figures do not represent all respondents as one or more failed to provide information

In contrast, 40.5 percent of respondents claimed to speak English and Spanish at different times, while 26.5 percent declared to use both languages intermixed. Notably, more than 50 percent of participants claimed that both the mother and father speak only Spanish at home (56.8 percent and 56.0 percent respectively) and 36.8 percent claimed that other family members living in the house also speak just Spanish.

Similarly, 34.4 percent of respondents claimed that their siblings speak English and Spanish at different times while 25.1 percent use both languages intermixed. More than 13 percent claimed to use only Spanish themselves and 15.1 percent claim their siblings use only Spanish at home. These figures illustrate how the use of Spanish and English is different among generations. The fact that individuals move between countries and different educational systems further complicates the task of classifying their bilingual profile.

4.3.2. Language proficiency

The respondents were also asked to assess their overall proficiency in reading and writing, both in English and Spanish, on a scale ranging from 1 (Poor) to 5 (Excellent). The ratings scales show that the majority self-reported their abilities speaking and reading English and Spanish as either excellent (5), very good (4) or good (3). The self-assessment ratings can also be taken as a corroboration of information about language dominance in particular abilities such as speaking and reading (see Altarriba & Heredia, 2001; Heredia, 1997; 2008; Heredia & Brown, 2013).

Table 4.6. Self-rating mean on speaking and reading abilities (n = 245)

	Late Bilinguals	Early Bilinguals	Simultaneous Bilinguals
Speaking English	3.77	4.08	4.65
Reading English	3.97	4.25	4.73
Speaking Spanish	4.55	4.57	4.05
Reading Spanish	4.65	4.53	3.96

The self-rating response means are displayed in Table 4.6. These figures show that late and early bilinguals rated their speaking and reading English skills lower than their Spanish skills, while simultaneous bilinguals consider their English skills to be significantly stronger than their Spanish skills. Independent t-tests showed that early bilinguals rated their Spanish reading proficiency higher ($M = 4.53$) than simultaneous ($M = 3.96$) bilinguals, $p < .001$. The comparison between late ($M = 4.65$) and simultaneous ($M = 3.96$) bilinguals' reading proficiencies was also significant, $p < .001$, showing late bilinguals to self-rate as better readers in Spanish. Finally, the comparison between late ($M = 4.65$) and early ($M = 4.53$) did not reach significance, $p > .05$, suggesting that both groups were comparable in their Spanish reading proficiencies. In relation to speaking Spanish, late ($M = 4.55$) bilinguals did not differ from early bilinguals ($M = 4.57$), $p > 0.05$. However, simultaneous bilinguals consistently rated themselves lower in their Spanish speaking ability than the other groups, $p < 0.05$.

Given that the degree of proficiency that an individual has in each language is an observable indicator of bilingualism, the figures for the speaking and reading English abilities substantiate a positive correspondence with the years of contact with English,

while showing a negative correspondence for the same abilities in Spanish. This key issue of language proficiency is further confirmed with claims of fluency in each language and the balance between the two languages (Romaine, 1995). Even though 71.3 percent of respondents claimed English as the dominant language, 88.4 percent claimed to be fluent in English. Similarly, 46.2 percent of participants claimed to be dominant in Spanish and 71.8 percent claim to be fluent in Spanish. A total of 17.5 percent respondents claimed that they consider both English and Spanish their dominant language and 60 percent claimed equal fluency in both languages. These figures corroborate that these speakers have one language that is stronger than the other and claim to have varying degrees of control over both languages, as they are often used in different domains and for different purposes. The fact that most respondents assessed their abilities in reading and writing as excellent or very good, both in English and Spanish, is useful to trust the results of the interpretation task.

Since the principal objective of this study was to determine the effect of years of contact with English on the comprehension of Spanish compound words, in the next section I discuss the results of the experimental task investigating both the structural analysis and the semantic interpretation of Spanish compound words.

4.4. Results of the experimental task

The following section analyzes and discusses the results of the experimental task, investigating both the structural analysis and the semantic interpretation of Spanish compound words. For ease of exposition, the results are divided into Study 1 and Study 2. Study 1 reports on the results of the structural analysis task that deals with

headedness, and Study 2 reports on the results of the semantic interpretation task dealing with transparency. When participants failed to answer one question the remaining responses were included in the calculations, and therefore the totals may vary from compound to compound. As may be recalled from Section 2.6.1, two different patterns of compounding in Spanish were included in the vocabulary test: [N+N]_N (e.g., *hombre rana* ‘frogman,’ lit. ‘man frog’) and [V+N]_N (e.g., *rompenueces* ‘nutcracker,’ lit. ‘crack nuts’). Data from the different groups of bilingual populations were analyzed in terms of accuracy of correct responses and compared to data from a control group of Spanish dominant subjects. The interpretation of the two different compound patterns in Spanish was compared because both Study 1 and Study 2 incorporate both between-group variables and within-subject variables.

Separate Analyses of Variance (ANOVA) were conducted on the percentage of correct responses. Study 1 was performed on morphological headedness (see 3.5.1) and Study 2 on semantic transparency (see 3.5.2) of compound words. Both analyses conformed to a mixed factorial design with Spanish Monolingual Controls, and Bilingual Type (Late, Early and Simultaneous) as the between-group factor, and morphological headedness and semantic transparency were examined as the within-group factor. Thus, for Study 1 the results conformed to a 4x2 mixed ANOVA, with group (monolingual control vs. late, early, and simultaneous bilinguals) as a between-group variable, and morphological headedness (V+N vs. N+N) as the within-group variable (see Figure 4.4). Participants’ responses were analyzed both by subjects (F_1) and by Items (F_2).

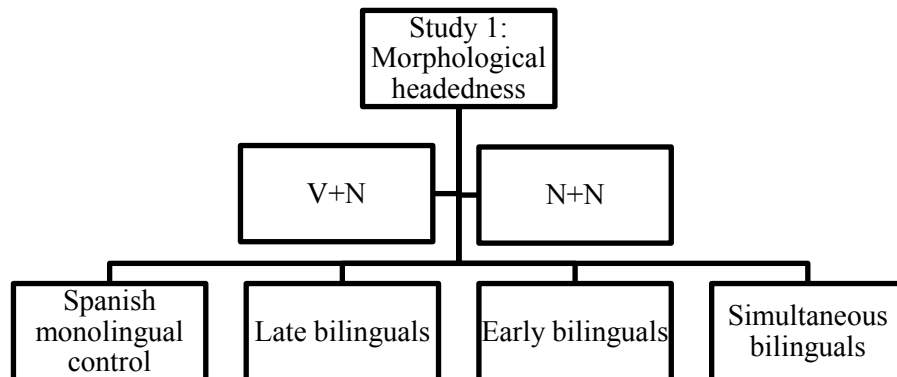


Figure 4.4. Factorial design of Study 1

For Study 2, results were also analyzed by subjects and by items, and in addition to transparency, morphological structure was also included. Thus, the design for study 2 conformed to a 4X2X2 mixed factorial design with group (control vs. late, early and simultaneous bilinguals) as a between-group variable, semantic transparency (opaque vs. transparent) and structure (V+N vs. N+N) as the within-group variables (see Figure 4.5). Data were screened for outliers and normality issues. Assumptions of normality were met.

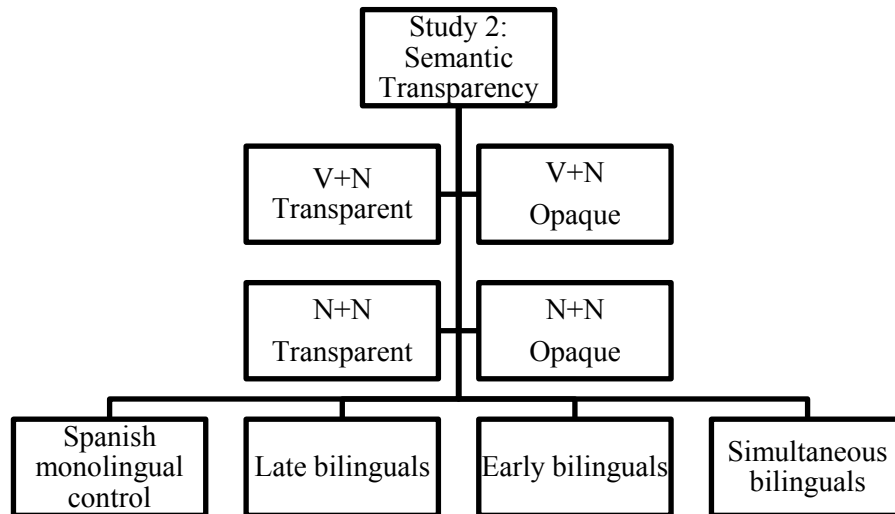


Figure 4.5. Factorial design of Study 2

4.4.1. Study 1: Morphological headedness

The aim of this part of the study was to assess the bilinguals' performance with the recognition of the head of the compound. The morphological structure interpretation task consisted of 20 compounds presented randomly in the vocabulary test; 10 words of the [V+N]_N pattern (i.e. *atrapamariposas* 'butterfly net, lit. catch+butterflies') and 10 of the [N+N]_N pattern (i.e. *campo turista* 'tourist camp , lit. camp+tourist'). For example, for the word *atrapamariposas* participants had two options to choose from: (a) *red para atrapar mariposas* 'butterfly net' vs. (b) *mariposas atrapadas en una red* 'butterflies trapped in a net'. For this word, 100 percent of control group, 96.7 percent of late bilinguals, 93.3 percent of early bilinguals, and 87.6 percent of simultaneous bilinguals selected option (a), which was the target response. The results of the morphological structure interpretation task appear on Table 4.7, which is descriptive, since it simply

shows percent accuracy for each word (cf. Appendix 5). Placing the data in graphic form shows the negative relationship between the mean accuracies and the age of acquisition of English across groups. This issue will be taken up at length in the discussion section (Section 7).

Table 4.7. Percentage accuracy of morphological headedness analysis on each word- first and second subsets

First subset: [V+N]_N

	CONT	LATE	EARLY	SIM
montacargas	100	100	90	77
atrapamariposas	100	97	93	88
sacacorchos	100	97	88	77
pintalabios	100	97	97	90
arrancaclavos	96	100	95	87
espantapájaros	96	100	90	88
abrecartas	96	100	92	92
aguafiestas	96	94	87	73
limpiabotas	96	90	92	73
tapaboca	93	100	93	91

Second subset: [N+N]_N

	CONT	LATE	EARLY	SIM
abeja reina	100	97	92	87
perro policía	100	94	90	86
coche bomba	100	94	85	65
episodio piloto	100	77	82	80
sombrero hongo	96	97	78	71
papel cebolla	96	87	87	77
día puente	96	84	83	64
campo turista	93	90	88	90
mono araña	93	90	83	76
premio consuelo	89	94	83	68

A 4 X 2 mixed ANOVA was conducted to compare the effect of age of acquisition of a second language on the interpretation of the morphological head of two

patterns of compounds words, [V+N]_N and [N+N]_N by the Spanish monolingual control, late bilingual, early bilingual, and simultaneous bilingual groups (cf. Figure 4.4). As will be recalled from Section 3.5, F_1 and F_2 analyses are performed to determine the extent to which results can be generalized to both subjects and items. Thus, since both participants and items have been incorporated as random factors, the result obtained can be generalized to both the population of subjects and the populations of items simultaneously (Clark, 1973). The standard deviation (presented in parentheses) shows how much dispersion from the average was found.

The ANOVA conducted on the overall accurate response rates revealed a main effect of bilingual type by subjects, $F_1(3, 268) = 13.675, p < .01$, and by items $F_2(3, 54) = 44.93, p < .01$. The mean percentage response accuracy by each group is described on Table 4.8. The main effect of bilingual type shows that, on average, there were statistical differences between the four groups. Multiple comparisons using the Least Significance Difference (LSD) were performed to determine differences between the bilingual groups in Study 1. In other words, the LSD provides a minimum value or the minimum difference between the variables. So, to achieve a significant difference, the difference between the two percentages, in this case, has to be greater than the LSD.

Table 4.8. Mean percentage response accuracy in Study 1: head-initial interpretation compared by subjects (F_1) (*with Standard Deviations in Parentheses*)

Group	Subjects (F_1)
Control	97 (.07)
Late bilinguals	94 (.09)
Early bilinguals	88 (.21)
Simultaneous bilinguals	80 (.19)

$F_1(3, 268) = 13.68, p < .01$ LSD=.066 n=272

Follow-up analysis by subjects using the LSD = .066 showed the Spanish monolingual control group to be more accurate in their overall responses to compound words ($M = .97, SD = .07$) than late ($M = .94, SD = .09$), early ($M = .88, SD = .21$) and simultaneous bilinguals ($M = .80, SD = .19$). The Spanish dominant control group ($M = .97$) was significantly better than early ($M = .88$) and simultaneous ($M = .80$) bilinguals. However, there were no significant differences between the control group ($M = .97$) and the late bilingual ($M = .94$) group.

*****The analysis by items revealed mean accuracy patterns as follows: the control group was more accurate ($M = .97, SD = .03$) than late ($M = .94, SD = .06$), early ($M = .88, SD = .05$) and simultaneous bilinguals ($M = .80, SD = .09$). The Spanish dominant control group ($M = .97$) was statistically significantly better than early ($M = .88$) and simultaneous ($M = .80$) bilinguals. However, there were no statistically significant differences between the control group ($M = .97$) and the late bilingual ($M = .94$) group.

Taken together, these results suggest that the more exposure the bilingual speakers have had to English, the more they considered the right constituent the head of the compound. However, even in the early and simultaneous bilingual groups there is not much influence from English head-final compounds in the interpretation of Spanish head-initial compounds, with correct responses above 80 percent accuracy across the board.

The analysis by morphological structure was significant by subjects $F_1(1, 268) = 63.467, p < .01$, and by items, $F_2(1, 18) = 12.236, p < .01$. The mean accuracy scores of compound pattern interpretations appear on Table 4.9. Moreover, the results by subjects show that participants were more accurate in their responses to V+N ($M = .88, SD = .18$) than N+N ($M = .82, SD = .19$). That is, V+N compounds words were easier to interpret than N+N across all groups. The results by items also show that the responses to V+N ($M = .93, SD = .07$) were more accurate than N+N ($M = .87, SD = .10$).

Table 4.9. Mean percentage response accuracy of Study 1: head-initial interpretation compared by subjects F_1 and by items F_2 (*with Standard Deviations in Parentheses*)

	Subjects F_1	Items F_2
V+N	88 (.18)	93 (.07)
N+N	82 (.19)	87 (.10)

$F_1(1,268)=63.47, p<.001 \ n=272$
 $F_2(1,18) = 12.24, p>.05 \ n=20$

The interaction of bilingual type by headedness did not reach statistically significant levels by subjects, $F_1(3, 268) = 1.62, p = .18$, nor by items, $F_2(3, 54) = 1.74,$

$p = .169$. Along with the results, the ANOVA on the accuracy data established a trend that shows that the less exposure to English these bilinguals have had, the more accurate their responses were in the interpretation task. These results provide support for the first hypothesis stating that the amount of exposure to English that heritage bilingual speakers have leads these speakers to consider the right constituent the head of the compound.

Mean percentage response accuracy results of the interaction of the variables are shown in Table 4.10 where subject (F_1) analyses are reported. Overall, the control group had the highest mean accuracy with a low SD in the head-initial interpretation scores in both the V+N and N+N mean accuracy by subjects F_1 and items F_2 . The control group and the late bilinguals had similar scores in the mean accuracies of the V+N interpretation both by subjects and items ($M = .97$). The control group mean accuracies of the N+N interpretation by subjects were also similar in both subjects and items ($M = .96$). The late bilinguals were not as accurate as the control with the interpretation of the N+N either by subjects or items. The control group scores by subjects ($M = .96$) and by items ($M = .96$) were higher than the late bilinguals mean accuracies by subjects ($M = .91$) and items ($M = .90$).

Table 4.10. Mean percentage response accuracy of the interactions in Study 1: head-initial interpretation analysis compared by subjects (F_1) (*with Standard Deviations in Parentheses*)

Mean accuracy by subjects (F_1)		
Group	V+N	N+N
Control	97 (.05)	96 (.08)
Late Bilinguals	97 (.06)	91 (.11)
Early Bilinguals	92 (.20)	85 (.22)
Simultaneous Bilinguals	84 (.19)	76 (.18)

$F_1(3,268)=1.62, p<.001$ $n=272$

The early bilinguals mean percentage accuracy was higher in the V+N by subjects ($M = .92$, $SD = .20$) and items ($M = .92$, $SD = .03$) than in the N+N by subjects ($M = .85$, $SD = .22$) and items ($M = .85$, $SD = .04$). The simultaneous bilinguals mean accuracy scores in the V+N by subjects ($M = .84$, $SD = .19$) and by items ($M = .84$, $SD = .08$) were again higher than the N+N by subjects ($M = .76$, $SD = .18$) and items ($M = .76$, $SD = .10$). In general, the mean percentage accuracies by subjects and items of the V+N pattern (i.e. *atrapamariposas* ‘butterfly net’, lit. ‘catch+butterflies’) were higher than the mean accuracies of the $[N+N]_N$ pattern (i.e. *campo turista* ‘tourist camp’, lit. ‘camp+tourist’).

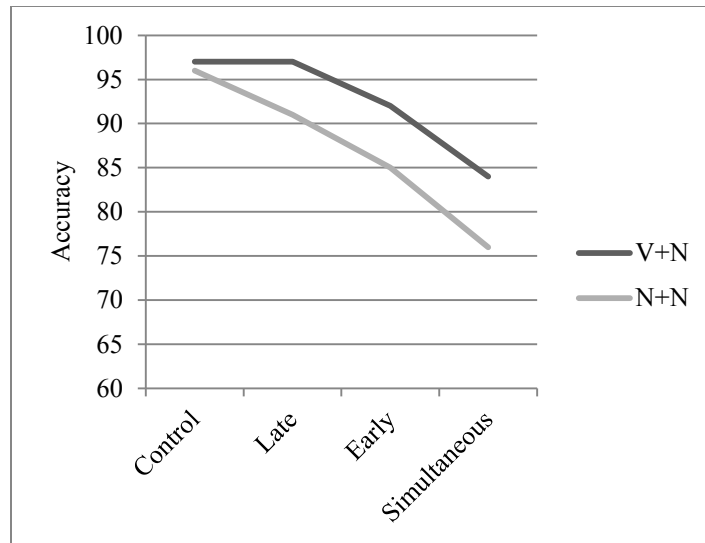


Figure 4.6 Overall mean percentage response accuracy in Study 1: head-initial interpretation compared by subjects (F_1)
 $F_1(3,268)=1.62, p<.001$ $n=272$

The ANOVA established a pattern in the data that is illustrated in figure 4.6. Overall, the mean percentage accuracy decreases when bilinguals have had more exposure to English. Simultaneous bilinguals, the group that has always been in contact with English in a bilingual acquisition environment, had the lowest scores in the interpretation of both V+N and N+N included in Study 1. These results also confirm the second hypothesis that states that heritage bilingual speakers would interpret $[V+N]_N$ more accurately than $[N+N]_N$ compounds regardless of their degree of English-dominance.

4.4.2. Study 2: Semantic transparency

The primary goal of the second study was to assess the bilinguals' performance with the semantic interpretation of compounds. The interpretation task was designed to look at

semantic transparency and also included N+N and V+N compound words to ascertain whether respondents considered them transparent (literal meaning) or opaque (figurative meaning). In this task, a set of 20 different compounds were used. They were presented randomly in the same vocabulary test as follows: five transparent and five opaque words of the [V+N]_N pattern (i.e. *pelagatos*) and 5 transparent and five opaque words of the [N+N]_N pattern) (i.e. *hombre rana*). For example, for the transparent word *hombre rana* ‘diver,’ lit. ‘man+frog’, participants had two options to choose from: (a) *hombre con ojos saltones* ‘man with bulging eyes’ vs. (b) *buzo* ‘diver’ in which (b) would be the target response. For this word, 100 percent of control group, 77.4 percent of late bilinguals, 65 percent of early bilinguals, and 49.3 percent of simultaneous bilinguals selected option (a), which was the target response. For the opaque word *pelagatos* ‘poor man,’ lit. ‘peel+cats’ participants had to select either (a) *persona insignificante* ‘insignificant person’ or (b) *tijeras para gatos* ‘cat scissors,’ in which (a) would be the target response. For this opaque word, 100 percent of control group, 90.3 percent of late bilinguals, 83.3 percent of early bilinguals, and 73.4 percent of simultaneous bilinguals chose the target response. The results of the semantic transparency interpretation task appear on Table 4.11, which is descriptive, since it basically shows the accuracy percentage for each word. Placing the data in graphic form shows the negative relationship between the mean accuracies and the age of acquisition of English across groups. This issue will be taken up at length in the discussion section. These scores also appear in Appendix 5.

Table 4.11. Percentage accuracy in Study 2: semantic transparency analysis on each word- third and fourth subsets

Third subset: [V+N]_N transparent compounds

	CONT	LATE	EARLY	SIMUL
pasatiempo	100	97	92	82
tornaboda	100	97	78	86
crecepelelo	100	90	83	85
guadameta	100	84	82	67
paracaídas	96	90	87	79

[V+N]_N opaque compounds

	CONT	LATE	EARLY	SIMUL
metepatas	100	94	82	69
comemierda	100	94	73	75
pelagatos	100	90	83	73
picapleitos	96	100	92	89
buscapiés	74	39	42	40

Fourth Subset: [N+N]_N transparent compounds

	CONT	LATE	EARLY	SIMUL
bienes raíces	100	97	92	77
premio consuelo	100	94	90	86
bocacalle	100	94	80	76
hombre rana	100	77	65	49
canción protesta	96	90	87	82

[N+N]_N opaque compounds

	CONT	LATE	EARLY	SIMUL
bocamanga	100	74	75	68
puntapié	100	71	43	41
hora pico	96	77	67	68
obra cumbre	96	77	63	64
balonmano	78	87	78	76

A 4 (language group: monolingual control vs. late, early and simultaneous bilinguals) X 2 (semantic transparency: opaque vs. transparent) X 2 (morphological structure: V+N vs. N+N) mixed ANOVA for Study 2 was also conducted to compare the effect of age of acquisition of a second language by the Spanish monolingual control, late, early, and simultaneous bilingual groups on the interpretation of the two patterns of compound words ($[V+N]_N$ and $[N+N]_N$) plus the semantic transparency (opaque vs. transparent) (cf. Figure 4.5).

Table 4.12. Mean percentage accuracy of semantic interpretation compared by subjects (F_1) and by items (F_2) (*with Standard Deviations in Parentheses*)

Group	Subjects F_1	Items F_2
Control	97 (.08)	97 (.07)
Late Bilinguals	86 (.18)	86 (.14)
Early Bilinguals	77 (.25)	77 (.14)
Simultaneous Bilinguals	72 (.23)	72 (.14)

$F_1(3, 268) = 24.11, p < .01$ LSD=.077 n=272

$F_2(3, 48) = 40.62, p < .01$ LSD=.04 n=20

The ANOVA on the response accuracy data revealed a main effect of bilingual type by subjects, $F_1(3, 268) = 24.11, p < .01$, and by items $F_2(3, 48) = 40.62, p < .01$. Mean percent response accuracy by each group appears on Table 4.12. The main effect of bilingual type shows that, on average, there were statistical significant differences

between the four groups. Follow-up analysis by subjects using the LSD = .077 showed the Spanish monolingual control group to be more accurate in their overall responses to compound words ($M = .97$, $SD = .08$) than late ($M = .86$, $SD = .18$), early ($M = .77$, $SD = .25$) and simultaneous bilinguals ($M = .72$, $SD = .23$). The analysis by items revealed mean accuracy patterns as follows: the control group was more accurate ($M = .97$, $SD = .07$) than late ($M = .86$, $SD = .14$), early ($M = .77$, $SD = .14$) and simultaneous bilinguals ($M = .72$, $SD = .14$). In the analyses by subjects there were significant differences between the control group ($M = .97$) and the late bilingual ($M = .86$) group. Also, the Spanish dominant control group ($M = .97$) was significantly better than early ($M = .77$) and simultaneous ($M = .72$) bilinguals. However, there was not significant difference was found when comparing the early ($M = .77$) and the simultaneous ($M = .72$) bilingual groups. The analysis by items revealed mean accuracy patterns as follows: the control group was more accurate ($M = .97$, $SD = .07$) than late ($M = .86$, $SD = .14$), early ($M = .77$, $SD = .14$) and simultaneous bilinguals ($M = .72$, $SD = .14$). The Spanish dominant control group ($M = .97$) was statistically significantly better than early ($M = .88$) and simultaneous ($M = .80$) bilinguals. However, there were no statistically significant differences between the control group ($M = .97$) and the late bilingual ($M = .94$) group. Taken together, these results suggest that the late and early bilingual speakers' interpretation of the meaning of compounds in Spanish was slightly more robust than those of the simultaneous bilinguals.

The analysis of semantic transparency (by compound pattern) was significant by subjects $F_1(1,268)=26.143$, $p < .01$, $n=272$ and by items $F_2(1,16) = .545$, $p = .471$. The

mean accuracy scores of semantic meaning interpretation based on compound pattern appear on Table 4.13.

Table 4.13. Mean percentage accuracy in Study 2: compound patterns interpretation compared by subjects (F_1) and by items (F_2) (with Standard Deviations in Parentheses)

	Subjects F_1	Items F_2
V+N	79 (.22)	85 (.16)
N+N	74 (.24)	81 (.16)

$F_1(1,268)=26.143, p<.01, n=272$
 $F_2(1,16)=.545, p=.471, n=20$

The results by subjects show that participants were more accurate in their responses to meaning of V+N ($M = .79, SD = .22$) than N+N ($M= .74, SD = .24$). That is, V+N compounds included in the test, either transparent or opaque, were easier to interpret than N+N across all groups. The results by items also show that the responses to V+N ($M=.85, SD = .16$) were more accurate than N+N ($M=.81, SD=.16$).

The interaction of transparency by bilingual type was significant by subjects $F_1(3, 268) = 24.11, p < .01$ $LSD=.077$ and by items $F_2(3, 48) = 40.62, p < .01, LSD=.04$. Mean percentage response accuracy by each group appears on Tables 4.14. Overall, as seen in the results by subjects, the Spanish monolingual control group had a very high accuracy rate for transparent compounds ($M = .99, SD = .04$), compared to the other groups, at statistically significant levels.

Table 4.14. Mean percentage response accuracy of responses in Study 2: transparency compared by subjects (F_1) (with Standard Deviations in Parentheses)

Mean accuracy by subjects F_1		
Group	T	O
Control	99 (.04)	94 (.10)
Late Bilinguals	89 (.15)	82 (.19)
Early Bilinguals	82(.24)	72 (.25)
Simultaneous Bilinguals	76 (.22)	68 (.22)

$F_1(3, 268) = 24.11, p < .01$ LSD=.077, n=272

Note: T- transparent, O- opaque

The late bilinguals with fewer years of contact with English had higher percentage accuracy ($M=.89$, $SD=.15$) than both the early ($M=.82$, $SD=.24$) and simultaneous bilinguals ($M=.76$, $SD=.22$). The Spanish monolingual control also had a higher accuracy rate of interpretation of opaque compounds ($M=.94$, $SD=.10$), compared to the late ($M=.89$, $SD=.19$), early ($M=.82$, $SD=.24$) and simultaneous ($M=.76$, $SD=.22$) bilinguals. In the results by items, the Spanish monolingual control group also had a very high accuracy rate for transparent and opaque compounds. Similarly, late bilinguals with fewer years of contact with English had higher percentage accuracy rates than early and simultaneous groups.

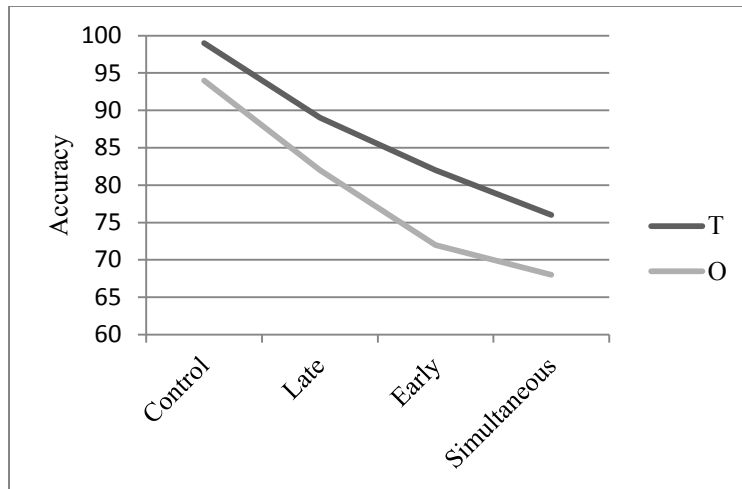


Figure 4.7. Overall mean percentage response accuracy in Study 2: transparency compared by subjects (F_1)
 $F_1(3, 268) = 24.11, p < .01$ LSD=.077, $n=272$

Taken together, these results suggest that the bilingual speakers' interpretation of the meaning of compounds in Spanish decreases in accuracy as a function of years of contact with English. The ANOVAs established patterns in the data that show the decrease in percentage response accuracy by bilingual type. These patterns are illustrated in Figure 4.7. As has been shown, as exposure to Spanish decreases, so does the ability of the bilingual speakers to give the same interpretation as Spanish-dominant speakers.

Table 4.15. Mean percentage response accuracy of responses in Study 2: transparency of morphological structure compared by subjects (F_1) (with Standard Deviations in Parentheses)

Mean accuracy by subjects F_1		
Group	V+N	N+N
Control	97 (.08)	97 (.08)
Late Bilinguals	87 (.14)	84 (.21)
Early Bilinguals	79(.24)	74 (.25)
Simultaneous Bilinguals	75 (.22)	69 (.22)

$F_1(1,268)=26.143, p<.01, LSD =.077, n=272$

Mean accuracies of the interaction of the variables are shown in Table 4.15 where subject (F_1) analyses results are reported. As can be seen in the analysis by subjects, the Spanish monolingual control group had a very high accuracy rate interpreting the semantic structure, whether transparent or opaque ($M = .97, SD = .05$), compared to the other groups. The ANOVA established a pattern in the data that is illustrated in figure 4.8. The late bilinguals with fewer years of contact with English had higher accuracy than either the early and simultaneous bilinguals in the analyses by subjects and items, at statistically significant levels. The early bilinguals were somewhat more accurate than the simultaneous bilinguals, but the differences were not statistically significant ($p > .05$).

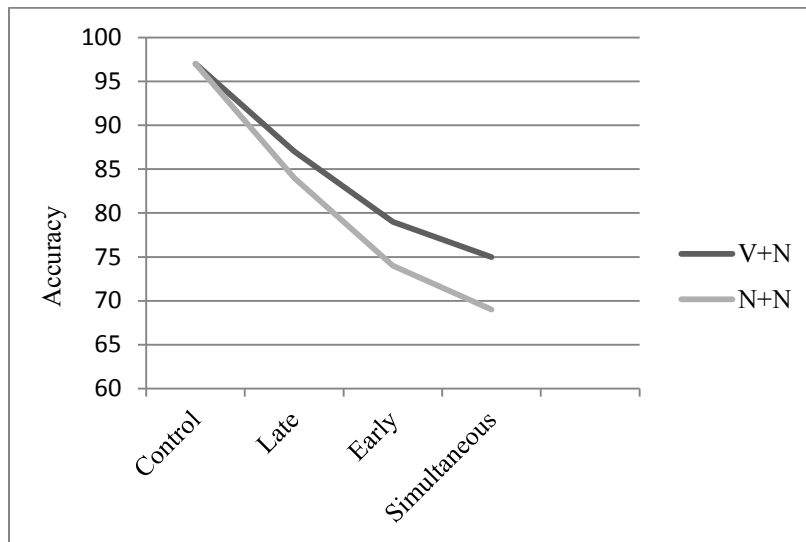


Figure 4.8 Overall mean percentage response accuracy in Study 2: transparency of both compound structures compared by subjects (F_1) $n=272$

Follow-up analysis by items using the $LSD = .04$ showed the Spanish monolingual control group to be more accurate in their overall responses to V+N compound words ($M = .97$, $SD = .02$) than late ($M = .87$, $SD = .03$), early ($M = .79$, $SD = .03$) and simultaneous bilinguals ($M = .75$, $SD = .08$) at statistically significant levels. The responses of N+N compound words revealed mean accuracy patterns as follows: the control group was more accurate ($M = .97$, $SD = .03$) than late ($M = .84$, $SD = .06$), early ($M = .74$, $SD = .04$) and simultaneous bilinguals ($M = .69$, $SD = .10$). The Spanish monolingual control group ($M = .97$) was significantly better than late ($M = .84$), early ($M = .74$) and simultaneous ($M = .69$) bilinguals. However, the difference between the early ($M = .74$) and the simultaneous bilingual ($M = .69$) group is not statistically

significant. Taken together, these results suggest that the bilingual speakers interpret V+N Spanish compounds better than N+N structures, regardless of transparency.

Two things are noteworthy in Study 2. The data from this study clearly replicated the results of Study 1, showing consistency and validating the differences between the bilingual types, and the compound structures. As in Study 1, along with the results, the ANOVA on the accuracy data established a pattern that also shows that the less exposure to English these bilinguals have had, the more accurate their responses were in the interpretation task. In general, the mean percentage accuracies by subjects and items of both transparent and opaque V+N pattern were higher than the mean accuracies of the transparent and opaque N+N pattern.

On the whole, the new findings also indicate that all bilinguals, in general terms, were better at understanding the transparent compounds. These results also suggest that the bilingual speakers' interpretation of the meaning of V+N compounds in Spanish is better than the interpretation of meaning of N+N compounds. Overall accuracy percentage decreases as a function of years of contact with English. These results support the third hypothesis stating that semantic transparency/opacity would play a role in accurate interpretation of both [V+N] and [N+N] compounds, assuming that bilingual speakers would correctly interpret transparent compounds while opaque compounds would be interpreted literally.

4.4.3. Confidence levels

Participants were asked to indicate how competent they felt (very competent, somewhat competent, not at all competent) using each compound word before working on the

vocabulary test. For the comparison of the results, compounds were grouped in the four subsets outlined in Section 3.4.1. The total responses for the first subset of Study 1, that is, the interpretation of the morphological head in V+N compounds averaged 60.65 percent for ‘very competent,’ 22.55 percent for ‘somewhat competent,’ and 16.80 percent for ‘not competent at all’ using each word. For the second subset of Study 1, that was aimed at the interpretation of the morphological head of N+N compounds, the responses averaged 61.05 percent for ‘very competent,’ 19.90 percent for ‘somewhat competent,’ and 19.05 percent for ‘not competent at all’. In fact, for Study 1 more than 80 percent of the total respondents felt either very competent or somewhat competent of their knowledge of these compound words. The 16.80 percent of the respondents for the V+N compounds subset that declared not feeling competent at all is lower than the 19.05 percent that also declared feeling not at all competent using each word in the N+N subset.

The total responses for the third subset of words included in Study 2 that aimed at the semantic interpretation of V+N compounds averaged 55.6 percent for ‘very competent,’ 24.7 percent for ‘somewhat competent,’ and 19.7 percent for ‘not at all competent’ using the compound words. For the fourth subset of N+N compound words included in Study 2, 45.9 percent of participants stated feeling ‘very competent’ while 23.3 percent felt ‘somewhat competent.’ A total of 30.8 percent of respondents chose ‘not at all competent’ using each word in this particular subset (cf. Table 4.16).

Table 4.16. Mean percentage of self-assessed* confidence levels compared by compound subsets

	Very competent	Somewhat competent	Not at all competent
Subset 1 V+N Morphological headedness	147 (60.65%)	54 (22.55%)	41 (16.80%)
Subset 2 N+N Morphological headedness	149 (61.05%)	48 (19.90%)	45 (19.05%)
Subset 3 V+N Semantic transparency	132 (55.60%)	60 (24.70%)	48 (19.70%)
Subset 4 N+N Semantic transparency	112 (45.9%)	57 (23.3%)	75 (30.8%)

*These figures do not represent all respondents as one or more failed to provide information

Interestingly, the respondents that rated themselves as feeling very competent or somewhat competent averaged 80 percent or more in subsets 1 and 2 (both dealing with morphological headedness of both V+N and N+N patterns) and in subset 3 (dealing with semantic transparency of V+N patterns). Over 30 percent of respondents were less confident about using N+N compounds included in subset 4 (cf. sections 4.5 and 4.6).

In a Yes/No question that addressed participants' level of frustration in answering the questions about the words, 46 percent of the total participants answered Yes, compared to 54 that answered No. However, in the question that asks participants to confirm difficulty in the use of the compound words after having taken the vocabulary test, the majority declared it was either very easy or easy, compared to hard or very hard

(cf. Appendix 6). All these subjective measures corroborate the overall results of the experiment and diminish the likelihood that the subjects were responding to the demand characteristics of the vocabulary test. As has been noted, the confidence levels do not reflect the accuracy percentages scored by the participants that point to a robust knowledge of these compound words.

4.4.4. Elicited production task: novel compounds productivity

To elicit novel items, the two last questions targeted productivity in a Yes/No question. A total of 68 percent of participants answered that it is not OK to create new words or phrases in Spanish. In the last question participants were asked to create a new word or phrase in Spanish if the answer to the previous question was *Yes*. The intention was to corroborate whether compounding would be used as a word formation process after being primed by the vocabulary test. From the 73 responses that were volunteered, novel lexical items created by respondents included bare and derived nouns as well as compounds that included other word classes, such as adjectives and prepositions. Table 4.17 includes novel V+N and N+N compounds, the focus of the present study. This additional task in the vocabulary test confirms what Nicoladis (1999) demonstrated in her research, namely, that the input children received from their environment influenced their compound production.

Table 4.17. Novel compounds created by participants

Novel word	Pattern	Lit. Translation	English gloss
1. cantacatarina	V+N	sing+ladybug	singing ladybug
2. chupadedos	V+N	lick+fingers	finger licker
3. comecaya	V+N	eat+poop	poop eater
4. duermerato	V+N	sleep+moment	light sleeper
5. gastatiempo	V+N	waste+time	time waster
6. montacabras	V+N	ride+goats	goat rider
7. paranalgas	V+N	lift+buttock	brief
8. picabeja	V+N	bite+bee	stinging bee
9. quitacanas	V+N	remove+gray hair	hair color
10. sacapelos	V+N	pluck+hairs	tweezers
11. sacatierra	V+N	remove+soil	soil remover
12. tocatumbas	V+N	touch, play+ tomb, dance	?
13. tornachristmas	V+N	day after+Christmas	day after Christmas
14. bomba madre	N+N	bomb+mother	mother bomb
15. hombrehuevo	N+N	man+egg	eggman

In the present study, the bilingual speakers' production of V+N compounds outnumbered the production of N+N nouns. Out of 15 words, 13 are V+N while two are N+N compounds. Given that in the present study the interpretation of V+N the mean accuracy scores are higher than those of the N+N, it can be assumed that the latter is easier to generate and that is the reason why this pattern is more productive in Spanish

(Moyna, 2011:274). The results of the elicited production task enable us to make the following prediction: If encouraged to produce compound words in Spanish to name instruments with novel words, bilinguals are more likely to produce more V+N (e.g. *sacatierra*, ‘soil remover,’ lit. remove+soil’) than any other compound. Likewise, if encouraged to highlight behavioral characteristics in mocking terms (e.g., *chupadedos*, ‘finger licker,’ lit. lick+finger’), bilinguals would produce more V+N compounds than any other compound.

Students had the option of making a comment at the end of the vocabulary test. The objective of this section was to check if there was any association procedure used to relate the stimuli in the interpretation task and the question about the possibility to create new words after completing the task. I prompted them with the open-ended question, *Is there anything you would like to tell me?* The following analysis is based on the respondent’s comments, and because of the limited range in number, the results are taken as descriptive. Some students explained or translated the words they created in the previous question that targeted productivity. For example, for the word *paranalgas* (‘lift’ + ‘buttocks,’ lit. brief) the respondent added the following explanation: “*Se me ocurrió viendo un comercial l de calzones ortopédicos*” (I thought of this word while watching a commercial on orthopedic briefs). Based on this comment (translation is mine), I am assuming that the meaning of this compound word is ‘brief that lifts buttocks.’ In another example, for the word *sacapelos*, the respondent translated it as *tweezers*. The word *tocatumbas* is an example of the issue of polysemous constituents in one language, and some words may have multiple meaning in both languages. Out of context, the word

tocatumbas is hard to interpret. Relevant to the concept of lexical meaning, some other comments by the participants address the problem of interpretation as follows: “There are some words that sound like they would have a certain meaning, yet they have a completely different definition;” “This may make it hard for a non-speaking Spanish (sic) individual to understand the meaning of these words;” “Ive (sic) heard some of these words before but I (sic) don’t (sic) know how to use them correctly. Then there are some words that you could interpret in different ways, I (sic) have to say this words were hard”.

Another issue, brought up by a respondent is the order of elements within compounds included in the present study (cf. Section 2.9.1.2). The respondent writes: “The majority of the words were easy for me although some of them stumped me. I know what the words mean but I was not too sure of the correct order”. Yet another respondent noticed the internal structure of the V+N compounds (cf. Section 2.6), making the following remark: “Just a little observation about spanish (sic) words, I noticed that the function of the object is the name of the object.

The pejorative nature of some V+N compounds in Spanish was also addressed by a respondent who made the following comment: “Many times, society puts their own meanings in words. For instance, *pelagatos*, I believe is not really a word, but somehow it became a word to make people feel bad”. Similarly, another respondent added: “It was difficult to try to use some of these odd/invented words also seen as slang. But some of them are well known here in our city”. This observation is in compliance with the assumption that compounds in the V+N class tend to highlight behavioral characteristics

in mocking terms, just like *pelagatos* ‘nobody’, lit. ‘peel+cats’ (cf. Section 2.6.1). The following comments confirm the issue of frequency of the compound words, in particular to this speech community: “Some of these words are common amongst our culture in Laredo. An example is *tornaboda*. Yet I was unfamiliar with other words such as *sacacorchos*,” “The Spanish (sic) I speak is much simpler than a lot of the words in this survey. These are not words I would use in everyday conversations;” “some words are very common and others are not that common”.

Certainly, a few comments point to the different degree of language dominance and language use (cf. Section 4.3.1) as follows: “There are a lot of words I don’t know in Spanish! I couldn’t tell if some were real;” “I was born in Mexico and some words that I read today in this study were new to me. Maybe I do need to read more in Spanish;” “I only learned spanish in an academic classroom setting;” “*Creo que varias de las supuestas definiciones de las palabras son incorrectas*” (“I believe that some of the alleged definitions are incorrect”). One comment in particular addresses the issue of creativity in the meaning-prediction process: “Some of the words were kind of hard to define but I guessed using logic.” Just as Nicoladis (2006:103) proposes, the one limit to children’s linguistic creativity with regard to compounds is the productivity of forms in their input language (cf. Section 2. 9). For the young adult participants, the low frequency of compounds which is further diminished in their L1 input, gives them few tokens with which to set the compounding parameter for Spanish. This points to “creativity” in the form of “logic” in order to interpret these compound words, since

there are as many ways to interpret a noun compound as there are ways of combining the underlying concepts (Gagné, 2002).

The following comments address the issue of compounds being available (i.e. still stored) but not accessible (i.e. not retrievable) from memory (cf. Heredia and Altarriba, 2001 for a similar issue; cf. also Tulving and Pearlstone, 1966). One respondent wrote: “I didn’t understand many of those words, some that I’ve heard have been from other people but I have hardly used some of them. *Tornaboda* I heard from my mother because she says they used to have weddings that lasted almost a whole week. I’ve also heard her say *perro policia*, *dia puente*, and a few others. I think the only ones I’ve might of (sic) used a couple of times are *pasatiempos*, *aguafiesta* (because of the expression “party-poopers” in English), and *mono araña* because of the Spider-man movie”. Some observations regarding the *availability vs. accessibility* issue are mentioned by a few respondents: “Some words I remembered what they were after I read the prompts, like *buscapiés*,” “I had no idea what these words meant when I first read them, but once I read what they could mean, I understood them better. Some of them made more sense than others;” “Most of the terms I’ve never used before, yet I’ve heard them. I would only use them in certain circumstances”.

Another respondent who answered *No* to the questions about creating words added the following: “*Estamos impuestos a las palabras que usamos a diario que se nos hace difícil adaptarnos a nuevas palabras*” (“We are accustomed to the words we use every day and we find it difficult to adapt to new words”). The observations volunteered by the participants point to compound words being deceptive, more so when speakers

lack language experience in their interpretation and production of these words presented out of context. The relevance of the comments lies in the fact that they strengthen different characteristics described in previous research (cf. Section 2.9). These observations also highlight the linguistic competence and awareness of the participants, as well as the attention paid while completing the survey.

4.5. Discussion: Study 1 structural analysis task

The first goal of Study 1 was to investigate whether bilingual speakers who were exposed to Spanish and English simultaneously or sequentially as children correctly interpret compounds in Spanish. Bilingual speakers whose L1 (Spanish) has left-headed compounds and whose L2 (English) has right-headed compounds made few errors of constituent ordering. The test included ten left-headed V+N compounds and ten N+N compounds (cf. Section 2.6). The results of Study 1, which deals with the interpretation of the morphological head of the compounds, are discussed in the next sections.

Ten N+N compounds were included in the vocabulary test. In this compound structure, the semantic relationship between two nouns was shown to be difficult to comprehend, given that the grammatical category of both constituents is identical and the configuration of the pattern contrasts in the two languages. Because the participants are bilingual, the lexicalized meaning – that is, the semantic relationship between the constituents that may not be prototypical – of the compounds in the non-target language (English) affects the interpretation of compound words in the target language (Spanish). The experiments proved that the more exposure the speakers had to English, the more they considered the right constituent the head of the compound (cf. Table 4.17).

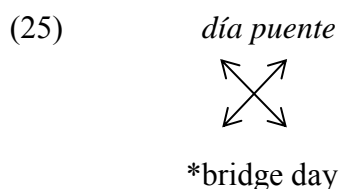
4.5.1 Study 1 Structural analysis task stimuli

Ten N+N compounds were included in the vocabulary test. The experiments proved that the more exposure the speakers had to English, the more they considered the right constituent the head of the compound (cf. Table 4.7). In the following sections, the results are discussed in an analysis of some of the words used as stimuli.

4.5.1.1. *día puente* ‘long weekend’ or ‘working day between two holidays,’ lit.

‘day+bridge’

In a N+N word like *día puente* (see example 25) the second nominal may have multiple correspondences, such as ‘bridge’ or ‘long weekend.’ In the vocabulary test, the options to choose from were either ‘a kind of day’ or ‘a kind of bridge’. The interaction of ‘day’ with ‘bridge’ in *día puente* was mostly interpreted as a ‘kind of day’ which is the target response.

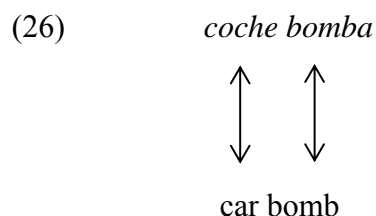


However, some simultaneous bilingual speakers with more contact with English assumed the compound refers to a ‘kind of bridge’ as they were considering *día puente* ‘day+bridge’ as right-headed compound. With only 64 percent accuracy, the word *día puente* got the lowest score by the simultaneous bilingual group. As expected, the control group respondents were the most accurate with their responses to this word as a

'kind of day,' scoring 96 percent, whereas the late and early bilingual groups scores reached 83 percent accuracy.

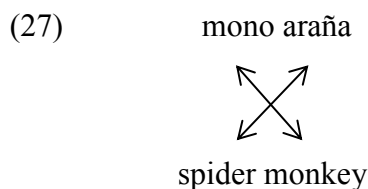
4.5.1.2. *coche bomba* 'car bomb,' lit. 'car + bomb'

In this case, the N+N word *coche bomba*, which designates a concrete man-made object, was interpreted accurately by 65 percent of the simultaneous bilinguals. This compound word is a peculiar case in the experiment because, surprisingly, the similar word order to the English word 'car bomb' did not lead to positive transfer in the interpretation (see example 26). This low score may have been due to the options that were either 'a kind of pump' or 'a kind of car' and the continuous contact the simultaneous bilinguals have had with English led them to interpret the right constituent *bomba* ('bomb or pump') as the head of the compound. The control group was 100 percent accurate in the interpretation of *coche bomba*, while the late bilingual group scored 94 percent accuracy. In addition, the early bilingual group were 85 percent accurate in the interpretation of this word.



4.5.1.3. *mono araña* ‘spider monkey,’ lit. ‘monkey spider’

A N+N compound word that was not interpreted with 100 percent accuracy by the control group was *mono araña* (see 27), where the left-constituent *mono* ‘monkey’ is the head of the compound. The second nominal acts as a non-head modifier that has an “identificational predicative relationship with the head” (Moyna, 2011: 164). Thus, *mono araña* is a monkey with disproportionately long limbs and long tail that looks like a spider. The accuracy scores for the word *mono araña* by late, early and simultaneous bilinguals were 90, 83, and 76 percent respectively.



4.5.1.4. *cartón piedra* ‘papier mache,’ lit. cardboard + stone

Of the ten compounds included in Study 1, one the most interesting examples is the word *cartón piedra* (‘papier mache,’ lit. cardboard + stone) which got a score of merely 89 percent accuracy in the interpretation by the control group, making it the lowest score of the subset. This word also got one of the lowest interpretation scores by the simultaneous bilingual participants, at 68 percent. To illustrate how misleading these words can be, let us analyse the options for this word (see 28). The definition used on 28.a (target) considers the left constituent the head of the compound, as in a type of

cardboard, while 28.b (distractor) points to the right constituent as the head, in this case as a ‘type of stone’.

- (28) cartón piedra
- a. cartón duro como piedra
 ‘cardboard as hard as stone’
 - b. piedra que parece de cartón
 ‘stone that looks like cardboard’

Therefore, taking the semantic considerations into account, according to which *cartón piedra* is a type of cardboard, not a type of stone, the accuracy scores suggest that the meaning is indeed difficult to grasp. As can be seen from the translation of *cartón piedra* (cardboard + stone) the order of constituents is the opposite from English N+N compounds, but the issue of order of constituents was not as problematic for the different bilingual types. An explanation for the bilinguals’ interpretation being so similar to the control group can be the low frequency of this word in the particular input of the latter.

4.5.1.5. *episodio piloto* ‘pilot program,’ lit. ‘episode+pilot’

Another interesting example in the subset for Study 1 is *episodio piloto* (‘pilot program,’ ‘episode+pilot’) because it got 77 percent mean accuracy and it was the lowest score in the responses of the late bilingual group. The control group did score 100 percent accuracy, while the early and simultaneous bilingual groups were 82 and 81 percent accurate respectively. The definitions for this word included ‘a kind of a program’ or ‘a kind of a pilot’ as in example 29.

- (29) episodio piloto
- a. primer episodio de una serie de programas de televisión
‘pilot program in a TV series’
 - b. piloto que aparece en un episodio de una serie de programas
‘pilot that appears in an episode of a TV series’

The noun *piloto* in this N+N compound is acting as a modifier that indicates *primer* ‘first’, but that also indicates *programa de prueba* as in a ‘trial episode’. Again, the English equivalent did not lead to positive transfer in the interpretation by the group that has had less contact with English.

For the rest of the N+N words in the subset, the mean accuracy responses exhibited the same pattern. These words, which include *abeja reina*, *perro policía*, *sombrero hongo*, *papel cebolla* and *campo turista*, had a higher than 70 percent accuracy in the responses of the simultaneous bilingual group, higher than 78 percent by the early bilingual group, and higher than 83 percent by the late bilingual group.

A second goal of study 1 was to verify whether respondents would interpret [V+N]_N more accurately than [N+N]_N compounds regardless of their degree of English-dominance. One reason for positing this hypothesis was that the [V+N] pattern is favored universally in child acquisition. Evidence of a correspondence between the [V+N]_N pattern (from Romance languages) and the English synthetic compounding [[N][V]er] comes from language acquisition research (cf. 2.10 for a detailed discussion). The mean accuracies corroborate that the usual V-O order makes it easier for heritage

language speakers, even those with the longest contact with English, to interpret the [V+N]_N Spanish patterns correctly (cf. Table 4.10). The control and the late bilingual groups mean percentage response accuracy for compounds of the V+N pattern was 97 percent, while the early bilinguals scored 92 percent. The simultaneous bilinguals mean percentage response accuracy was 84 percent. For the N+N compounds interpretation, the control and late bilinguals scored above 90 percent accuracy, while the early bilinguals scored 85 percent. The simultaneous bilinguals' response accuracy score was 76 percent. Note that all the mean percentage response accuracy percentages are higher for the V+N than for the N+N compounds across all the groups. For the [V+N]_N pattern, the morphological head did not become an issue for the majority of respondents.

4.5.1.6. *aguafiestas* 'party pooper,' lit 'water+parties'

The compound *aguafiestas* is exocentric (cf. 2.6), as it refers to something that is not named by either of the constituents of the compound. Metaphorically, it refers to someone who is 'a spoilsport, or 'a killjoy'. The meaning in English is best expressed by the idiom 'to rain on someone's parade'. The definitions presented in (30) are designed to look at the morphological structure; option (30a) suggests parties as the definition and it is the distractor and option (30b) points at 'something' that ruins a party (rain in this example) the target response. The early and late bilingual groups got 94 and 87 percent mean accuracy respectively, while the control group got 96 percent mean accuracy. With a mean percentage average of 73 percent accuracy, the V+N compound *aguafiestas* ('party pooper,' lit 'water+parties') got one of the two lowest score in the interpretation of the simultaneous bilinguals (see example 30).

- (30) aguafiestas
- a. fiestas en las que se juega con agua
‘parties where you play with water’
 - b. lluvia repentina que arruina las fiestas
‘sudden rain that ruins parties’

It can be argued that the low mean percentage accuracy score of the simultaneous bilinguals, the group that has been the longest in contact with English, was due to the fact that the verb *aguar* (spoil), is very infrequent, and therefore even some late bilingual speakers would interpret *agua* (the left-constituent) as ‘water’.

4.5.1.7. *limpiabotas* ‘shoeshine person / product’, lit. ‘clean+boots

The V+N *limpiabotas* (‘shoeshine person / product’, lit. ‘clean+boots’) got the lowest score in the interpretation by the simultaneous bilingual group (73%). The distractor *botas* ‘boots’ presented in (31a) makes reference to the second constituent as the head of the compound, while the target definition (31b) refers to the specific semantic function performed by a person. All other groups of participants performed at 90 percent or better in the interpretation of this compound.

- (31) limpiabotas
- a. botas que se limpian con cera
‘boots that are to be cleaned with wax’
 - b. persona que limpia botas para ganarse la vida
‘person who cleans boots for a living’

Summing up, of the two subsets included in Study 1 to determine the interpretation of the morphological head of the compounds, the N+N endocentric compounds were more challenging than the V+N exocentric compounds. In fact, the existence of head-final [N+N]_N as competing patterns in English (e.g., *dog house*), did slightly affect the interpretation in the bilingual group that has always been in contact with English. Also, the V+N pattern was interpreted more accurately across all bilingual types (cf. Table 4.17), lending credence to the fact that differences in productivity between the two languages in contact may affect the extent of transfer from English to Spanish. Thus, the high productivity of the Spanish [V+N]_N compound pattern, coupled with the morphological differences with the productive English equivalent (N+V-er), made the pattern immune to transfer influence.

To conclude, the main results of Study 1 showed that the more exposure the bilingual speakers have had to English, the more they considered the right constituent the head of the compound while interpreting both N+N and V+N patterns. The simultaneous bilinguals were less accurate than the late and early bilinguals and the control group in the morphological interpretation task. Additionally, the interpretation of the V+N was more accurate than the interpretation of the N+N pattern across all groups of participants.

4.6. Discussion: Study 2 semantic transparency

Does semantic transparency/opacity play a role in accurate interpretation of Spanish compound words? Transparency allows semantic interpretation of the compound word based on the meaning of one or both constituents. The main goal of study 2 was to

investigate whether bilingual speakers differ from Spanish-dominant speakers in their literal or figurative interpretation of compounds in Spanish. In transparent words such as *crecepelo* ('hair tonic,' lit. 'grow+hair') or *obra cumbre*, ('masterpiece,' lit. 'work+summit') or opaque words such as *metepatas* ('inopportune,' lit. 'meddle-foot') or *bocacalle* ('entrance,' lit. 'mouth+street') the relationship between head and complement affected speakers' ability to understand both $[V+N]_N$ and $[N+N]_N$ compounds.

4.6.1 Study 2 semantic transparency task stimuli

In a semantically transparent V+N compound, such as *matamoscas* (*fly swatter*, lit. 'kill' + 'flies') (see 32a), the interaction of the two independent morphemes contributes to the meaning of the word: 'an object to kill flies' or *fly swatter*. In contrast, let's look at a semantically opaque compound. The word *metepatas* 'inopportune,' lit. 'meddle+ feet' (see 32b) is an opaque V+N compound because native speakers may recognize the constituents but fail to recognize how they contribute to the meaning. To interpret this compound, the independent meaning of both '*mete*' ('put' or meddle') and '*patas*' ('one's foot' or 'feet') has to be inhibited. To illustrate the semantic transparency and opacity of compounds, let us consider the examples in (32) (cf. Section 2.7).

(32)	compound	literal gloss	meaning
	a. matamoscas	kill+flies	fly swatter
	b. metepatas	put/meddle+feet	inopportune
	c. hombre rana	man+frog	diver
	d. obra cumbre	work+summit	masterpiece

In fully transparent N+N compounds, the meaning of the entire string can be inferred from the parts. For example, in (32c) *hombre rana* is some type of ‘man.’ In contrast, let us look at a semantically opaque N+N compound such as *obra cumbre* in (32d). This compound was vetted as opaque by native speakers, maybe because they recognized the constituents but failed to recognize how they contributed to the meaning of the whole.

4.6.1.1. *puntapié* ‘kick,’ lit. ‘point+foot’

The N+N opaque compound with the lowest mean percentage accuracy by the simultaneous and early bilingual groups was *puntapié* (‘kick,’ lit. ‘point+foot’) with a score of only 41 and 43 percent accuracy respectively.

(33)	puntapié
	a. golpe que se da con la punta del pié ‘blow given with the tip of the foot’
	b. un paso clásico del ballet ‘classic ballet step’

In this example, *puntapié* is not a kind of point but a type of ‘blow’ given with the tip of the foot, as in 33a, which is the target definition. The distractor (33b) that makes reference to a ballet step that is usually performed while ‘on the tip of the toes’ made more sense in a literal interpretation of the constituents in Spanish *punta+pié* (‘point+foot’). It is apparent in this case that the definition (33a) *golpe que se da con la punta del pie* may have motivated the participants with less experience with Spanish to choose ‘classic ballet step’ as the definition. It can be argued that the use of *golpe* ‘blow’ in the definition of *puntapié* was competing with the alternative word *patada* that is also found in the dialect spoken in the community. It may be the case that the definition ‘classic ballet step’ was selected because of the possessive relationship between the constituents that proved to be more ambiguous to interpret.

4.6.1.2. *obra cumbre*, ‘masterpiece,’ lit. ‘work+summit’

The word *obra cumbre* got 64 and 63 percent mean accuracy by the simultaneous and early bilingual groups respectively. It got 77 percent mean accuracy by the late bilinguals and 96 percent by the control group. In this case, the $[N+N]_N$ *obra cumbre*, (‘masterpiece,’ lit. ‘work+summit’) classified as transparent in norming studies, indicates the complexity of factors that influence its interpretation by all bilingual types.

- (34) *obra cumbre*
- a. libro de gran éxito
 ‘book of great success’
- b. pico de la montaña
 ‘mountain peak’

The choices presented included the target figurative meaning (34.a) ‘libro de gran éxito’ (book of great success) and a literal meaning (34.b) ‘pico de la montaña’ (mountain peak). In *obra cumbre*, the first constituent is the head of the compound. In this example, the head may be obvious to Spanish native speakers but not so for early or simultaneous bilinguals. The fact that *obra* has multiple correspondences, such as work, piece, play, or building under construction, makes it difficult to interpret. The non-head modifier *cumbre* also has multiple correspondences, such as summit, height, or peak. The interaction of these two nouns may not point out to ‘book’ in the definition and may very well point to ‘peak’ if respondents are looking at the word as a right-headed compound. Therefore, for this specific N+N compound and based on the definition provided, besides denotation the issue of word order added difficulty to the interpretation.

4.6.1.3. *buscapiés* ‘squib,’ lit. ‘search+feet’

Of all the compounds presented in Study 2, the most ambiguous was the V+N *buscapiés* (‘squib,’ lit. ‘search+feet’), classified as opaque in the norming studies. Unpredictably, since the target definition makes reference to ‘firecracker’ as listed in the Spanish dictionaries (DRAE) and as vetted by native speakers in the norming studies, the mean accuracy percentage accuracy in the interpretation of this word was 74 percent by the control group, and 39 percent by the late bilingual group. The early bilingual group scored 42 percent while the simultaneous bilinguals score 40 percent. The fact that it got the lowest score across all groups even though it was vetted by speakers of the border

Spanish variety and it might be considered a frequent word in the community point to the opacity of the constituents (see 35).

- (35) *buscapiés*
- a. *perro que se usa para olfatear el rastro que dejan las personas en la tierra por donde han pasado*
‘dog used to sniff the trail left by persons on the soil where people have walked’
 - b. *cohete que corre por la tierra al ser encendido*
‘firecracker that moves along the ground once lit’

The options available for this compound were the distractor (35a) ‘a type of dog’ and the target definition (35b) ‘**a type of firecracker**’. The interpretation of the word *buscapiés* proved to be problematic out of context.

4.6.1.4. *crecepelo* ‘hair tonic,’ lit. ‘grow+hair’

The transparent [V+N]_N compound *crecepelo* (36) was easy to interpret because it represents a type of nominal construction that may not be interpreted in a figurative sense.

- (36) *crecepelo*
- a. *producto destinado a hacer crecer el pelo*
‘tonic that makes hair grow’
 - b. *alguien que logra ser famoso*
‘someone who manages to be famous’

When considering the options for *crecepelo* (36), the target literal meaning (36.a) ‘tonic that makes hair grow’ may make more sense because the constituents ‘grow’ and ‘hair’ are transparent. As Moyna (2011:203) states, the properties of the denotation influence interpretation. The issue that is challenging in this V+N compound is the fact that these compounds are used for different semantic functions that may range from literal to metaphoric. For example, in the designation of a man-made product such as *crecepelo*, the meaning is straightforward as it is being used to designate something created for a specific purpose. In (36b) the distractor ‘someone who manages to be famous’ is figurative because the definition is being applied to humans. The rather high mean accuracy percentages for this compound word points to the transparency in the relationship of the constituents. The simultaneous bilingual group scored 85 percent mean accuracy while the early bilinguals scored 83 percent. The late bilingual group scored 90 percent while the control group scored 100 percent mean accuracy.

4.6.1.5. *metepatas* ‘inopportune,’ lit. ‘meddle+foot’

In the options for *metepatas* (37), an opaque compound that incorporates a pre-existing stock metaphor, the literal meaning (37a) *chanclas tipo pata de gallo* ‘flip-flop’ may have confused a few respondents because of the creative interaction of the V+N constituents *meter* ‘meddle’ and *patas* ‘feet’ that in Spanish can be interpreted as “to put one’s foot in it.” The word is used in the target figurative sense of (37b) ‘inopportune person’.

- (37) metepatas
- a. chancas tipo ‘pata de gallo’
‘flip-flops’
 - b. persona inoportuna
‘inopportune person’

When applied to animates, [V+N]_N compounds tend to highlight a part of the denotation that is used metonymically to refer to the whole. In *metepatas*, ‘feet’ is a salient feature of someone meddling in something, and may be similar to the English expression ‘put one’s foot in it’, but that did not hinder the accurate interpretation. The compound *metepatas* was correctly interpreted with the target definition by all groups, with quite high mean percentage accuracy of 69 by the simultaneous, 82 by the early, and 94 by the late bilingual groups. The control group scored 100 percent for this specific word.

Summing up, on the semantic meaning interpretation task in Study 2, the mean accuracies of the [V+N]_N compound patters were also significantly higher than the [N+N]_N pattern. The mean percentage response accuracy of responses on semantic transparency was higher for V+N than for N+N compounds across all bilingual types, for both transparent and opaque compounds. The late bilingual group mean percentage response accuracy was 87 percent for V+N and 97 percent for N+N compounds. The early bilingual group mean percentage response accuracy was 79 for V+N and 74 percent for N+N compounds, while the simultaneous bilinguals mean response accuracy was 75 percent accurate on V+N and 69 percent accurate on N+N nouns. The control

group mean percentage response accuracy was 97 percent for both V+N and N+N compounds.

For the sake of argument, and to show that the interpretation of one compound word may be as deceptive as the next, let us compare two opaque compound words, such as the creative [V+N]_N *picapleitos* ('shyster,' lit. 'peck+lawsuits') that was interpreted better than the opaque [N+N]_N *bocamanga* ('cuff', lit. 'mouth+sleeve'). On one hand, the V-O order of the constituents *pica* 'peck' and *pleitos* 'lawsuit' point to a 'lawyer that is unruly,' making it easier to understand the meaning of these compounds configuration even if they are not frequent and transparent. It is assumed that all participants in the study acquired the V-O order before the critical age of 8 to 10 (Montrul, 2008:24), and this is the most productive pattern in modern Spanish (Moyna, 2011:271). Research discussed in Section 1.5.1 describes the developmental stages that children who speak languages with V-O order go through. Children coin nominal compounds with a V+N configuration even if this pattern is not frequent in the input. The structure of V+N compounds is the most parallel to syntax, is frequent and has no effect on interpretation because it has no counterpart in English where the constituents have to be understood in reverse order (*lawsuits pecker). In the interpretation task, the choices available for the compound *picapleitos* were 'troublemaker' or 'fighting cock.' The semantic issue of this V+N compound is that it is metaphoric and it is jargon usually applied to lawyers. Such an opaque relationship between constituents had to be interpreted because of the linguistic competence, the personal experiences and the

creativity of the respondents. The distractor ‘fighting cock’ meant to provide a literal meaning in the like of ‘cockfight’ being that *pleito* and *pelea*, are synonyms.

The interaction of the two full form nouns on *bocamanga*, on the other hand, pose a considerable problem for interpretation. The concept combination in a lexical item requires semantic as well as pragmatic knowledge to tease apart the relation between constituents. It is assumed that a native speaker will interpret compounds relying on his or her cognitive and background knowledge. For *bocamanga*, the multiple correspondences of the the head of the compound might be obvious to native speakers or more proficient bilinguals if asked to analyze a word that has been lexicalized, and it assumed that less lexicalization means more transparency while more lexicalization means more opacity (Dressler, 2006:40). Libben’s model of transparency (cf. 2.7.1) presupposes a scale where transparency of the head is more important than of the non-head. For a few early and simultaneous bilinguals, having to interpret the word *bocamanga* as any of the two definitions proved challenging.



Figure 4.9. Interpretation of *bocamanga* ‘cuff’, lit. ‘mouth+sleeve’ as ‘sneeze’ by norming studies participants

The distractor *estornudo apoyado en la manga de la camisa* ‘sneeze into the sleeve of your shirt’ (see Figure 4.9) was based on a participant’s drawing in one of the pilot studies sessions (cf. 3.4.2). In the target definition *puño de la camisa* ‘cuff’ the word *puño* is a frequent word. However, the interpretation of the noun *boca* as *puño* – a polysemantic noun with meanings such as cuff or fist – plus the interaction with *manga* ‘sleeve’ proved to be a challenge for the participants who have had less contact with Spanish. The previous analysis enables me to draw the general conclusions that will be discussed in the next section.

4.7 General discussion

There is growing evidence that the linguistic competence of bilingual heritage speakers diverges in some properties from that of monolingual speakers of the same language. Previous studies have explored the resilience versus the vulnerability of different aspects of grammatical knowledge as a function of L2 age of acquisition and L1 attrition. The population in question is that of simultaneous and early bilinguals, since usually the home language, Spanish in this case, often lacks academic support. Under these conditions, the home language (L1) usually makes no headway with respect to the dominant language (L2) resulting in incomplete acquisition or attrition.

Few studies on lexicon have been performed on bilingual heritage language speakers. For example, Polinsky (2005), in a study that looks at lexical recognition and translation, found selective retention and forgetting of words by lexical category by Russian heritage speakers. The results of her study showed that the heritage language speakers were more accurate and faster in recognition of verbs than nouns and

adjectives. Furthermore, Moyna's (2011b) research on N+N compounds interpretation did find differences, though hardly statistically significant, between early and late Spanish-English bilinguals. She reports that head-initial N+N compounds are more basic than N+N concatenative compounds in Spanish. Moyna's findings are in agreement with other studies about heritage speakers that confirm that, as exposure to Spanish decreases, the capacity of these speakers diverges from Spanish-dominant speakers.

The present study that looks at the way in which three different bilingual groups interpret compound words proved head-initial N+N and exocentric V+N compounds to be a resilient language component. The data revealed a positive relationship between the mean percentage response accuracy in interpretation and the age of acquisition of English. A trend in the data was established by the results obtained in both Study 1 and Study 2. The data analysis in both studies shows that when the age of English acquisition decreases the mean percentage accuracy of interpretation increases (cf. sections 5 and 6). On the one hand, Study 1 data shows that the overall mean percentage accuracy on the head-initial interpretation for both N+N and V+N patterns was 76 percent and above across all bilingual groups. Likewise, Study 2 data confirms that the overall mean percentage accuracy on the semantic transparency for both patterns was 69 percent or better across all bilingual groups. The above mentioned tendency indicates that knowledge of compounds, unlike other aspects of grammar, resists quite well under early or simultaneous acquisition.

Comparisons between the Spanish monolingual control group and the late bilinguals did not show statistically significant differences. However, comparing the

control group to the early and simultaneous types of bilingual groups did show reliable statistical differences. Primarily, the performance of the Spanish monolingual control was better than the performance of the late, early and simultaneous bilinguals in the interpretation of both patterns of compounds in both tasks. In addition, the late bilinguals were more accurate than the early and simultaneous bilingual groups, also with statistical differences in the comparisons. The early bilinguals performed better than the simultaneous bilinguals in the interpretation tasks, and the differences were statistically significant. To summarize, the trend in the data links age of acquisition of English to accuracy of interpretation, so that the earlier the first tends to happen, the lower the accuracy in the interpretation of both the head and the semantic meaning of both V+N and N+N compounds.

Montrul (2008) states that age of acquisition is crucial for what properties are vulnerable to incomplete acquisition in childhood bilingualism. Thus study has demonstrated that interpretation of compound words is not seriously negatively affected by bilingualism, be it late, early or simultaneous. The lack of input in Spanish has a moderate effect on the comprehension of complex and less frequent structures, such as compound words. Unquestionably, the mean percentage accuracy scores point to a marginal effect on the interpretation of compounds by late, early, and simultaneous bilingual groups (cf. Tables 4.9 and 4.12). Compared to monolingual competence norms, some of these second-generation Spanish speakers may be cases of *incomplete acquisition* or *L1 attrition*, but this area of the lexicon is quite robust even under those conditions.

It is complicated to distinguish whether each individual heritage speakers' language development is a case of *incomplete acquisition* or *L1 attrition*. On one hand, bilingual speakers may not be able to interpret compound words like educated Spanish monolingual speakers do, and missing *input* may be the source of competence divergence, as proposed by Pires and Rothman (2009). This assumption is in line with Montrul's *Weaker language as L1 Hypothesis* that states that "even if it may lag behind in development due to insufficient exposure to input and use, the weaker language in simultaneous bilingual acquisition is acquired as a first language, through the same cognitive and linguistic means used to acquire the stronger language available in early childhood (2008:126). Regarding the compound words addressed in this research, the respondents' self-reported confidence levels average 80 percent or higher for very competent and somewhat competent ratings for Subsets 1 and 2 that deal with morphological headedness of both V+N and N+N patterns, and for Subset 3 that deals with semantic transparency of the V+N pattern. The ratings dealing with semantic transparency of the N+N pattern included in Subset 4 averaged 70 percent. The high confidence levels reported by all participants are in agreement with the mean percent accuracy scores of the interpretation task.

Montrul goes on to explain that early exposure to the two languages is not enough for full linguistic development, therefore the relationship between knowledge of language and use of language as a function of input was also assessed in this study. Analyses of Variance (ANOVA) were performed to the data collected with the vocabulary test to test the research hypotheses. As has been noted, the trend in the data

obtained in the experiment links age of acquisition of English to accuracy of interpretation, so that the earlier the first tends to happen, the lower the accuracy in the interpretation of both the head and the semantic interpretation of both V+N and N+N compounds. In addition, the V+N patterns were interpreted more accurately than the N+N in both the head and the semantic interpretation as well by all bilingual groups. Equally important, the results show that semantic opacity of the compounds did not severely affect the accurate interpretation of both V+N and N+N patterns. And while this study might not have properly assessed the cognitive factors that are implicated in the target-deviant performance of heritage bilingual speakers, the robustness of compound words has been identified.

This study investigated how heritage bilingual speakers interpret compound words in Spanish. Bilingual participants' age of acquisition and schooling, along with language use were the variable factors that had an effect on the outcome. The vocabulary test designed to elicit an interpretation of N+N and V+N compounds in Spanish included 40 words presented in isolation. Each word was followed by two possible definitions that were designed to assess 1) headedness and 2) semantic transparency. In general, the results of both interpretation tasks converged on one result: there is modest vulnerability to vocabulary development, even with low frequency words in the input, such as compounds.

To conclude, my experiment confirms that late bilinguals' interpretation capacity is similar to the Spanish-dominant control group. Late bilinguals have more native-like knowledge of the Spanish lexicon because they have not had as prolonged

contact with English as early and simultaneous bilinguals. The prolonged contact with Spanish translates into the assumption that the late bilinguals compound interpretation process heavily relies on cognitive and linguistic knowledge. Even if early and simultaneous bilinguals are proficient in their L1 (Spanish) they still may experience the *compound word gap* in their linguistic knowledge because these words are not frequent. However, the university students that participated in the study had fewer problems with the interpretation of the transparent [V+N] compounds than [N+N] compounds in Spanish. It is hypothesized that this is due to the fact that as children they had access to the same V-O compound patterns in English as well, even though they *unlearned* this pattern at some point in development. Considering that the [V+N] pattern is very productive in Spanish, transparent words such as *paracaídas* (stop + falls) are easily interpreted, unlike opaque words such as *metepatas* (meddle+feet). Even though the latter compound is also a [V+N] compound, cognitive devices (metaphor and metonymy) must be activated in the interpretation of the compound meaning ‘inopportune.’

Bilingual speakers are able to interpret transparent N+N compounds in English because they are the largest group of compounds in the language and these words are frequent in the input and acquired at an early stage. These bilingual speakers have experience interpreting English compounds such *blackboard* and *birdbrain*, regardless of whether the meaning of the compound word is derived from the meaning of its constituents. Spanish also has right-headed compounds which are not as productive as they are in English. The [N+N] compounds presented in the vocabulary test were left-

headed and have no equivalent in English. This contrasting head-initial configuration did pose a little challenge for some of the participants' interpretation of compounds. The head position in the [N+N] compound pattern did affect the semantic interpretation even in compounds classified as transparent in norming studies. For example, *papel cebolla* ('tracing paper,' lit. 'paper+onion'), was interpreted with high accuracy averaging over 77 percent by all bilingual groups. An opaque compound, *puntapié* (point+foot) presented a challenge of interpretation to late, early, and simultaneous bilinguals, that scored 70 percent, 43 percent, and 41 percent respectively. The otherwise slight differences in interpretation of both [V+N] and [N+N] compounds among simultaneous, early and late bilinguals point to cross-linguistic transfer. The interpretation of the head, along with the semantic complexity inherent in some the words, was problematic for very few bilinguals.

4.8. Section summary

This section analyzed the data from the sociolinguistic questionnaire and discussed the results of the interpretation task. It addresses the research question of how bilingual speakers interpret compounds. The sociolinguistic questionnaire addresses the main independent variable of the study, which is age of acquisition of English, either as a second language or in bilingual first language acquisition. These bilingual populations were broken down in three groups according to the age of acquisition of English: simultaneous, early, and late bilinguals. The descriptive data obtained in the sociolinguistic questionnaire was also broken down by social variables such as language

history and language use and were taken into consideration to confirm a homogeneous group of participants.

The interpretation task results have been discussed in Study 1, focused on morphological headedness (4.4.1) and Study 2, focused on semantic transparency (4.4.2) of compound words. These analyses have allowed a comparison between the different bilingual groups and the Spanish monolingual control group. As expected, for most words the group with fewer years of contact with English interpreted compound words just as the Spanish monolingual control group. Groups with more contact with English had more trouble identifying the morphological head of the compound. Regarding transparency, the compounds with semantic opacity presented fewer problems to late bilinguals because of their greater acquaintance with the Spanish lexicon. Also in accordance with expectation was the fact that early and simultaneous bilinguals were not as accurate as the late bilinguals in either the morphological analysis task or the semantic interpretation task. Furthermore, all bilingual heritage speakers interpreted $[V+N]_N$ more accurately than $[N+N]_N$ compounds regardless of their degree of English-dominance.

The following section is the conclusion. It also reviews the previous sections and discusses the significance of the study. It presents an evaluation of the study in terms of strengths and weaknesses, and of what could be improved. Finally, it recommends potential research branching from the study.

5. CONCLUSION

Words are but symbols for the relations of things
to one another and to us;
nowhere do they touch upon absolute truth.....
Friedrich Nietzsche

5.1 Section overview

This section draws together the key aspects of the present study on the interpretation of Spanish compound words by heritage language bilinguals (HS). It digests the previous sections, with a focus on the main results on the effects of age of acquisition of the participants in relation to the hypotheses being tested. It then offers an evaluation of the significance of the study, including what it might add to the field of Spanish heritage speakers in the United States, as well as age of acquisition effects in vocabulary knowledge and word-recognition ability in particular. This section also offers a critical appraisal of the study, including what worked well and what could have been done differently, as well as what can be improved. In addition, it provides recommendations for possible areas of research that may be drawn from the study. Lastly, it considers applications of the study results beyond the scope of linguistic profiling of heritage speakers of Spanish, including potential pedagogical uses.

5.2 Summary of previous sections

The purpose of this study was to investigate how HS interpret compound words in Spanish. The aim was to establish whether early and simultaneous bilingualism with

English had an influence in the interpretation. This study also attempted to relate children's acquisition to adult interpretation of compounds. The simultaneous and intermittent use of English and Spanish in Laredo raises questions about cross-linguistic transfer in young adult bilinguals in the area of compounding. It is assumed that due to negative transfer from the L2 onto the L1, some bilinguals' incomplete or attrited grammars may display restructuring of the L1 in this lexicon area. This study was based on the interpretation of two specific nominal patterns of Spanish compounding: [N+N]_N (e.g., *obra cumbre* 'masterpiece,' lit. 'work summit') and [V+N]_N (e.g., *pelagatos* 'poor man,' lit. 'peel+cats').

Section 1 introduced a linguistic characterization of HS and related concepts such as incomplete acquisition and L1 attrition, L1 acquisition, L2 acquisition, critical period in L2 acquisition, and critical period in L1 attrition. It addressed research on HSs' grammatical competence, and dealt with specific factors such as age of acquisition, sequence of acquisition, and other related parameters. Furthermore, it also discussed research on effects of stabilized incomplete acquisition on different properties, and why the present study was focused on compound words. As a final point, Section 1 discussed why this study was set out to compare the performance of three different types of bilinguals to a monolingual control group.

Section 2 offered the definitional properties of compounds including phonological, orthographic, and morphosyntactic features. It also included the characteristics of compounds, such as structure and meaning. Previous studies on acquisition of compound words were also addressed in this section. The interpretation

task of the $[V+N]_N$ and $[N+N]_N$ compound words is based on their morphological structure and their semantic complexity and, therefore, a thorough account of these two areas of interest is presented.

Section 3 describes the methodology used to collect the necessary data among heritage speaker bilinguals for the present study. The recruitment of the participants in Laredo is discussed and sociodemographic information about the participants and the sampling procedures is provided. This section also presents the type of design of the study, the variables specified in my research questions and hypotheses, and the statistical techniques used to quantify the results. Limitations of the research are also discussed.

Section 4 presents the results, discussion, and analysis of the sociolinguistic questionnaire and the interpretation task completed by a total of 272 respondents categorized into specific bilingual type groups: late, early and simultaneous Spanish-English bilinguals, plus the Spanish dominant native speakers in the control group. The analysis of the data from the sociolinguistic questionnaire corroborates a homogeneous Mexican-American population in Laredo. Section 4 also summed up the data of the interpretation tasks and provided answers to questions that were formulated to determine if the outcomes support the hypotheses. The results of the interpretation task are presented as Study 1 and Study 2. The aim of Study 1 was to assess the bilinguals' performance with the recognition of the head while the aim of Study 2 was to determine bilinguals performance with semantic transparency of the $[V+N]_N$ and $[N+N]_N$ compound words. The empirical evidence showing that the amount of exposure bilingual speakers have to English determines whether or not they interpret compounds

in Spanish as they do compounds in English was reviewed in this section. This fact is the most salient finding: more exposure to English (in early and simultaneous bilinguals) led to less accuracy in interpreting the morphological structure and the meaning of both $[V+N]_N$ and $[N+N]_N$ compound words. Also noteworthy in the results, is the fact that overall, the mean response accuracy for $[V+N]_N$ compounds was higher than the $[N+N]_N$ pattern in both tasks. Both participants and items were incorporated as random factors, and therefore the result obtained can be generalized to both the population of subjects and the population of items simultaneously.

5.3 Evaluation of the study

The information discussed in the previous section examines how the study data support the three main hypotheses regarding compound interpretation by the different bilingual groups. The study data will be discussed in this section, as I am set to answer the questions that were hypothesized.

The current study's first hypothesis addresses the matter of years of contact the speakers have had with English, and whether bilingual speakers would interpret compounds in Spanish as they do compounds in English, since language dominance, as stated by Nicoladis (1999, 2002a) could explain crosslinguistic transfer in the form of compound reversals. The results of the present study in this regard indicate that nominal compounding is an area of linguistic knowledge not as vulnerable to incomplete acquisition or attrition as others considered before. Studies of language loss in a bilingual context have shown that attrition can significantly affect morpho-syntactic and semantic-pragmatic information such as tense, aspect and mood (Montrul, 2002, 2007;

Polinsky, 1997; Silva-Corvalán, 1994/2000), gender agreement in nouns (Montrul, Foote, & Perpiñan, 2008; Polinsky, 2006, 2008), inflected infinitives (Rothman, 2007) and the null-subject pronouns (Montrul, 2004a; Polinsky, 1997) among others (cf. Section 2.5). Montrul claims that the critical period for acquisition and loss applies to the grammar (computational system), but not to the lexicon. This study confirms that, when it comes to interpretation, Spanish compound words are a robust component in bilingual heritage language speakers. This study on young adults also confirms Montrul's (2008) claims regarding younger bilingual children being more vulnerable to language loss than older bilingual children and the simultaneous bilingual children's tendency to show more attrition or incomplete acquisition than sequential bilingual children exposed to their L1 predominantly until they start school. However, the proficiency of these young adult bilinguals in the area of lexicon of their L1, specifically compounds words, does not drastically diverge from age-matched and educationally-matched native speakers.

Study 1 looked at the interpretation of the morphological head. The interpretation task presented isolated compound words along with two possible options as definitions for each one. Participants had to decide whether the definition that denoted the left constituent or the right constituent of the compound was the correct one. The outcome was as hypothesized since overall, there was transfer from the competing English compounding. The head-final $[N+N]_N$ interpretation tends to appear more often in the responses of bilinguals who have had more years of contact with English. In examining the $[V+N]_N$ compounds, the results also show that bilinguals with more years of contact with English also interpreted the second constituent as the head more frequently. The

results revealed that the earlier contact with English did bring a slight increase in the reversal of $[V+N]_N$ and $[N+N]_N$ compounds. When comparing the overall mean percentage accuracy by subjects for both patterns of compounding, there was not a statistically significant difference in means of percent accuracy between the control group and the late bilinguals. In general, the late bilinguals' interpretation of the head-initial $V+N$ compounds resembled the control group, with both groups scoring at approximately 100 percent accuracy. For the $N+N$ compounds, the control group and late bilinguals mean response accuracy was also rather high, above 90 percent for both groups. When comparing the control group and the late bilinguals, no statistically significant difference was found either. There was, however, a statistically significant difference between the control group and the simultaneous bilinguals. When comparing the mean percentage responses for $V+N$ compound interpretation between late and early bilinguals, the difference in means of percent accuracy is not significant, while the difference between early and simultaneous bilinguals is slightly significant. Similarly, when comparing the mean percent accuracy for the $N+N$ compound interpretation, there is a statistically significant difference between the control group and the early and simultaneous bilinguals. There is also a significant difference between the early and the simultaneous bilingual groups. Overall, simultaneous bilinguals, the group that has always been in contact with English in a bilingual acquisition environment, had the lowest scores in the interpretation of both $V+N$ and $N+N$ included in Study 1. However, it must be noted that 84 percent accuracy on the interpretation of head-initial $V+N$

compounds and 76 percent accuracy on the interpretation of N+N compound by the simultaneous bilingual group is a rather high score.

The second hypothesis proposes a difference in the interpretation between [V+N]_N and [N+N]_N compounds. As predicted, degree of English dominance had a smaller effect on the interpretation of Spanish [V+N]_N than of [N+N]_N compounds. It is noteworthy that the results obtained show a higher mean accuracy for [V+N]_N compounds in both head-initial and meaning interpretation tasks across all bilingual types. The fact that the [V+N]_N pattern has no counterpart where the constituents could be interpreted in reverse order (i.e. *ice-break, where the English standard is *ice-breaker*) while the head-initial [N+N]_N does have a competing pattern in English, might explain the difference in interpretation between both patterns. These results may support the explanation of child acquisition tendencies that universally favors the [V+N]_N pattern (Clark *et al.*, 1986) as it is one of the stages that emerges when children learn to create correctly ordered compounds (Nicoladis, 2006; Clark *et al.*, 1986) (cf. 2.9.1). Even if this argument is challenged with studies that show that not all children follow the same stages of development (Becker, 1994) and that the rate of production of the verb phrase stage is dependent on frequency in the input (Nicoladis, 2003), the higher mean accuracy scores in the interpretation of V+N compounds compared to the N+N compounds included in the present study do support the second hypothesis postulated in this study. It can be argued on quantitative grounds that the greater ease of V+N interpretation is due the frequency in the input, as Moyna's findings show that it is considerably the most productive pattern in modern Spanish (2011:271).

The lexical structure of the V+N compounds is the most parallel to syntax. In a VO language like English, the verb typically comes before the object. The HS that participated in this study acquired the VO order in Spanish rather early and because V+N pattern is very frequent, it is assumed that they were exposed to these Spanish compound nouns regardless of their degree of English dominance. The overall mean percentage response accuracy in the interpretation of the ten different V+N compounds was rather high across all bilingual groups. The most remarkable population in this study is that of the simultaneous bilinguals that manage to employ both patterns of compounding in either language, given that these speakers have acquired both Spanish and English as two L1s, but only English has been supported by the educational system. Mean accuracy scores for these participants on the interpretation of all compounds are above 73 percent (cf. 4.4).

A third hypothesis deals with semantic transparency and the role it may play in accurate interpretation of Spanish compounds by these young adult bilinguals. Semantic transparency, (i.e. *espantapájaros*, ‘scarecrow,’ lit. ‘scare’ + ‘birds’) or opacity (i.e. *ahorcaperros*, a type of sliding knot, lit. ‘choke’ + ‘dogs’) has been pointed out as an important variable in the processing of compound words (Libben, 1998). The results of Study 2 show that the mean accuracy rates of transparent (T) [V+N]_N and [N+N]_N compounds is higher than the rates of the opaque (O) compounds in the interpretation by all bilingual types. Moreover, it was found that the bilingual speakers’ interpretation of the meaning of both transparent and opaque [V+N]_N and [N+N]_N compounds in Spanish decreases in accuracy as a function of years of contact with English. This outcome gives

support to the hypotheses of the study on the topic of semantic transparency.

Nevertheless, when comparing the mean accuracy percentages between $[V+N]_N$ and $[N+N]_N$ compounds, it falls short of being statistically significant overall.

Concerning the semantic interpretation of N+N compounds, it is not clear whether the transparency of the morphological head helped with the target interpretation. In the vocabulary test, respondents had to choose between two options for each word. The first option meant to be a distractor but it can also be a figurative interpretation of each compound. The mean response accuracy by bilingual population clearly shows a positive relationship between accuracy and late bilingualism, since participants with more contact with English chose the distractor more frequently than the target meaning. However, the overall mean percentage response accuracy in the interpretation of the semantic transparency of all ten N+N compounds by all bilingual groups is rather high, averaging above 72 percent. The percent accuracy of the simultaneous bilingual group was the lowest overall, with scores ranging above 60 percent on eight out of the ten $[N+N]_N$ compounds included in the subset (cf. 4.5). The potential interpretation of each compound word had to rely on experience with the Spanish lexicon, as both options provided range from literal to metaphoric and because all compounds were presented out of context and that leads to the issue of compounds being available (i.e. still stored) but not accessible (i.e. not retrievable) from memory (cf. 5.7.1).

5.3.1 Cognitive process of interpretation in a situation of language contact

The current study deals with interpretation of compound words in Spanish heritage speakers who are late, early and simultaneous acquirers of English; nevertheless, some

of the results can be extrapolated to similar situations of language contact. To my knowledge, this is the first study to investigate whether the linguistic experience of these bilingual speakers affects the interpretation of two different patterns of nominal compounds. Additionally, the performance of the bilingual groups was compared to a Spanish dominant control group residing on the Mexican side of the border. Even though for some Spanish compounds the morphological headedness and semantic interpretation was not always obvious, the results of the experiment confirm rather high mean percentage accuracy by all bilingual groups, pointing to compounds as a robust area of linguistic knowledge in all bilingual heritage speakers.

This study will serve to compare future findings from other studies on the interpretation of compound words, as it illustrates that bilinguals may share linguistic information between languages at the morphological and syntactic level. Slight differences in the interpretation of compound words by different bilingual types have been documented. For example, in a recent study that compares the interpretation of noun-noun Spanish compounds, Moyna (2010) found differences, though not statistically significant, between the accurate responses of early and late bilinguals. The results of her study show that as exposure to Spanish decreases, the interpretation of compounds by Spanish early bilinguals diverges from the interpretation by Spanish-dominant speakers. It must be noted, particularly, that compounds presented devoid of any context must be analyzed with a flexible cognitive process, (i.e. conceptual metaphor and metonymy combination), either retrieving or constructing meaning. The context-free presentation “makes sense to first identify how the meanings of the

constituents (i.e., prior knowledge) affect interpretation of the compound” (Wisniewski, 1996:450). Conceptual combination, according to Wisniewski, involves accessing two or more concepts and determining how they fit together to form a new concept. Cognitive differences have been documented between bilinguals and monolinguals with a bilingual advantage in cognitive flexibility. Along with this flexibility, the experience with choosing languages allows bilinguals to create less strong connections between words and referents (Nicoladis, 2006). The flexible cognitive process developed in a situation of language contact, that is, a “more imaginative word formation process,” might be responsible for the creative interpretation of noun-noun combinations (Benczes, 2005:263).

On the grounds that the acquisition of a second language may influence the development of some other variable that then influences creativity, it could be assumed that bilingualism enhances creativity by increasing relevant cognitive capacities (i.e. general intelligence and intellectual development) (Simonton, 2008).

5.3.2. Cross-linguistic interpretation of compounds

As previously stated, the current study deals with interpretation of compound words by three different types of Spanish-English bilinguals; yet some of the results can also contribute to the fields of the bilingual lexicon and compound variation. The V+N configuration is more frequent in Spanish than it is in English, but the acquisition stages of compounds are similar, starting at a comparable age. Moreover, the fact that both languages feature VO order makes it possible for these speakers to interpret the V+N pattern in Spanish at high accuracy rates. It can be argued that deverbal compounds in

English with the structure O-V-er/-ing (see examples 38a-f) are very productive and frequent in English (Clark , 1993) but an equivalent is not competing in Spanish as a translation may produce either a bare (38a-b) , a derived (38c- d) or a [V+N]_N compound nominal (38e). Examples 40.a-e illustrate what has been stated as an issue in the acquisition of compounds, that is, that there are no cross-linguistic universals for what can be described by these structures.

(38)	Pattern O-V-er / -ing	Spanish gloss
	a. chewing gum	<i>chicle</i>
	b. playing cards	<i>naipes</i>
	c. baby sitter	<i>niñera</i>
	d. washing machine	<i>lavadora</i>
	e. letter-opener	<i>abrecartas</i>

Regarding N+N nouns, Nicoladis (1999, 2002) claims that frequency differences between languages account for the differences in acquisition in English (produced at around age 2) and French N+N compounds (produced at around age 3) since “there is little difference between the complexities of the construction in the two languages”. In one of her studies, Nicoladis (2002) found that while French-English bilingual children show signs of crosslinguistic transfer in the production of N+N compounds, there is very little impact on their comprehension when they acquire both left- and right-headed compounds. The present study found minor constituent reversals in the interpretation of

Spanish N+N compounds. The results indicate modest impact on the comprehension of left-headed Spanish N+N compounds by these young adult bilinguals, even though this pattern is more frequent in English. Most of the research on compounds looks at children's ability to create object-verb-er compounds and N+N compounds (cf. 2.9) in English. By comparing the results of the present study, it is possible to determine that the differences identified in the early stages of bilingual acquisition, to some degree, do not continue into adulthood.

The accuracy rates in the present study were higher for the interpretation of V+N compounds than for N+N compounds in both analyses for subjects and items, and even though these differences barely reach statistical significance for both headedness and semantic transparency, these results point to an important fact in a contact situation. The N+N head-final compounds are frequent in English but not in Spanish, and V+N are frequent in Spanish but not in English. The rather high accuracy percentage rates in the vocabulary test indicate on one hand, that the frequency of N+N head-final English compounds in the input does not affect the interpretation of head-initial Spanish N+N. Let us keep in mind the fact that head-final N+N Spanish compounds are also frequent in Spanish due to the borrowing of technical, semi-technical, and commercial terminology from languages such as English, for example, the head-final *tour operador* 'tour operator,' and *sueroterapia* 'serum therapy' that are now used in colloquial registers (Moyna, 2011:174). These head-final N+N compounds are available in the input, along with head-initial N+N. On the other hand, even for the groups with more contact with English where few compounds of the V+N pattern are found, the accuracy rates of

interpretation of the Spanish V+N pattern were rather high. The early acquisition of the V+N stage might account for these results. It is important to also consider the experience that bilingual speakers have of placing Spanish adjectives before or after nouns with a different reading in each case as a result - e.g., *pobre mujer* (unfortunate) vs. *mujer pobre* (indigent).

The vocabulary test for this study is designed for interpretation of compounds, so similarly, if exposure to a language may change the frequency with which they are produced, exposure to the frequent but reversed N+N compounds in English may have helped with the interpretation of the same pattern in Spanish, as the high mean accuracy rates obtained in the experiment demonstrate. These results are explained by the notion of shared representations of compounds in English and Spanish as explained by Levy et al. (2006:130). Bilinguals whose L1 has right-headed compounds and whose L2 has left-headed compounds are expected to make errors of constituent misordering. They might have transfer errors while interpreting or producing compounds, but as speakers become more proficient in L2, or L1 in the case of HLS, such transfers errors are less likely to occur. Cognitive knowledge of concepts likely bring into play more influence on compound meaning than form. In like manner, the frequent V+N compound in Spanish helped with the interpretation of a form that was ultimately unlearned in English, as the mean accuracy rated in the experiment are also higher for the interpretation of this pattern.

In Libben's approach (1998), it is assumed that the lexical representations of semantically transparent compounds are linked to their constituents and that they are

represented in the lexicon in terms of their constituents as well as in terms of the whole word (cf. 2.7.1). It must be noted that these premises focus on compounds that have representation in the lexicon and do not address how conceptual representations for novel compounds are formed. Some of the Spanish compound words that were classified as opaque in the norming studies may be novel to the bilingual participants and as a result the interpretation was literal (cf. 4.6). The possibility of an alternative interpretation, not the target and attested by the norming studies, must be explained with models of combined concepts (Gagné and Spalding, 2006), designed for English, but that may be applied to Spanish. The interpretation of compound constituents by heritage speaker bilinguals might depict a specific relation, such as *puntapié* ‘kick,’ lit. ‘point+foot’ that has to be retrieved, rather than constructed. In the interpretation of [V+N]_N compounds, given by their syntactic configuration, it may be more plausible to integrate the conceptual representation by constructing, rather than retrieving.

Compound words in the language system, for instance *snowball*, are connected to combined concepts in the conceptual system, *snow* and *ball* in this case. The main assumption in the area of conceptual combination is that once the constituents of a compound are understood, a new concept is thus created (Gagné and Spalding, 2006). The task of conceptual combinations has to be taken into account when discussing the ability of bilinguals to function independently in one language or both languages simultaneously while interpreting Spanish compound words. The relationship between the constituents in the Spanish noun + noun compounds included in the study presented, to some extent, more of a challenge in the interpretation than the relationship between

verb+noun compounds. The results of the present study favor the interpretation of the V+N over N+N compounds, suggesting that the canonical VO structure is easier to map in the speakers' mind. It is possible that in N+N compounds the position of the head and the variety of roles represented by the constituents add to the uncertainty of semantic meaning based on the definitions provided on the interpretation task.

Depending on task demands, these speakers who are dominant in the language acquired later (English in this case), are expected to inadequately develop in morphosyntactic strategies and lexical norms, an outcome that Montrul (2008) characterizes as the *Weaker Language as L1 Hypothesis*. The notion of a critical period in L1 attrition, that Montrul claims applies to grammar (computational system) but not to the lexicon may explain the results of the present study. A small number of bilingual speakers that participated in this study were not be able to interpret compound words like educated Spanish monolingual speakers do, and missing *input* may be the source of competence divergence, as proposed by Pires and Rothman (2009) (cf. 1.6). The fact that the young adults that participated in the study are educated and proficient in Spanish, just as the Spanish dominant speakers that participated in this study as control group, goes in line with the missing input competence divergence proposal, as the HLS had sufficient exposure to a standard border dialect that is always in contact with the Mexican monolingual variety.

To summarize, how heritage bilinguals organize their two languages may marginally affect lexical interpretation of Spanish compound words. As a result of this study, I have found evidence to support my hypotheses. Not only years of contact with

English affect the way in which these words are interpreted, but the fact that compounds are much less common in the Spanish input comes into play. Also, the conceptual combinations depend on factors such as language dominance and language use as well as the distinct usage of each word . This study empirically tests Montrul's (2008) Weaker Language as L2 Hypothesis in the specific case of compound interpretation. These simultaneous bilinguals were able to retain the signatures of the first language beyond the stage of early syntactic development during the school years and into adulthood. The results show how the longer contact with English affects the way they interpret the compound words, but we may also be talking about a different kind of 'world knowledge' required to meet the naming demands of a speech community. For example, *hombre rana* ('frog man, lit. man frog') was interpreted as 'prince' by some students, and this based on *short stories* where the frog turned into a prince when kissed by the princess. In the interpretation process, HS may know the lexical meaning of the constituents but their previous knowledge and experience might motivate the possible relations between them with a different reading.

Theories of childhood bilingualism propose that children learning two languages simultaneously during infancy go through developmental stages where they are able to differentiate either language and build a different lexicon and grammar for each language. The Separate System Hypothesis of bilingual development (cf. 2.2.3) may explain how bilingual children, while growing up, do build a distinct lexicon for each language. The question that remains on the issue of L1 development in bilingual speakers is that of the critical period of attrition as an L2 becomes dominant.

5. 4. Strengths and limitations of this study

There are several strong points to this study. First of all, the sociolinguistic questionnaire was appropriate to allow the classification of participants by bilingual type that included late, early, and simultaneous bilinguals according to age of acquisition. Second, the recruitment allowed for a large homogenous sample of young adults, all Mexican-American bilingual speakers, from which I drew the participants for this study. The sample has a mean age of under 30 and represents the different types of bilinguals that may be found on any city or town along the U.S.-Mexico border. Altogether, the study includes a robust sample size of 245 bilingual respondents, which were classified according to age of English acquisition, language histories and current proficiency. In addition, a strong point of the study is the incorporation of a control group of individuals living in Mexico. This approach allows for a clear comparison with fully competent adult native speakers of Mexican Spanish (mean age 51) that are not found in a situation of language contact, such as Laredo, Texas. No statistical differences were found between the performance of the control group and the late bilingual group in the interpretation of any compound word included in both Study 1 and Study 2.

A key feature of the study is the vocabulary test design accessible in *Survey-Monkey* proved to be a safe and reliable instrument that made it possible for individuals on either side of the U.S.-Mexico border to participate. Some studies (Polinsky 1997, 2006) have used monolingual speakers who speak the full variety as comparison groups while other researchers (Silva-Corvalán 1994) have used first generation immigrants. In this study, the late bilinguals' performance in the interpretation of compounds resembled

the control group, validating the view that degree of incomplete acquisition or attrition in first generation immigrants may not be as severe as in second and third generation immigrants (Montrul, 2008). The majority of previous studies have examined compound processing in monolingual populations. Other studies that have considered bilingual reading, production and comprehension of compound words and the linguistic competence of adult early bilinguals have used considerably smaller samples (cf. 1.7).

A limiting factor may be the small number of items that served as core stimuli for each of the variables tested. Based on pilot tests results and comments, I made a decision to include two sets of 40 compound words to serve as core stimuli in the study of $[V+N]_N$ and $[N+N]_N$ morphological headedness and semantic transparency (cf. 3.3.2). Set 1 included 20 words (10 for each pattern) and Set 2 included 20 compounds (five transparent and five opaque for each pattern). The relatively small number of items included on the tasks made it convenient for participants, but might not represent a good sample of the compound words, and that in turn affected the significance of the analyses by items (F_2). Nevertheless, the results for each individual word were treated qualitatively. All the same, an important point of the present study is the addition of semantically opaque compound words as stimuli, as previous research has for the most part focused on compounds with transparent meaning.

Additionally, the task was not sensitive enough to ascertain the participant's intuitions or possibility that they knew something about the compound word. In this study, in order to measure confidence levels before taking the interpretation task, respondents were offered a choice of three pre-coded responses: very competent,

somewhat competent, and not at all competent. After respondents were done with the interpretation task, they were asked to indicate how difficult it was to interpret each word. They were offered a choice of four pre-coded responses: very easy, easy, hard, and very hard (cf. 4.3.2). Future analyses should look at the interpretation task but using five or seven point rating scales (i.e., Likert) so that respondents' level of confidence and competence can be more precisely assessed. These levels would confirm whether respondents were already acquainted with the words or simply guessed.

5.5. Recommendations for further study

There are several points which have become apparent in the course of this research, and which could be considered for much further investigation. Future research should be performed in a laboratory setting with the use of a more sensitive task in measuring performance. For example, the technique of priming – the implicit memory effect in which exposure to a stimulus influences response to a later stimulus – can be used to test if its effects can influence subjects' choices on a lexical decision task. Another possibility would be to use context to help in the comprehension of the compound word. For example, the subjects can be presented with the following sentence:

“Yo siempre quise ser un buen nadador y ahora que finalmente soy un hombre rana estoy maravillado”

Immediately after reading RANA, the participants will see BUZO vs SAPO, *buzo* being a synonym of *hombre rana* (non-literal meaning) and *sapo* 'toad' being an alternative word for *rana* 'frog' (semantically related). Subjects will then be asked to make a lexical decision. The goal would be to see if more priming for *buzo* facilitates word encoding

because the sentence is not about *rana* or *sapo*. Also, the number of words for each pattern included could be increased to test for each pattern in separate experiments. Since Spanish features both right-headed and left-headed N+N compounds, the possibility that the degrees of transparency interact with a morpheme's position in this pattern can also be explored in the future.

The present research employs Spanish compound words as stimuli. The translation equivalents of these words should be considered in future cross-language priming experiments. For example, the prime would be presented in one language and the target in the other language. These translation equivalents should be tested in studies of the lexicon of bilingual speakers at the lemma level, that is, the level at which morphological information is assumed to be accessed (Levy et al., 2006). For example, if speakers are able to understand *mete*, the first constituent of the compound *metepatas* ('meddler,' lit. 'put+feet') at the lexeme level and recognize it is a form of *meter* (to put in), it would be interesting to compare the interpretation of the first constituent of the compound *aguafiestas* ('party pooper,' lit. ruin+parties) to see if it is recognized as a form of *aguar* (to spoil). If *agua* in *aguafiestas* is recognized as the verb *aguar* it is because of familiarity with the Spanish lexicon. If it is associated with the noun *agua* then is there influence from English 'water party = splash party'? In addition, a translation task may be used to examine whether the constituent *agua* in *aguafiestas* is translated as a noun or as a verb.

The results of this study can also point to other strands of research that can contribute to the analysis of cognitive aspects of Spanish compound words

interpretation, if for example, we analyze an attested N+N compound like *sombrero hongo* ('bowler hat, 'lit. 'hat+mushroom') where *sombrero* is the head, and compare it to a distractor like *hongo sombrero* (*a type of mushroom) that may also be a possibility and only differs by the order of elements. Another example would be the [V+N]_N compound *abrecartas* ('letter opener,' lit. open+letters) where the target definition would be the instrument to open letters, as the compound was created precisely to designate such an object. As a distractor, *abrecartas* could be applied to a human to highlight a behavioral characteristic in mocking terms (a person who opens someone else's mail). Such an experiment would be appropriate to focus on a novel and alternate interpretation of [N+N]_N and [V+N]_N compounds by different bilingual types.

The data analyzed in this study were based on interpretation of compound words with cues provided in written form. Bilingual heritage speakers typically have stronger oral and aural skills than reading and writing skills. Consequently, further study with different tasks using aural/oral experiments is necessary to corroborate results found in the reading task used in this experiment. With an experiment focused on aural skills, heritage bilinguals speakers' percent accuracy of interpretation of compound words would probably be significantly higher than the percent accuracy of the reading task presented in this study. The patterns of stress and intonation in Spanish would likely help with interpretation because these speakers typically have more experience with aural skills because they were exposed to the language aurally at home (Moyna, 2011).

The findings of the present study suggest that in a situation of contact of Spanish with a language like English, which contain compounds with different

headedness properties, transfer might occur and the order of compounds in English might be reflected in Spanish, as the latter becomes the weaker language. How bilinguals store their language information is then an area that could continue to be explored with compound words. In addition, the L1 abilities of bilinguals according to their age of acquisition of an L2, interfacing aspects of grammar of the weaker language that require the integration of syntactic knowledge with pragmatic, lexical or even prosodic information should be pursued as well as language mixing. Using some of the drawings designed by participants in the norming studies for this research, in future studies it would be possible to explore the production of compounds. Along the lines of Nicoladis' (2003) study of accelerated development, where children were shown pictures, for example, of a machine catching butterflies, and asked to name the object; or the work of Licerias and Díaz (2001) to elicit command of attested and non-attested Spanish N+N compounding (see figure 5.1). The recommended Picture Task experiment design would be different than the elicited production tasks used in the norming studies and the questionnaire in the present research, as both involved reading.



Figure 5.1. © *Mujer pulpo* ‘Octopus woman’
Source: Licerias and Díaz (2001)

To interpret compound words in future studies, the multiple correspondences of words must be taken into account. Finkbeiner, M., Forster, K., Nicol, J., and Nakamura, K. (2004) propose that semantic features at the conceptual level become *semantic senses*, that is, “bundles of features corresponding to distinct usages” (8). This concept however, is based on single words, and based on the number of meanings or ways in which a word can be used. Some words are polysemous in one language, and some may have multiple meaning in both languages. It is possible that the more semantic senses are shared between words across languages the more identical the concepts are. For example, the Spanish [V+N]_N compound *guardameta* ‘goalkeeper,’ lit. ‘keep-goal’ should be relatively easy to interpret because of its associated predication and because the semantic relation of the two constituents of this compounds is transparent (according to norming studies); however, out of context it was not easy to analyze. The verb

guarda(r) is polysemous, with meanings ranging from *keep, put away, save, guard*; while the noun *meta* (goal) is also be a case of multiple correspondences, such as objective, aim, intention, end, or purpose and therefore, this particular compound word was hard to interpret.

5.6. Outreach and extension focus of this study

Compound words in Spanish provide an opportunity for students to experience multiple meanings and multiple words at the same time. Children may or may not recognize the compound *candlestick* as they hear or read the most common version of the rhyme “Jack be nimble, Jack be quick, Jack jump over the candlestick”. It is unlikely they know that they are using a word that can be decomposed into the constituents *candle* and *stick* (Clark and Berman, 1984). Similarly, children may or may not recognize the compound *telaraña* (spider web, lit. web+spider).

As an extension of my study, I am presently designing a game of *lotería* (i.e., Mexican Bingo) as a pedagogical tool to teach Spanish compounds. It is a game of chance using images of compound words on a deck of cards. The deck is composed of a set of 64 images of different patterns of compound words. Every image has a name so students can read while playing. Each student will get a board with a 4 x 4 grid of images. As students play this game, they will be aware of the constituents of a compound word, affording them the possibility to consider the meaning of the word and the meaning of each of its constituents. To start the learning game, the caller would draw a card, call the target word or may even use it in a sentence. The players’ task would be to recognize the compound word from the pictures on the board game, mark it off with a

marker, just as in the game of bingo (see Figure 5.2). Students will become familiar with these complex words as they play the picture bingo and practice reading and listening skills, learn vocabulary and pronunciation.

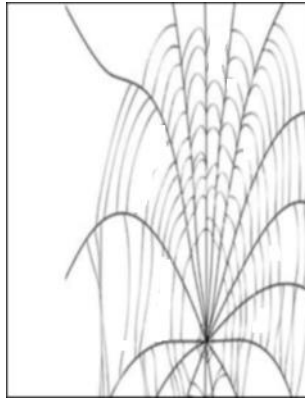


Figure 5.2. Bingo calling card:
La telaraña (spider web, lit. web+spider)

Depending on the grade level, the students will learn Spanish vocabulary, reading, phonics and spelling, word formation, semantic, as well as context issues. The task of translation can also be incorporated while playing this game.

5.7. Section summary

This final section draws together the key elements of previous sections that lead to an evaluation of the present work. It briefly summarizes the previous sections, with a focus on different types of bilinguals, on the results of age of acquisition effects on the interpretation of compounds, and on the comparison of their performance to a Spanish dominant control group. Bilingual participants in the present study include late

bilinguals (acquiring their L2 after 12 years of age), early bilinguals (acquiring their L2 between the ages of 3-11 years), and simultaneous bilinguals (acquiring both languages before the age of three years).

The goal of this study was to assess any potential language loss or incomplete acquisition of the weaker language in the college-age young adult heritage speakers with respect to a Spanish-dominant population found on the Mexican side of the border. According to research, this second generation bilingual speakers with different levels of proficiency in their L1 are often the ones with limited vocabulary, are limited to basic word order and make morphosyntactic errors with case, gender agreement, and other morphology (Montrul, 2011). This work presents evidence of key aspects that suggest that there are differences in the interpretation of Spanish compound words by the different types of bilinguals, but that these differences have little repercussions on the adult lexicon of the young adult participants. The data for this study was based on interpretation of compound words, and all prompts provided were written. Even though it is well known that bilinguals often lack strong written skills, the self-rating assessment of the bilinguals that participated in the study point to strong reading skills in both languages. The main prediction was that if English is the dominant language, these bilinguals would interpret the compounds words as they do in English and less accurately with respect to Spanish dominant speakers not found in a contact situation such as Laredo, Texas. The data shows that for a few compound words *headedness* and *semantic interpretation* was not obvious, but overall, compounds are a robust area of the lexicon in these heritage speaker bilinguals. This section also offered a critical review of

the study, as well as recommendations for different areas of research that may be drawn from the study results. Investigating the ways in which heritage speaker bilinguals perform at a cognitive level may lead to practical pedagogical applications. Applications beyond the scope of linguistic profiling of heritage speakers of Spanish may help in the effort to re-expose and instruct this diverse population.

This study aimed to contribute to elucidate the enigma of Spanish heritage language speakers' competence. It presents evidence that simultaneous acquisition of Spanish and English and age of acquisition of English as a second language influences the interpretation process of compound words with different configurations in each language. The lexicon, being a slate of words stored in the speakers' mind, emerges as a challenge in the form of compound words. Based on my theoretical considerations and an analysis of the data, I propose that the interplay of several factors addressed in this study, such as age of acquisition of languages, language use, and proficiency may condition the interpretation of compound words, but in general do not greatly affect this robust area of the lexicon. Given similar language proficiency, the interpretation of compound headedness and meaning by late bilinguals appears to be on a par with that of the Spanish dominant control group. The early bilinguals performed better than the simultaneous bilinguals, as results point to the latter group as the more affected by the contact with English regarding compound interpretation. The intriguing questions raised in this study, regarding the interpretation process in the written modality, invite different perspectives of research. I hope that this work will instigate further research as much more work remains to be done.

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APPENDIX 1
Online Questionnaire

CONSENT FORM

You agree to participate in a study on bilingual speakers. This survey will only take about 10 – 15 minutes of your time.

Your answers will be kept confidential. Your name will only be used to assign course credit. No names will be used in any written reports or analyses. No negative consequences are anticipated should you decline to complete this survey. You may later be asked to voluntarily participate in a follow up survey.

For further questions about this study, please contact Ms. Patricia González at (956)326-2470, pgonzalez@tamiu.edu, Dr. M. Irene Moyna at moyna@tamu.edu, Dr. Roberto Heredia at rheredia@tamiu.edu, or Dr. David Beck, the Institutional Review board Chairperson, at dbeck@tamiu.edu.

I have read and understand the explanation provided to me.

By entering my name electronically, I voluntarily agree to participate in this study.

Student's name
University Course
Professor's name

Please complete this questionnaire on bilingual speakers. I am going to ask you questions about your bilingual capability. Please answer each question. However, if you wish to skip a question you may do so. I appreciate your help.

1. Indicate your major/department.

--

2. What is your gender?

- Male
- Female

3. What is your race or ethnicity? Check all that apply.

- African- American or Black
- Hispanic or Latino/Latina
- American-Indian, Native-American Asian, Pacific Islander
- White

4. Where were you born?

5. If you were born outside the U.S., how old were you when you arrived in this country?

6. How old were you when you started speaking ENGLISH?

Select age.

- 0-1 yr old
- 2-3
- 3-4
- 5-6
- 7-8
- 8-9
- 10-11
- 12-13
- 14-15
- 16-17
- 18-19
- 20 or older

7. How old were you when you started speaking SPANISH?

Select age.

- 0-1 yr old
- 2-3
- 3-4
- 5-6
- 7-8
- 8-9

- 10-11
- 12-13
- 14-15
- 16-17
- 18-19
- 20 or older

8. How old are you now?

9. Where was your mother (stepmother) born?

- United States Mexico Other country

10. Where was your father (stepfather) born?

- United States Mexico Other country

11. In the home where you reside, indicate whether you or other family members speak in the following way.

	English	Spanish	English or Spanish are spoken at different times	Both English or Spanish are intermixed while talking	Other
Yourself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mother (stepmother)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Father (stepfather)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Siblings (brothers, sisters)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other family members living in the house	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. Where have you lived? Select nation (nations) according to age. Check all that apply.

	United States	Mexico	Other Spanish speaking country	Other country
0-1 yr old	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8-9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12-13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14-15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16-17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18-19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 or older	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. Some people cross the U.S.-Mexico border regularly. Are you a “border crosser” from Mexico?

- Yes No

14. If you are a “border crosser”, where do you feel more comfortable?

- United States Mexico

15. Where do you primarily live now? Check all that apply.

- United States
- Mexico
- Laredo
- Other Texas location
- Nuevo Laredo
- Other Mexico location
- Other

16. Where did you go to school? (Check all that apply)

	United States	Mexico	Other Spanish country	Other country
PreK – K	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 st -3 rd grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 th -6 th grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 th -8 th grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 th -12 th grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
College	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. I consider my dominant language(s) to be:

- English
- Spanish
- Other (please specify) _____

18. I am fluent in:

- English
- Spanish
- Other language(s) (please specify) _____

19. How do you rate your ability?

	Excellent	Very good	Good	Fair	Not very good	Poor
Speaking English?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading English?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speaking Spanish?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Spanish?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20. What language(s) do you speak most often in the following situations? (Check all that apply)

	English	Spanish	English or Spanish are spoken at different times	Both English & Spanish are intermixed while talking	Other
With parents at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
With siblings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
With grandparents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At social events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At church	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. How comfortable do you feel speaking Spanish when you are talking on/at the:

	Very comfortable	Somewhat comfortable	Not comfortable at all
telephone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
office	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
store	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
church	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. Below are some interesting words. Indicate how COMPETENT you feel about using these words.

Competency	Very competent	Somewhat competent	Not at all competent
abeja reina	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
abrecartas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
aguafiestas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

arrancaclavos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
atrapamariposas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
balonmano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bienes raíces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bocacalle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bocamanga	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
buscapiés	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
canción protesta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
campo turista	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cartón piedra	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
coche bomba	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
comemierda	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
crecepelos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
día puente	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
episodio piloto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
espantapájaros	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
guardameta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hombre rana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hora pico	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
limpiabotas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
metepatas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
montacargas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mono araña	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
obra cumbre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
papel cebolla	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
perro policía	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
picapleitos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pintalabios	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
premio consuelo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
puntapié	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
sacacorchos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
sombrero hongo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
tapaboca	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
tornaboda	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
paracaídas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pasatiempo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pelagatos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Spanish vocabulary

Please answer the following prompts to the best of your ability.

1. limpiabotas

- botas que se limpian con cera
- persona que limpia botas para ganarse la vida

2. balonmano

- pelota pequeña
- juego de pelota

3. metepatas

- chancas tipo ‘pata de gallo’
- persona inoportuna

4. arrancaclavos

- clavos que se arrancan de la pared
- palanca que se usa para arrancar clavos

5. campo turista

- campo para turistas
- turista en el campo

6. atrapamariposas

- red para atrapar mariposas
- mariposas atrapadas en una red

7. crecepelo

- producto destinado a hacer crecer el pelo
- alguien que logra ser famoso

8. cartón piedra

- cartón duro como piedra
- piedra que parece de cartón

9. día puente

- puente que se cruza solamente de día
- día libre que alarga el fin de semana

10.coche bomba

- bomba de la gasolina de un coche
- coche cargado de explosivos tipo bomba

11.canción protesta

- composición para expresar quejas
- serenata que incomoda a los vecinos

12.picapleitos

- persona revoltosa que busca problemas
- gallo de pelea

13. episodio piloto

- primer episodio de una serie de programas de televisión
- piloto que aparece en un episodio de una serie de programas

14. montacargas

- vehículo para montar cargas en plataformas
- cargas que se montan en una plataforma

15. abrecartas

- instrumento para abrir cartas selladas
- cartas que se abren solas

16. abeja reina

- reina que parece abeja
- abeja que reina en un panal

17. hombre rana

- hombre con ojos saltones
- buzo

18. papel cebolla

- papel semitransparente con textura de capas de cebolla
- cebolla blanca de capas que semejan papel

19. perro policía

- policía que adiestra perros
- perro que trabaja para la policía

20. sacacorchos

- palanca para sacar los corchos a las botellas de vino
- corchos que se sacan a las botellas de vino

21. pintalabios

- labios que se pintan con una barra de color
- cosmético para pintar labios

22. sombrero hongo

- sombrero que parece un hongo
- hongo que parece un sombrero pequeño

23. comemierda

- persona despreciable
- persona que acostumbra comer porquerías

24. mono araña

- mono que parece araña
- araña que se mueve como mono

25. tapaboca

- boca tapada con un pañuelo
- pañuelo para tapar la boca

26. premio consuelo

- premio millonario de la lotería
- premio que no es el principal de un sorteo o concurso

27. buscapiés

- perro que se usa para olfatear el rastro que dejan las personas en la tierra por donde han pasado
- cohete que corre por la tierra al ser encendido

28. tornaboda

- fiesta que se celebra el día siguiente de la boda
- persona que vuelve a casarse después de enviudar

29. guardameta

- baúl donde se guarda ropa antigua
- portero en un partido de fútbol

30. puntapié

- golpe que se da con la punta del pié
- un paso clásico del ballet

31. paracaídas

- colchoneta que se usa para amortiguar las caídas de los gimnastas
- sombrilla que se utiliza para arrojarse de un avión

32. espantapájaros

- pájaros que se espantan fácilmente
- mono de paja que se usa para espantar pájaros

33. hora pico

- hora en que hay mayor tráfico
- hora en la que va a empezar un evento

34. pasatiempo

- distracción
- persona que está sin hacer nada

35. bocamanga

- estornudo con la boca apoyada en la manga de la camisa
- puño de la camisa

36. obra cumbre

- libro de gran éxito
- edificio muy alto

37. pelagatos

- persona insignificante
- tijeras para gatos

38. bienes raíces

- tesoro enterrado bajo un árbol
- propiedades que incluyen terrenos y edificios

39. aguafiestas

- fiestas en las que se juega con agua
- lluvia repentina que arruina las fiestas

40. bocacalle

- entrada de una calle corta
- vendedor que grita por las calles

41. Did you feel frustrated in answering the questions about the words?

Yes No

42. Indicate how difficult it is to use these words.

Difficulty

	Very easy	Easy	Hard	Very hard
abeja reina	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
abrecartas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
aguafiestas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
arrancaclavos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
atrapamariposas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
balonmano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bienes raíces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bocacalle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bocamanga	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
buscapiés	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
canción protesta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
campo turista	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cartón piedra	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
coche bomba	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
comemierda	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
crecepelo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
día puente	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
episodio piloto	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
espantapájaros	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
guardameta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hombre rana	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hora pico	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
limpiabotas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
metepatas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
montacargas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mono araña	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
obra cumbre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
papel cebolla	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
perro policía	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
picapleitos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pintalabios	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
premio consuelo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
puntapié	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
sacacorchos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
sombrero hongo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
tapaboca	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
tornaboda	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
paracaídas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pasatiempo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pelagatos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

43. Is it OK to create new words/phrases in Spanish?

Yes No

44. If you answered yes to Q43, please create a new word or phrase in Spanish.

45. If English is your second language (ESL), do you speak English with an accent?

Yes No

46. Is there anything you would like to tell me? You may write in English or Spanish.

THANK YOU!

I appreciate your help in completing this survey.

Please press the “Done” button to submit your answers.

APPENDIX 2

Norming studies

Prueba de vocabulario

1. plumafuente
 - a. fuente en forma de pluma
 - b. pluma estilográfica
 - c. fuente cubierta de plumas de aves
 - d. pluma preparada para servir de adorno
 - e. _____

2. reinamadre
 - a. madre de los príncipes
 - b. reina muy bien conservada
 - c. madre que se llama reina
 - d. reina que manda en la casa
 - e. _____

3. uñagato
 - a. gato que se come las uñas
 - b. uña deforme
 - c. gato que se defiende con las uñas
 - d. uña de gato que es medicinal
 - e. _____

4. aplanacalles
 - a. persona muy pesada que camina a todos lados
 - b. calles muy niveladas
 - c. camión para pavimentar pasos estrechos y largos
 - d. calles para camiones de triple remolque
 - e. _____

5. comegente
 - a. animal muy hambriento que caza a otro más débil
 - b. objeto para tomar alimentos
 - c. gente que se la pasa comiendo
 - d. gente que come buffet chino sin saciar su apetito
 - e. _____

6. ahorcaperros

- a. cuerda que se usa para amarrar perros
- b. perros muy bravos
- c. persona que tortura a los perros
- d. perros que se encuentran en la perrera municipal
- e. _____

7. echalumbre

- a. persona muy enojada
- b. lumbre de un encendedor de gas butano
- c. animal fabuloso de un cuento de hadas
- d. fuego que arde sin control
- e. _____

8. cruzacalles

- a. persona que cruza las calles sin ver para ambos lados
- b. calles que se intersecan
- c. objeto utilizado para cruzar la calle
- d. calles en declive
- e. _____

9. destripacuentos

- a. alguien que no sabe contar cuentos
- b. cuentos de asesinos en serie
- c. persona que arranca hojas a los libros
- d. cuentos que no son fáciles de interpretar
- e. _____

10. soplamocos

- a. un pañuelo de algodón
- b. mocos espesos que segregan las membranas mucosas
- c. objeto que se usa para sacarle los mocos a los bebés
- d. flemas que escupen los varones
- e. _____

11. comecocos

- a. un turista que come cocos en la playa
- b. cocos comilones
- c. monstruo que come cabezas humanas
- d. cocos con bocas
- e. _____

12. cortacallos

- a. manicurista que corta callos
- b. callos muy maltratados
- c. callos que cortan la respiración
- d. cuchillo que se usa para cortar callos
- e. _____

13. brincacharcos

- a. aquello que se usa para brincar un charco
- b. persona que cruza al lado americano
- c. charcos que se brincan para cruzar la calle
- d. charcos que brincan los niños después de la lluvia
- e. _____

14. asaltacunas

- a. cunas que han sido asaltadas por robachicos
- b. una persona que tiene más edad que su pareja sentimental
- c. camita para niños con barandillas laterales
- d. un asaltante de bancos
- e. _____

15. cortapuros

- a. alguien que elabora materiales para puros
- b. puros que acortan la vida
- c. cigarros cubanos
- d. algo que se usa para cortar la planta de tabaco claro
- e. _____

16. cortaviento

- a. persona muy atractiva que corta la respiración
- b. viento filoso
- c. tijeras que simulas con los dedos para cortar el viento
- d. viento que corta esquinas
- e. _____

17. espantapájaros

- a. máscara para espantar durante la “Noche de brujas”
- b. escopeta que se dispara para espantar pájaros
- c. pájaros miedosos
- d. pájaros pequeños
- e. _____

18. lanzallamas

- a. lanza envuelta en llamas
- b. alguien que lanza llamas
- c. llamas que lanza un volcán en erupción
- d. mamíferos rumiantes que se lanzan contra la gente
- e. _____

19. limpiaúñas

- a. manicurista
- b. instrumento de metal que sirve para limpiar las uñas
- c. uñas de las personas empleadas en el servicio doméstico
- d. uñas puras y naturales
- e. _____

20. matafuegos

- a. persona que extingue incendios
- b. medicina que alivia fuegos labiales
- c. fuegos forestales
- d. fuego amigo que causa la muerte a soldados aliados
- e. _____

21. aguafiestas

- a. lluvia fuerte que arruina la fiesta
- b. fiestas arruinadas por un aguacero
- c. fiestas en las que se juega con agua
- d. persona que turba cualquier diversión
- e. _____

22. quemacocos

- a. máquina industrial que quema cocos para generar calor
- b. cocos tostados para preparar dulces
- c. cocos con que se mete miedo a los niños
- d. parrilla para poner cocos al fuego
- e. _____

23. matarratas

- a. gato que caza ratas
- b. ratas rabiosas que viven en cloacas
- c. veneno que mata ratas
- d. ratas que comen carroña
- e. _____

24. tumbabotes

- a. botes de basura derribados por travesura
- b. objeto para aplastar botes
- c. borracho que duerme en un bote de basura
- d. botes pequeños arrastrados mar adentro
- e. _____

25. matasellos

- a. una planta argentina
- b. una asesino que marca a su víctima en la frente
- c. sellos del correo
- d. firma disquera de reggaetoneros
- e. _____

26. abrecartas

- a. cartas que se abren solas
- b. cartero que abre la correspondencia ajena
- c. cartas que se usan para jugar la primera ronda
- d. aquello que sirve para abrir cartas
- e. _____

27. pasamano

- a. mano que se pasa sobre la frente cuando se trata de recordar algo
- b. bienvenida a un amigo
- c. mano arrugada como pasa
- d. mano de color preparado para pintar
- e. _____

28. pelagatos

- a. objeto que sirve para cortar el pelo a los gatos
- b. gatos sin pelo
- c. gatos despellejados
- d. salón de belleza para gatos
- e. _____

29. pisapapeles

- a. persona que pone el pie sobre papel higiénico pegado al zapato
- b. papeles archivados
- c. periódicos atrasados
- d. utensilio que se pone sobre papeles para que no se muevan
- e. _____

30. portamonedas

- a. monedas para jugar videojuegos
- b. bolsa con cierre para llevar dinero a mano
- c. dinero fraccionario de billetes
- d. persona que trae monedas en el bolsillo
- e. _____

31. quitamanchas

- a. goma de borrar color rosado
- b. algo que arranca manchas
- c. señal que una cosa hace en un cuerpo y lo echa a perder
- d. padre que venga el honor de su hija
- e. _____

32. rompecabezas

- a. cabezas rotas
- b. problema de difícil solución
- c. cuatrero que roba vacas solamente
- d. cabezas con ondulación artificial del cabello
- e. _____

33. trotamundos

- a. mundos que trotan con prisa
- b. persona que viaja por todo el mundo
- c. mundos que giran alrededor del sol
- d. caballo que va al trote
- e. _____

34. rompenueces

- a. instrumento para partir nueces
- b. nueces cubiertas con pasta de azúcar
- c. persona que rompe nueces
- d. nueces picadas
- e. _____

35. sacabala

- a. balas para cazar venados
- b. alguien que saca conclusiones
- c. balas que se sacan de una herida
- d. pinza para sacar una bala de dentro de la herida
- e. _____

36. rompeimágenes

- a. imágenes en cuadros con el vidrio estrellado
- b. parecido con los parientes (la mamá o el papá, por ejemplo)
- c. imágenes de la Virgen que se encuentran en una tortilla
- d. instrumento para restaurar imágenes antiguas
- e. _____

37. casa cuna

- a. casa donde se atienden pequeños
- b. cuna para bebés recién nacidos
- c. casa de los fundadores de un pueblo
- d. cunita improvisada en un cajón
- e. _____

38. mono araña

- a. chango que come arañas
- b. araña de patas largas cuya picadura es venenosa
- c. mono de cuerpo delgado y patas largas
- d. araña con el cuerpo cubierto de vello negruzco
- e. _____

39. sacacorchos

- a. tapón para botella de vino tinto
- b. instrumento con espiral para destapar botellas con corcho
- c. corchos que sacan los catadores
- d. alguien que consigue abrir botellas
- e. _____

40. sacamuelas

- a. muelas del juicio
- b. persona que se dedica a sacar muelas
- c. muelas picadas que se tienen que extraer
- d. palillo de dientes
- e. _____

41. tragafuegos

- a. artista callejero que expulsa fuego por la boca
- b. fuegos que destruyen bosques
- c. persona que tiene mal aliento
- d. aparato para extinguir incendios
- e. _____

42. hormiga caballo
- a. insecto de color negro
 - b. caballo pequeño de crin colorada
 - c. persona trabajadora que cuida caballos
 - d. poni
 - e. _____
43. sacapotras
- a. alguien que saca a las potras a pasear
 - b. yeguas pequeñas
 - c. aparato de gimnasia para efectuar diferentes saltos
 - d. potras que mudan los dientes de leche
 - e. _____
44. calienta libros
- a. chimenea que alumbra libros
 - b. libros de caballerías
 - c. libros sobre ejercicios de calentamiento
 - d. forro de plástico para proteger los libros
 - e. _____
45. tiraceite
- a. aceite desperdiciado
 - b. alguien que tira aceite en el drenaje
 - c. aceite para los frenos del automóvil
 - d. lugar especial para reciclar el aceite
 - e. _____
46. sacamocos
- a. aparato para aliviar la congestión nasal
 - b. mocos que salen cuando se llora fuertemente y sin parar
 - c. persona que se pica la nariz
 - d. mocos de guajolote
 - e. _____
47. posavasos
- a. recipientes de cristal que sirven para beber agua
 - b. vasos desechables
 - c. persona que se encarga de traer los vasos a la fiesta
 - d. soporte para colocar bajo los vasos
 - e. _____

48. cuentakilómetros

- a. kilómetros que faltan para llegar
- b. número de kilómetros entre punto A y punto B
- c. kilómetros registrados en un viaje en carro
- d. aparato que registra los kilómetros recorridos
- e. _____

49. bocacalle

- a. calle con salida
- b. entrada de una calle
- c. boca cerrada
- d. calle de forma circular
- e. _____

50. caña espina

- a. espina de la caña de azúcar
- b. especie de bambú
- c. caña de pescar de madera
- d. astilla puntiaguda de la madera
- e. _____

51. cartón piedra

- a. cartón que se mezcla con yeso y aceite para hacer figuras
- b. trozo de piedra que es blanda como el cartón
- c. cartulina con diseños que semejan mármol o granito
- d. pedernal que parece de cartón
- e. _____

52. rompeimágenes

- a. persona que habla mal del prójimo
- b. imágenes de celebridades que destruyen su reputación
- c. imagen del ángel rebelado
- d. persona que rechaza la autoridad de normas y modelos
- e. _____

53. mataburros

- a. burros que tiran de las carretas de los ropavejeros
- b. persona que atropella a un burro
- c. profesor de un niño bruto
- d. burros de carga muertos de hambre
- e. _____

54. parachoques
- a. choques que se evitan por un milagro
 - b. acto de evitar un accidente
 - c. pieza que amortigua los efectos de un choque
 - d. choques que suceden en los carritos “chocones” del carnaval
 - e. _____
55. hormiga caballo
- a. caballo colorado
 - b. hormiga negra y colorada
 - c. poni
 - d. hormiga voladora
 - e. _____
56. sombrero hongo
- a. hongo alucinante que parece sombrero de charro
 - b. sombrero de copa rígida de forma semicircular
 - c. hongos que crecen del tamaño de un sombrero
 - d. sombrero de chef
 - e. _____
57. calientapiés
- a. pies sudados cuando el clima es caliente
 - b. cohetes de artificio que tienden a tronar cerca de los pies
 - c. pies cansados
 - d. aparato que calienta los pies
 - e. _____
58. sacapotras
- a. persona que saca a pasear caballos
 - b. potrancas para exhibición en la feria
 - c. persona que provoca abortos a yeguas
 - d. yeguas retiradas que viven en ranchos
 - e. _____
59. buque escuela
- a. escuela para marineros
 - b. buque veracruzano
 - c. buque donde se imparten clases
 - d. escuela para la tripulación de submarinos
 - e. _____

60. abeja reina
- a. reina de las abejas
 - b. una abeja que se llama reina
 - c. abeja que vuela al frente del enjambre
 - d. reina laboriosa como las abejas
 - e. _____
61. día puente
- a. día internacional de la salud
 - b. puente que se cruza solamente de día
 - c. puente de madera
 - d. día de vacaciones
 - e. _____
62. hombre rana
- a. hombre con piernas largas
 - b. rana macho
 - c. hombre que explora el fondo del mar
 - d. rana que habla
 - e. _____
63. lápiz tinta
- a. lápiz que no se borra
 - b. un lápiz que escribe como pluma
 - c. tinta de color gris
 - d. tinta que se puede borrar
 - e. _____
64. campoturista
- a. turistas que van al campo
 - b. campo para personas que van de viaje
 - c. turistas que juegan fútbol soccer
 - d. campo donde se recrean los turistas
 - e. _____
65. salvavidas
- a. balas que no hacen daño, solamente ruido
 - b. vidas de los pecadores que se arrepienten
 - c. vidas fuera de peligro
 - d. algo que permite sostenerse en la superficie del agua
 - e. _____

66. tapaboca

- a. objeto que sirve para tapar botes
- b. boca cerrada
- c. boca de oro
- d. objeto que sirve para cubrir la boca
- e. _____

67. tocadiscos

- a. discos que escuchaban las abuelitas
- b. aparato que sirve para tocar discos
- c. discos grabados en Francia
- d. interpretar una pieza musical
- e. _____

68. tornafiesta

- a. tornero que organiza reuniones para celebrar
- b. fiesta después de una boda
- c. fiesta que se pospone
- d. volver a casa después de una fiesta
- e. _____

69. trabalenguas

- a. obstáculo en pista y campo
- b. lenguas de vaca preparadas en Chile piquín
- c. algo que es difícil de pronunciar
- d. lenguas que se traban al hablar
- e. _____

70. vagamundo

- a. persona que anda de un lugar a otro
- b. mundo irreal
- c. mundo de los ociosos
- d. equipaje
- e. _____

71. tumbaburros

- a. tumba para burros
- b. burros que tumban a la gente
- c. aparato para tumbar al enemigo
- d. jugadores que pierden en el juego del burro
- e. _____

72. pez luna

- a. luna que se refleja en el agua
- b. pez redondo como la luna
- c. luna de colores semejante a una carpa
- d. pez delgado
- e. _____

73. lengua madre

- a. lengua que es la madre de otra lengua
- b. madre que amamanta a su bebé
- c. madre que habla dos idiomas o lenguas
- d. lengua larga
- e. _____

74. pájaro mosca

- a. pájaro que se alimenta de moscas
- b. pájaro pequeño
- c. mosca que ronda los nidos de los pájaros
- d. mosca que vuela como pájaro
- e. _____

75. papel pluma

- a. papel elaborada para escribir con pluma
- b. pluma para escribir en papel
- c. papel manuscrito con pluma
- d. pluma de ave color blanca
- e. _____

76. pañomanos

- a. manos sucias
- b. paño para limpiar las manos
- c. tela de diversos hilos tejida a mano
- d. manos del reloj
- e. _____

77. abrojo

- a. aparato utilizado para abrir los ojos en una operación
- b. abrigo de color rojo
- c. ojos abiertos
- d. llave maestra para abrir un cerrojo
- e. _____

78. aguafiestas

- a. aguas frescas
- b. fiestas arruinadas por un aguacero
- c. persona que interrumpe las fiestas
- d. fiestas en las que se juega con agua
- e. _____

79. arrancaclavos

- a. individuo cuyo trabajo es quitar clavos
- b. clavos fáciles de clavar
- c. clavos largos sin cabeza difíciles de arrancar
- d. palanca para sacar clavos
- e. _____

80. buscabulla

- a. bulla que se hace en un partido de fútbol
- b. persona en busca de pleitos
- c. bulla provocada por celos
- d. buscarle tres pies al gato
- e. _____

81. botafuego

- a. bota para apagar el fuego
- b. bota que usan los bomberos
- c. fuego que quema las botas de los bomberos
- d. un aparato que prende fuego
- e. _____

82. casamuro

- a. casa con paredes que logran aislar el ruido
- b. muro alrededor de una casa
- c. casa de ladrillos que semejan un muro
- d. muro de cinco metros de altura
- e. _____

83. colapez

- a. la cola de un pez
- b. un pez detrás de otro pez
- c. una fila de peces nadando juntos
- d. pez que se usa para preparar refrescos de cola
- e. _____

84. ganapan

- a. pan de muerto
- b. alguien que tiene ganas de comer pan
- c. premio que se gana en una rifa
- d. pan que se gana a cambio de trabajo
- e. _____

85. pelacejas

- a. cejas rasuradas
- b. pinzas para sacar las cejas
- c. cejas pintadas con delineador
- d. pelar las plumas a una gallina
- e. _____

86. rascacaballos

- a. un peine para rascar caballos
- b. caballos que corren carreras
- c. heno para caballos
- d. caballos entrenados para bailar en las ferias
- e. _____

87. emborrachacabras

- a. bebida que emborracha a las cabras
- b. persona que emborracha cabras
- c. cabras borrachas de sol
- d. cabras dando vueltas en el monte
- e. _____

88. espantasueño

- a. libro que te quita el sueño
- b. sueño muy malo
- c. sueño del que no se puede despertar
- d. persona que no te deja conciliar el sueño
- e. _____

89. frunciboca

- a. dulce muy agrio
- b. boca muy pequeña de labios gruesos
- c. aquello que obliga a fruncir la boca
- d. boca lista para dar un beso
- e. _____

90. lambeplatos

- a. animal que limpia los platos con la lengua
- b. platos para mascotas
- c. alguien que lambe las sobras de la comida de los platos
- d. platos sucios
- e. _____

91. ponefaltas

- a. maestra que pone falta por error
- b. faltas a la moral
- c. lugar donde se ponen las faltas
- d. faltas injustificadas
- e. _____

92. portavasos

- a. artefacto que sirve para poner vasos
- b. vasos desechables
- c. mesero que sirve las bebidas en la fiesta
- d. vasos limpios
- e. _____

93. quemarropa

- a. ropa quemada
- b. aquello que se utiliza para quemar ropa
- c. detergente que daña la ropa
- d. ropa de los bomberos
- e. _____

94. quitahipos

- a. hipo estremecedor que le da a los bebitos
- b. susto que te quita el hipo
- c. hipos que se quitan tomando agua
- d. trabajador del zoológico
- e. _____

95. rompehielos

- a. hielo en cubitos
- b. persona que rompe el hielo
- c. hielo preparado con agua destilada
- d. buque que puede atravesar capas de hielo
- e. _____

96. tragaños

- a. años que pasan sin dejar huella
- b. persona por la que no pasan los años
- c. medicamento que se toma dos veces al año
- d. año en que no se come mucho
- e. _____

APPENDIX 3
Pilot study

Universidad Texas A&M
Departamento de Estudios Hispánicos
Proyecto de Tesis Doctoral

A usted se le está invitando a participar en un estudio de investigación realizado por la Profesora Patricia González.

En caso de aceptar participar en el estudio, escriba su nombre e inicial de su apellido (por ejemplo; Patricia G.)

Cuestionario sociolingüístico

1. Lugar de nacimiento

- México
- Estados Unidos
- Otro país _____

2. ¿En que países ha vivido? Seleccionar un país de acuerdo a la edad que tenía. Cada renglón necesita una respuesta.

	México	Estados Unidos	Otro país
0-1 años	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3-4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7-8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8-9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12-13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14-15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16-17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18-19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 or older	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Otro país (especificar) _____

3. ¿Cuántos años tenías cuando empezaste a hablar INGLÉS?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20+

4. ¿Cuántos años tenías cuando empezaste a hablar ESPAÑOL?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20+

5. Países donde se ha educado:

	México	Estados Unidos	Otro país
Maternal-Kinder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Primaria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Secundaria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparatoria	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Universidad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Otro país (especificar) _____

6. El (Los) idioma(s) que domina:

- Español
- Inglés
- Ambos (español e inglés)
- Otro

Otro idioma (especificar) _____

7. Lengua que utiliza en las siguientes situaciones:

	Español	Inglés	Otro idioma
En casa con los padres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En casa con los hermanos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En casa con los abuelos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En el trabajo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En reuniones sociales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En la iglesia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
En la escuela	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Otra situación	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Otra situación (especificar) _____

Prueba de vocabulario

Elegir la definición correcta.

1. abrecartas

- instrumento para abrir cartas selladas
- cartas que se abren solas

2. abeja reina

- reina que parece abeja
- abeja que reina en un panal

3. arrancaclavos

- clavos que se arrancan de la pared
- palanca que se usa para arrancar clavos

4. campo turista

- campo para turistas
- turista en el campo

5. atrapamariposas

- red para atrapar mariposas
- mariposas atrapadas en una red

6. coche bomba

- bomba de la gasolina de un coche
- coche cargado de explosivos tipo bomba

7. espantapájaros

- pájaros que se espantan fácilmente
- mono de paja que se usa para espantar pájaros

8. cartón piedra

- cartón duro como piedra
- piedra que parece de cartón

9. aguafiestas

- fiestas en las que se juega con agua
- lluvia repentina que arruina la fiesta

10. día puente

- puente que se cruza solamente de día
- día libre que alarga el fin de semana

11. limpiabotas

- botas que se limpian con cera
- persona que limpia botas para ganarse la vida

12. episodio piloto

- primer episodio de una serie de programas de televisión
- piloto que aparece en un episodio de una serie de programas

13. montacargas

- vehículo para montar cargas en plataformas
- cargas que se montan en una plataforma

14. papel cebolla

- papel semitransparente con textura de capas de cebolla
- cebolla blanca de capas que semejan papel

15. pintalabios

- labios que se pintan con una barra de color
- cosmético para pintar labios

16. mono araña

- mono que parece araña
- araña que se mueve como mono

17. sacacorchos

- palanca para sacar los corchos a las botellas de vino
- corchos que se sacan a las botellas de vino

18. perro policía

- policía que adiestra perros
- perro que trabaja para la policía

19. tapaboca

- boca tapada con un pañuelo
- pañuelo para tapar la boca

20. sombrero hongo

- sombrero que parece un hongo
- hongo que parece un sombrero pequeño

21. comemierda

- persona despreciable
- persona que acostumbra comer porquerías

22. premio consuelo

- alivio que se siente al ganar un premio
- premio que se da al perdedor

23. buscapiés

- perro que se usa para olfatear rastro que dejan las personas en la tierra por donde han pasado
- cohete que corre por la tierra al ser encendido

24. canción protesta

- composición para expresar quejas
- serenata que incomoda a los vecinos

25. tornaboda

- fiesta que se celebra el día siguiente de la boda
- persona que vuelve a casarse después de enviudar

26. palabra clave

- promesa que se hacen los novios ante el altar
- sentencia que informa sobre el contenido de un documento

27. guardameta

- baúl donde se guarda ropa antigua
- portero en un partido de fútbol

28. puntapié

- golpe que se da con la punta del pié
- un paso clásico del ballet

29. picapleitos

- persona revoltosa que busca problemas
- pleitos de mujerzuelas

30. hombre rana

- hombre con ojos saltones
- buzo

31. paracaídas

- colchoneta que se usa para amortiguar las caídas de los gimnastas
- sombrilla que se utiliza para arrojarse de un avión

32. hora pico

- hora en que hay mayor tráfico
- manecilla que marca la hora

33. pasatiempo

- distracción
- persona que está sin hacer nada

34. bocamanga

- estornudo con la boca apoyada en la manga de la camisa
- puño de la camisa

35. crecepelo

- producto destinado a hacer crecer el pelo
- alguien que logra adquirir mayor importancia

36. obra cumbre

- libro de gran éxito
- cima de la montaña

37. pelagatos

- persona insignificante
- tijeras para gatos

38. bienes raíces

- ramas para curar el mal de ojo
- propiedades que incluyen terrenos y edificios

39. metepatas

- chanclas tipo "pata de gallo"
- persona inoportuna

40. balonmano

pelota pequeña

juego de pelota

Favor de evaluar la prueba de vocabulario en una escala del 1 al 7, donde 1 es muy fácil y 7 es muy difícil.

Fácil						Difícil
1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Gracias por participar en este estudio.

Favor de oprimir 'listo'.

APPENDIX 4

Elicited Production Task

Fill in the blanks. Answer with ONE word only.

1. Un instrumento que usan en el salón de belleza para cortar callos se llama

_____.

2. Vidrio delantero del carro que sirve para cortar el viento se llama

_____.

3. Aparato usado en la guerra para lanzar llamas se llama

_____.

4. Una señora de 40 años que se casa con un joven de 20 años se llama

_____.

5. Una persona que arruina la fiesta es una

_____.

6. El veneno que se usa para matar ratas se llama

_____.

7. El instrumento que sirve para abrir cartas se llama

_____.

8. El objeto que se utiliza sobre el escritorio para evitar que los papeles se muevan se

llama _____.

9. Producto que sirve para quitar manchas de la ropa se llama

_____.

10. Bolsa pequeña para llevar dinero a la mano se llama

_____.

11. Un lugar donde se recoge y cría a bebitos abandonados es una

_____.

12. Un mono de cuerpo delgado y patas y cola muy largas que parece araña es un

_____.

13. Un tipo de cartón que parece piedra se llama

_____.

14. Caña de bambú con nudos espinosos se llama

_____.

15. Un sombrero que tiene forma de hongo se llama

_____.

APPENDIX 5

Accuracy percentage analysis on each word* included in the interpretation task.

	CONTROL	LATE BILINGUALS	EARLY BILINGUALS	SIMULTANEOUS BILINGUALS
abeja reina	1	0.967742	0.916667	0.87013
abrecartas	0.962963	1	0.916667	0.922078
aguafiestas	0.962963	0.935484	0.866667	0.733766
arrancaclavos	0.962963	1	0.95	0.87013
atrapamariposas	1	0.967742	0.933333	0.876623
balonmano	0.777778	0.870968	0.783333	0.75974
bienes raíces	1	0.967742	0.916667	0.766234
bocacalle	1	0.935484	0.8	0.766234
bocamanga	1	0.741935	0.75	0.675325
buscapiés	0.740741	0.387097	0.416667	0.402597
campo turista	0.925926	0.903226	0.883333	0.902597
canción protesta	0.962963	0.903226	0.866667	0.818182
cartón piedra	0.888889	0.935484	0.833333	0.681818
coche bomba	1	0.935484	0.85	0.649351
comemierda	1	0.935484	0.733333	0.746753
crecepeló	1	0.903226	0.833333	0.850649
día puente	0.962963	0.83871	0.833333	0.636364
episodio piloto	1	0.774194	0.816667	0.805195
espantapájaros	0.962963	1	0.9	0.876623
guadameta	1	0.83871	0.816667	0.668831
hombre rana	1	0.774194	0.65	0.493506
hora pico	0.962963	0.774194	0.666667	0.681818
limpiabotas	0.962963	0.903226	0.916667	0.733766
metepatas	1	0.935484	0.816667	0.694805
mono araña	0.925926	0.903226	0.833333	0.75974
montacargas	1	1	0.9	0.766234
obra cumbre	0.962963	0.774194	0.633333	0.642857
papel cebolla	0.962963	0.870968	0.866667	0.766234
paracaídas	0.962963	0.903226	0.866667	0.792208
pasatiempo	1	0.967742	0.916667	0.818182
pelagatos	1	0.903226	0.833333	0.733766
perro policía	1	0.935484	0.9	0.863636
picapleitos	0.962963	1	0.916667	0.88961
pintalabios	1	0.967742	0.966667	0.902597
premio consuelo	1	0.935484	0.9	0.863636

puntapié	1	0.709677	0.433333	0.409091
sacacorchos	1	0.967742	0.883333	0.766234
sombrero hongo	0.962963	0.967742	0.783333	0.707792
tapaboca	0.925926	1	0.933333	0.909091
tornaboda	1	0.967742	0.783333	0.863636

* Words presented in alphabetical order

APPENDIX 6

Totals and percentages of responses for difficulty using the compounds words*
n=245

	Very easy	Easy	Hard	Very hard
abeja reina	117(48%)	54 (21%)	45 (19%)	(13%)
abrecartas	120(49%)	74 (27%)	39 (16%)	19(8%)
aguafiestas	110 (45%)	71(29%)	39 (16%)	23(10%)
arrancaclavos	98 (40%)	64(26%)	61(25%)	22(9%)
atrapamariposas	112 (46%)	54 (22%)	49(20%)	32(13%)
balonmano	39 (16%)	42 (17%)	112(46%)	51(21%)
bienes raíces	86 (35%)	56 (23%)	67(28%)	35(15%)
bocacalle	39 (16%)	49 (20%)	110(45%)	46(19%)
bocamanga	34 (14%)	42 (17%)	111(46%)	59(24%)
buscapiés	44 (18%)	44(18%)	103(42%)	51(21%)
canción protesta	61 (25%)	66(27%)	86(35%)	32(13%)
campo turista	93 (39%)	86(35%)	46(19%)	17(7%)
cartón piedra	34 (14%)	44(18%)	12(5%)	44(18%)
coche bomba	95 (39%)	51(21%)	66(27%)	31(13%)
comemierda	93 (38%)	60(25%)	56(23%)	35(15%)
crecepelo	76(31%)	69(28%)	63(26%)	36(15%)
día puente	83 (34%)	69 (28%)	69(28%)	24(10%)
episodio piloto	81 (33%)	46(19%)	83(34%)	34(14%)
espantapájaros	149 (61%)	44(18%)	27(11%)	24(10%)
guardameta	78(32%)	32(13%)	100(41%)	36(15%)
hombre rana	66 (27%)	61(25%)	88(36%)	29(12%)
hora pico	98 (40%)	76(31%)	42(17%)	27(11%)
limpiabotas	103(42%)	88(36%)	36(15%)	17(7%)
metepatas	78 (32%)	71(29%)	76(31%)	22(9%)
montacargas	105(43%)	48 (20%)	66(27%)	24(10%)
mono araña	86 (35%)	61 (25%)	69(28%)	29(12%)
obra cumbre	42 (17%)	37(15%)	111(46%)	54(22%)
papel cebolla	59(24%)	60 (25%)	93(38%)	32(13%)
perro policía	127(52%)	68 (28%)	29(12%)	22(9%)
picapleitos	110 (45%)	61(25%)	46(19%)	24(10%)
pintalabios	147(60%)	56 (23%)	22(9%)	22(9%)
premio consuelo	108(44%)	51 (21%)	56(23%)	29(12%)
puntapié	61(25%)	61 (25%)	91(37%)	34(14%)
sacacorchos	98(40%)	32 (13%)	71(29%)	46(19%)
sombrero hongo	51(21%)	51 (21%)	98(40%)	44(18%)

tapaboca	108(44%)	68(28%)	44(18%)	24(10%)
tornaboda	120(49%)	37(15%)	54(22%)	32(13%)
paracaídas	140(57%)	42(17%)	34(14%)	29(12%)
pasatiempo	157(64%)	49(20%)	24(10%)	14(6%)
pelagatos	69(28%)	59(24%)	83(34%)	34(14%)

Note: Words presented in alphabetical order

*These figures do not represent all respondents as one or more failed to provide information