IMPORTARLE UN CUCUMBER: HOW DIFFERENCES AMONG BILINGUALS IN LANGUAGE BROKERING EXPERIENCE AFFECTS IDIOM PROCESSING

A Dissertation

by

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Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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August 2015

Major Subject: Psychology

ABSTRACT

Language brokering refers to a widespread practice in refugee and/or immigrant communities whereby bilingual individuals act as linguistic and/or cultural intermediaries on behalf of family or community members. Previous psycholinguistic research suggests brokering may lead to a heightened awareness of semantic equivalence across language boundaries. The present research examined the impact of brokering experience on the semantic processing of idioms across languages. Specifically, the research examined how brokering experience affects same vs. different language semantic processing of decomposable and non-decomposable idioms. Across three experiments, proficient Spanish-English bilinguals, classified as brokers or non-brokers saw a series of idioms in one language; each idiom was followed by a target word (in the same or different language) that was related to the meaning of the idiom (critical trials) or unrelated (control trials). Idiom reading times and relative speed and accuracy of idiom-target semantic relatedness judgments were examined as a function of group (brokers vs. non-brokers), target word language (Spanish or English), and idiom type (decomposable or non-decomposable). Idioms in Experiments 1 and 2 consisted of "unidirectional" idioms, i.e., those with an idiomatic form in only one of the languages; those in Exp. 3 consisted of "bidirectional" idioms, i.e., those with an idiom counterpart in both languages. It was hypothesized that whereas brokers and non-brokers would be equally fast at reading idioms for meaning, brokers should experience less disruption than non-brokers in judging semantic relatedness of idioms and target words when idiom

and target language differed than when they were the same. It was further hypothesized that non-decomposable idioms would be processed differently than decomposable ones but that the nature of the difference may interact with target language and group. The findings generally support the hypotheses and suggest that brokers activate phrase meaning more easily than non-brokers across language boundaries even when processing expressions that are typically fixed with respect to language. More generally, this research underscores the theoretical and practical significance of systematically studying individual differences in language experience within bilingual ethnic minority communities.

DEDICATION

I dedicate this dissertation to *mi familia, mi madre, María Guadalupe Flores Igualate (Doña Lupe), mi hermano Joaquín López y mi primo hermano, héroe y defensor de todo lo malo, Oscar, siempre serás la persona que trataré de modelar. Se te quiere y se te extraña mucho, primo.*

ACKNOWLEDGMENTS

First, I would like to thank my committee; my chair Dr. Vaid, Dr. Heredia, Dr. Moyna, and Dr. Salter; thank you for your patience, guidance, and support because without it I would not have been able to complete this endeavor. Thank you all for your guidance and support throughout the writing and defending of my major area paper including the last minute doodle polls, cancellations, and a million emails to the development and completion of this dissertation.

Dr. Vaid., thank you for your endless support in this process, for constantly pushing me to think more about the theory rather than the methods, and for allowing me to research almost anything. Never did I imagine that George López, Anjelah Johnson (Bon Qui Qui), and Quarter Horse Racing, would be topics of research. Also, thank you for allowing our individual meetings to end up with discussions on films, social movements, gender inequality, and Mad Men as well as research. You are a woman of many talents and I am so thankful for all of your encouragement, mentorship, and help throughout the years. Dr. Heredia, thank you for allowing me to take over your lab space in Laredo to collect data for my dissertation and various projects. I am eternally grateful for your hospitality and generosity. Dr. Moyna, thank you for always being so encouraging, motivating, and positive throughout my entire graduate school career. Dr. Salter, thank you for making me think both critically and in broader terms about research and its applications.

Thanks also go to my friends, *mi familia,* and colleagues. *A mis amiga/os, gracias por comprenderme en los momentos difíciles y más cuando quería rendirme. Dagoberto, Jesús y Gabriel gracias por su apoyo, honestidad, cariño y nuestras noches de nopales,* American Horror Story, y RuPaul's Drag Race. *Ustedes son de los mejores amigos que he tenido en la vida. No saben cuánto les agradezco todo.*

To my lab mates, Kayoung Kim and Sümeyra Tosun, where would we be without the academic sisterhood we have fostered in the lab? From helping me with statistics to realizing that we share multiple interests from Schnauzers, orange nail polish to an obsession with The Big Lebowski. We have laughed, cried, analyzed data, and pushed each other through this entire process. Kayoung, from your prospective student visit, our connection was definitely one of sisterhood, which has naturally led to our Academic Soul Sisters title. Thank you for always being the person to confide in when I doubted myself, research, and even the completion of the PhD. Sümeyra, you are the stats genius and the example to follow in the lab. Dr. Kim and Dr. Tosun, I have not only gained amazing colleagues, but two amazing academic sisters! *Las adoro!*

También muchas gracias a mi familia hermosa, a mi madre, Doña Lupe y mi hermano, Joaquín López, sin ustedes no creo que esto hubiera sido posible. Los quiero con todo mi corazón. Mamá (Doña Lupe), gracias por ser tan cariñosa, trabajadora y por apoyarme y recordarme que todo se puede lograr en este mundo aunque tenga el genio de Doña Maxi y Don Roberto. Doña Lupe eres mi ejemplo de mujer y madre. Te quiero hasta el black hole! To my little big brother, Joaquín, you are my best friend and my biggest supporter. I am so grateful for all that you do for Doña Lupe and myself. Any

time I had a doubt or worry, your response was always, “Why are you worrying? You’re going to do it, little big sister! Stop crying!” Your constant positive attitude, jokes, and ridiculous snapchats are things I will always remember about graduate school. You’re the best little big brother! Love you *feo*! To my Betty mom, thank you for your unconditional love and support; others only wish to have you as their Betty mom. *También le tengo que dar gracias a mi papá*, Mr. López (Dad).*Gracias por siempre apoyarme en todas mis metas, y por siempre querer lo mejor para uno. A mis abuelitos Lorenzo, Antonia Maximina, y Lala ustedes son mi motivación por ser una mejor persona y esto no sería posible sin ustedes. Y finalmente a mi Abuelito Robe, como siempre decías, “Con ganas mija!” Le eche ganas y se logro!*

NOMENCLATURE

ERP	Event related brain potentials
CS	Code-switching
RSVP	Rapid Serial Visual Presentation
L1	First acquired language
L2	Second acquired language
ANOVA	Analysis of variance
TAMIU	Texas A&M International University
DECOM	Decomposability
NON-DECOM	Non-decomposability

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CHAPTER I

INTRODUCTION

"… [B]ilingualism and multilingualism.. [are] … of great value not only in our relations with the rest of the world, but also in the enhancement of the human spirit, in the development of the highest order of humanism."

George I. Sánchez (1997, p. 133).

In language contact situations such as when people immigrate to a different region, how are they ultimately able to communicate with people who do not speak the same language as they do? At some point they must become bilingual or acquire a working knowledge of two (or more) languages. Although the term "bilingual" has been defined in different ways, for the purpose of the present research we will adopt the definition proposed by Grosjean (1997), according to which a bilingual is an individual who functions in more than one language (whether speaking, reading, or writing) on a regular basis. In most parts of the world, the number of such individuals is greater than the number of individuals who know and function in only a single language.

It is estimated that there are currently about 40 million foreign-born immigrants in the U.S. and that about 85% of them speak a language other than English at home (U.S. Department of Commerce, 2012). How do these individuals negotiate linguistic and cultural interactions with English only speakers in the United States? To what extent do they rely on younger members of the community who have acquired proficiency in

English through interactions with peers in school while retaining knowledge of their heritage language? Moreover, what are the long-term psycholinguistic repercussions of early informal translation experience on the part of these younger bilingual members of immigrant communities? The latter question, in particular, is what motivated the current research.

Language Brokering

The experience of translating for one's family or community members is referred to as "language brokering" (Morales & Hanson, 2005; see also the expression "para-phrasing" coined by Orellana, 2009). Although the practice of language brokering has been around for a long time, research interest in language brokering is still relatively new. Hall and Sham (2007, p. 17) note that language brokering is "a phenomenon that gets mentioned in passing, the paragraph here and there, rather than considered as an important subject of study in its own right." Nevertheless, investigations of language brokering have rapidly accumulated over the past decade.

Although the practice of language brokering activity is one that most bilinguals have probably engaged in to some extent at some point of time, for the purpose of the present investigation we will consider only the two extreme ends of the continuum. We will refer to bilinguals who regularly engage in the practice of informal translation as "brokers" and bilinguals who have not had reason to acquire experience in informal translation and/or who choose not to engage in it as "non-brokers". Language brokers are typically children of immigrants whose parents do not speak the majority language. As such, brokers often serve as cultural and linguistic intermediaries on behalf of their

family or community members (Hall & Guéry, 2010; Lazarevic, Raffaelli, & Wiley, 2014; McQuillan & Tse, 1995; Morales & Hanson, 2005; Tse, 1995, 2001).

A distinction of note here is between interpreting and translating. As pointed out by Morales and Hanson (2005, p. 472), translation "is best associated with written work" whereas interpretation refers to spoken communicative ability, or "meanings that may be conveyed in ordinary social interactions." Language brokering may involve both interpretation and translation.

Another distinction of relevance is between translation as engaged in by those with formal training in translation or interpretation, and that performed in informal settings by those without any prior formal training. Language brokering refers to the practice of *informal* translation. Like formal translators/interpreters, brokers must take (spoken or written) information from one language, process it, and then formulate it in a different language. However, unlike formal translation, the goal of language brokering is not merely to provide an accurate translation of the content of a message, but rather to render it in a culturally appropriate form as well.

In the following sections relevant research on translation and bilingualism will be reviewed to provide a context for the present study.

Bilingualism and Translation/Interpretation Research

Research on bilingualism has examined the issue of translation using a variety of approaches. One approach has been to compare translation ability in relation to degree of language proficiency. This work has shown that the two are separable skills: individuals

may be highly proficient in functioning in two (or more) languages but they need not be particularly skilled in translation (Lambert, 1972).

Another approach has been to examine how language proficiency affects translation ease in each direction. Using a repetition priming task, Francis, Tokowicz, and Kroll (2014) reported that bilingual individuals who were more proficient (defined here in terms of lower error rates on an encoding task) showed equal priming effects regardless of the direction of the translation (first to second language or vice versa), whereas less proficient bilinguals showed a translation direction asymmetry.

A third approach has been to focus on characteristics of words that facilitate or impede translation ease. For example, de Groot (1992) found that words with higher frequency, higher imageability, and high cognate status were translated faster and more accurately than those with low frequency, lower imageability, and low cognate status.

A fourth approach, and one that is more closely related to the present investigation, has been to examine whether experience in translation may have "spillover" effects on language or cognitive processing. One of the earliest studies of this type was that of Malakoff and Hakuta (1991). This study examined the "natural" translation ability of Spanish-English children, who were asked to translate words, sentences and stories from their first language (Spanish) to their second language (English) and vice versa. The children were found to be extremely good translators, making very few errors. An English dominance effect was also noted, indicating that the children were better at translating into English than into Spanish. Malakoff and Hakuta

(1991) suggested that the high level of translation performance of their "natural translators" is reflective of enhanced linguistic knowledge.

Most studies that have sought to examine the cognitive or linguistic impact of translation experience have typically studied bilinguals with *formal* training in translation, looking at such things as the effect of length or type of training. For example, Tzou, Eslami, Chen, and Vaid (2011) compared bilingual students of translation/interpretation with 1 year or 2 years of formal training in translation/interpretation with bilinguals without any such training. Training was, not surprisingly, found to contribute to better performance on a simultaneous interpreting task and was also associated with enhanced language processing and verbal working memory (Tzou et al., 2011). In a similar study, Signorelli, Haarmann, and Obler (2012), comparing professional interpreters with bilinguals who did not have this experience found that interpreters outperformed non-interpreters on a reading span test of working memory capacity by recalling more sentence final words. Interpreters were also found to be better at repeating non-words than non-interpreters.

These studies suggest that formal training in translation/interpreting may lead to particular advantages in working memory. Given that formal training in translation appears to have a discernible impact it is reasonable to ask if informal experience in translation may also affect language and/or cognitive functioning. In the following section, we will review existing studies on language brokering with a view to theorizing how the experience of language brokering may influence the processing of a particular form of language: expressions with non-literal meaning.

Previous Research on Language Brokering

Studies of language brokering have also taken a variety of approaches, from observational and qualitative to correlational or quasi-experimental. In the review that follows I summarize key findings from previous studies of language brokering and conclude with a rationale for expanding research on language brokering into the domain of figurative language processing.

Emotions

A major area of research has examined how language brokers feel about their previous language brokering experience (e.g., Corona, Stevens, Halfond, Shaffer, Reid-Quiñones, & González, 2011; Donner, Orellana, & Jiménez, 2008; Love & Buriel, 2007; Weisskirch & Alva, 2002; Weisskirch; 2007).

Weisskirch and Alva (2002) administered measures of acculturation, translation frequency, stress, and self-perception to a group of 5th grade schoolchildren and found that boys reporting translation experience also reported more acculturative stress than girls. Prior brokering experience was also reported as not evoking any positive feelings. The authors suggest that any emotional benefits of language brokering experience may take a while to become evident. In a later study, Weisskirch (2007) presented brokers with different emotion words and asked them to rate the words on a five point scale (1=low; 5=high) in relation to how they felt about translating. He found that the words *helpful, happy, proud, trusted, good* and *positive* were given the highest ratings and that the words *angry, guilty, scrutinized, ashamed,* and *anxious* were given the lowest ratings with respect to the bilinguals' feelings about translating. Thus, brokering

experience was shown to be associated with more positive than negative emotions. Importantly, in this study, 7th graders instead of 5th graders were used, suggesting that older children may be more likely to associate brokering with positive feelings than those who are newly engaged in this practice. The younger the broker the less likely it appears that they will be favorably inclined towards their language brokering experiences.

Could brokering have other effects? Given the relationship between positive emotions and self-efficacy prior language brokering may also relate to self-esteem.

Self-Esteem

Several studies of language brokering have investigated the effects of brokering experience on self-esteem and confidence. One of the first studies to document psychological aspects of language brokering was conducted by Shannon (1990). In this study two siblings, Leti and Adán, served as language brokers for their family and were observed for two years. Adán, the older sibling, expressed feeling confident in his Spanish and English language abilities. Leti, the younger sibling, initially reported feelings of stress and inadequacy in her brokering when she first started, but later reported that it aided her self-confidence.

Weisskirch (2007) found that brokers born in the United States reported more self-esteem as a result of brokering than brokers born outside of the United States Similarly, Dorner and colleagues (2008) noted that the more they had brokered the more confident brokers felt about their brokering abilities.

Taken together, the existing studies imply that brokering may increase self-esteem and confidence in children and adolescents who participate in brokering. We next turn to how brokering experience may affect family relationships.

Helping the Family

Language brokering typically involves translating on behalf of family members in a variety of situations. This experience may conceivably have an effect on family dynamics. Several studies report that brokers refer to their brokering experience as "something they do" or just a part of "helping the family" (e.g., Corona, et al., 2011; Dorner et al., 2008; López, Lezama, & Vaid, 2014; Orellana, Dorner, & Pulido, 2003).

Using an interview method, Dorner and colleagues (2008) interviewed brokers in the 7th grade who had two years previously been asked about their brokering experience in order to determine how their relationships with those they brokered were affected over time. The interviews suggested that brokering was mutually beneficial to the brokers and those for whom they brokered (i.e., their parents), promoting interdependent learning of linguistic skill in English (for brokers) and Spanish (for non-brokers). Brokers reported feeling good about brokering for their families and reported that brokering was a responsibility they performed for the benefit of the family.

Villanueva and Buriel (2010) interviewed a group of Latina adolescents between the ages of 13 and 15 years about their language brokering experiences and noted that participants described brokering more often as a means of helping the family rather than as a job or chore. Corona and colleagues (2011) and López and colleagues (2014) conducted semi-structured interviews with adult Spanish-English brokers. Corona and

colleagues (2011) reported that brokering was seen as a way of assisting the family. López and colleagues (2014) replicated this finding and also found brokers reported feeling closer to their parents as a result of their brokering experience.

Not all language brokering research has found positive outcomes of language brokering experience (Martínez, McClure, & Eddy, 2009; Orellana, Dorner, & Pulido, 2003; Wu & Kim, 2009). Orellana and colleagues (2003) conducted a survey of 5th and 6th grade children about their brokering experiences. The children reported having to broker for their parents in a variety of settings (e.g., doctor's office, government offices, school, etc.). The authors found that brokering may place children into adult-like roles that may be too complex for their age, as is the case in medical situations where a child broker may have to inform a parent/guardian that she has cancer.

Other studies have examined effects of language brokering on familial relationships. Martínez and colleagues (2009) examined how the amount of brokering (e.g. high context vs. low context) affects parent/child relationships. High context brokers were classified as bilingual children who had to broker for both parents, while low context brokers were brokers who had to broker less frequently or for only one parent. Bilingual and bicultural Latino families answered surveys on the context of language brokering, family environment, parent and child depression. Differences were found between low and high context brokers. For high context brokers, more instances of paternal stress were reported than for low context brokers, while low context brokers reported greater paternal involvement, appropriate discipline, monitoring, and homework encouragement. Martinez and colleagues (2009) findings suggest that the more often that

children have to broker, the more negatively it may affect parent-child relationships. However, this research was conducted on Latina/o families.

In another study, Wu and Kim (2009) investigated the effects of language brokering and familial obligation among Chinese-American families. Chinese-American adolescents were administered a series of measures to gauge their degree of orientation to Chinese values, sense of familial obligation, perceptions of mattering, alienation to and from parents, and perceptions of language brokering. Unlike studies where brokers in general were found to feel a sense of helping the family (e.g., Donner et al., 2008), Wu and Kim found differences between Chinese-American brokers who identified as more Chinese oriented and those who identified as less Chinese oriented. Brokers who felt a stronger orientation toward Chinese culture felt a stronger sense of familial obligation and reported no negative feelings toward language brokering. In contrast, brokers with a weaker ethnic orientation reported a weaker sense of familial obligation and felt that brokering was a burden and an activity that alienated from their parents.

To summarize, it appears that language brokering can both positively and negatively affect parent/child relationships. On the one hand, some brokers report brokering being a productive experience (Corona et al., 2011; Dorner et al., 2008; López et al., 2014; Orellana et al., 2003). On the other hand, some brokers report brokering experience to be burdensome (Martínez et al., 2009; Wu & Kim, 2009).

Ethnic Identity

Another line of research on language brokering has examined how it may affect how brokers identify with their heritage culture (Weisskirch et al., 2011). Castañeda

(2005) found that Mexican American women with prior brokering experience believed that their Spanish speaking ability was improved by brokering and that brokering was also related to how they identified ethnically. Similarly, Love and Buriel (2007) found a positive relationship between language brokering and biculturalism among adolescent bilinguals, and that female brokers rated biculturalism more favorably than male brokers. Females were also more likely to self-identify as more bicultural than male brokers. Thus, prior language brokering may affect ethnic identity and this may be moderated by gender.

Not all research finds a positive association between brokering and ethnic identity. For example, Martinez and colleagues (2009) found differences among brokers' ethnic identity and level of brokering. Brokers with two monolingual parents were classified as "high language brokers (HLB)," while brokers with at least one bilingual parent were classified as "low language brokers (LLB)." When asked about how they self-identified, HLB reported less ethnic belonging, while LLB reported more ethnic belonging. This finding would suggest that brokering may not have a positive effect toward maintaining an ethnic identity. However, Weisskirch et al. (2011) did not find this effect. In their study, frequent, infrequent, and non- language brokers completed an online survey where they answered questions related to heritage cultural values and ethnic identity. Frequent language brokers were found to have higher cultural heritage values and ethnic identity than infrequent language brokers. Although Martínez et al. (2009) and Weisskirch et al. (2011) show conflicting results with respect to language brokering in relation to ethnic identity, it is important to note that Martínez et al. only

had 73 participants, while Weisskirch et al. (2011) had 1,222. Thus, it may be that high amounts of language brokering are associated with more negative ethnic identity.

The research reviewed above presents a snapshot of studies on language brokering and ethnic identity. As can be discerned, findings have been mixed. Some research suggests that language brokering could be related to an increased belonging to the heritage ethnic group (Castañeda, 2005; Love & Buriel, 2007; Weisskirch et al., 2011), while others have found that language brokering may have the opposite effect (Martínez et al., 2009).

Brokering and Academic Achievement

A number of studies have examined language brokering in relation to academic achievement. Prior brokering experience has been found to be related to school grades (Acoach & Webb, 2004; Buriel et al., 1988; Tse, 1995). Buriel and colleagues administered questionnaires to 9th and 10th graders and found a positive correlation between language brokering and school grades, particularly in females. This finding was later replicated by Acoach and Webb (2004), who also found a positive correlation between grade point average and brokering experience in a group of junior high participants. Similarly, Tse (1995) found differences between U.S. born brokers and foreign-born brokers' school performance, with foreign-born brokers reporting higher grade point averages than U.S.-born brokers.

By dividing a group of 6th graders into three sets based on brokering experience (e.g., active, partial, non-brokers), Dorner, Orellana, and Li-Grining (2007) compared the standardized test scores across groups based on brokering experience. Active

brokers, who reported the most frequent brokering, were found to have the highest test scores compared to partial and non-brokers. These findings suggest that brokering may be beneficial to academic achievement.

Form of Head Start

Language brokering is a skill that is acquired outside of the classroom, but how may such an experience affect skills not typically measured in the classroom? Through self-report during interviews, prior language brokering experience has been found to increase first and second language literacy knowledge (McQuillan & Tse, 1995). This is a result of brokers having translating linguistic material, whose language is more advanced than what is learned in school. Brokers must adhere to cultural and linguistic norms and yet it is a skill acquired without instruction (Hall & Guéry, 2010).

Orellana and D'warte (2010) contend that language brokering ability should be considered when making school assessments of brokers, for it is not adequately measured by the standard forms of educational assessment. As Tse (1995, p. 190) notes, "[b]rokers are providing valuable services to a variety of agents, and at the same time also appear to be gaining from their brokering experience". However, this skill tends to go unnoticed by school officials.

Form of Giftedness

In her book, *Expanding Definitions of Giftedness: The Case of Young Interpreters From Immigrant Communities,* Valdés (2003) describes a study in which twenty-five young interpreters participated in a simulated interpretation task. The task consisted of the young interpreters brokering for a fictitious mother and principal who

were members of the research team. The "mother" and "principal" read from a script, while the young interpreter was asked to translate between the "mother" and "principal" as they would in a real life situation. The interactions were video and audio-recorded and coded for the types of renditions (i.e. close, expanded, reduced, substituted, summarized, non-renditions, i.e., renditions that did not correspond to the original message, and zero-renditions, i.e., not translated). Valdés found that the interpreters were able to correctly interpret for the "mother" and "principal" research team.

Valdés suggests that these young interpreters were able to solve metalinguistic problems by understanding the source and target language and how to effectively communicate meaning and ideas between the two languages. Young interpreters were also able to pull information from both of their languages in order to provide correct translations and were able to "anticipate and strategically avoid some linguistic and lexical challenges, and try out and discard possible forms and structures" (p. 162). Valdés refers to the young bilinguals' ability to interpret sophisticated situations as a form of giftedness and posits that young interpreters benefit from their translation experiences because they are participating in difficult tasks almost daily. These tasks require some cognitive effort and with experience this practice may facilitate other activities such as memory, decision making and reasoning. The research conducted by Valdés on young interpreters lays the groundwork for the importance of studying the effects of language brokering on bilingual language processing.

Comparisons Between Brokers and Non-brokers

Previous studies of language brokering have by and large examined brokers using observational or descriptive approaches, or with some correlational measures. Few studies have sought to compare the performance of language brokers to bilinguals without brokering experience. One of the first to do so used a qualitative approach (see Cline, Crafter, O'Dell & Abreu, 2011). The study aimed at comparing the direct experiences of bilinguals with previous language brokering experience (brokers), and those without language brokering experience (bilingual non-brokers) and monolinguals (monolingual non-brokers). Semi-structured interviews were used, where participants were presented with a series of vignettes about children participating in typical (i.e., babysitting) and atypical household chores (i.e., language brokering). Participants were asked questions about each of the vignettes as to what they thought about what the person was doing, what others might think of what the broker was doing, what they thought of the person being brokered for (e.g. the mother), and what they thought about the broker's future. Cline and colleagues (2011) found that brokers expressed that it was good that the broker in the vignettes was helping the parent, but if the broker had to miss a lot of school, then brokering could become a problem. Non-brokers also expressed feelings that if brokers have to miss school then brokering could create problems. Overall, positive traits and feelings were expressed toward the broker in the vignettes. Interestingly, the monolinguals rated broker abilities more positively than did both brokers and non-brokers. Although monolinguals expressed more positive feelings toward language brokering (i.e. brokers should be proud of speaking two languages,

their parents should be happy they can translate for them, etc.), they also expressed concern that the broker's parent did not speak English.

The importance of the study by Cline et al. (2011) is that it highlighted the differences between brokers, non-brokers and monolinguals on beliefs of brokering. More generally, it is crucial for brokering research to explore the experience of brokers and non-brokers particularly on language processing.

Psycholinguistic Studies on Language Brokering

Over the past ten years, several studies have sought to investigate cognitive and/or psycholinguistic repercussions of language brokering experience. In order to examine the long-term impact of brokering, these studies have treated brokering as a dichotomous individual difference variable. Typically, bilinguals with extensive early brokering experience were compared to bilinguals with hardly any prior brokering experience but who were otherwise proficient in both languages based on self-report or other behavioral measures. Using this approach, various cognitive and psycholinguistic studies compared the performance of young adult bilinguals with or without prior brokering experience on measures of metalinguistic awareness, category exemplar generation, divergent thinking and plausibility judgments (López & Vaid, 2015*;* Lopez, Vaid & Chen, 2012; López, Vaid, & Tosun, 2015; Vaid & López, 2014; Vaid,et al., 2015; Vaid, Martínez, Chen, & Manzano, 2006; Vaid, Milliken, López, & Rao, 2011). I review these studies in the sections below.

Metalinguistic Awareness

In one of the earliest studies that compared brokers and non-brokers, the question of interest was whether brokering experience makes bilinguals more attentive to ambiguity in discourse (Vaid, et al., 2006). To test this claim, a joke detection task was developed in which Spanish-English bilingual adults with or without brokering experience were visually presented with single sentences in English and Spanish that were either one-liner jokes or were not funny. The not funny items were created by replacing the final punchline word of an actual one liner joke with another word that rendered the sentence plausible but not funny, e.g., "She went on a fourteen day diet but she only lost two *weeks*/*ounces*". In addition, the stimuli were classified into humor that relied on word play or humor that relied on extralinguistic (cultural) knowledge. Participants' task was to decide as quickly as possible if a given sentence was or was not funny. Vaid and colleagues found that brokers were faster and more accurate than non-brokers at detecting jokes in Spanish, particularly jokes in which the humor relied on extralinguistic factors; no group differences were found in detection of humor that relied on word play. Thus, qualified support was found for the notion that language brokering experience enhances attention to ambiguity.

Using a sound deletion paradigm, Vaid and colleagues (2011) investigated possible differences between brokers and non-brokers in phonotactic awareness. Spanish-English bilinguals were presented with monosyllabic and polysyllabic interlingual homographs and cognates (e.g. pan/*pan;* doctor/*doctor*) in separate language blocks. Their task was to mentally take away the "first sound" of each word and say

aloud what remained. Prior work conducted with Spanish-dominant versus English monolingual speakers had shown that "the first sound" is conceptualized as a phoneme in the case of English but as a syllable in the case of Spanish. The question of interest for Vaid and colleagues was whether brokers (more so than non-brokers) would shift their conceptualization of the first sound depending on whether they perceived the word to be in English or in Spanish. This was indeed found, suggesting that brokering confers a sensitivity to language-specific phonotactic structure. Non-brokers on this task construed the first sound as a phoneme regardless of the language of the stimulus, suggesting that their parsing of English speech sounds generalized to their preferred parsing of Spanish words.

Categorization

The impact of language brokering has also been studied at the conceptual level. López and Vaid (2015) had brokers and non-brokers generate category exemplars for everyday categories such as ANIMALS or HOLIDAYS in Spanish or in English on two separate occasions (with some participants having to do the task in the same language on both occasions and others switching to the other language the second time). It was found that brokers compared to non-brokers demonstrated a greater cross-language overlap in the exemplars generated when the response language changed across the two test sessions. This finding was taken to suggest that brokering fosters a more integrated conceptual organization with category exemplars that are translation equivalents being more readily retrieved than is the case with non-brokers.

Beyond Literal Language

Correlates of brokering experience have also been investigated using non-literal language tasks (López et al., 2012; Vaid & López, 2014; Vaid, et al., 2014). The Remote Associates Test (RAT, Mednick & Mednick, 1967) has been used to examine the effects of brokering in the context of a creative problem solving task. Briefly, RAT problems are used to assess a form of creativity that involves divergent thinking. In this task participants are given three words (e.g. *cake, cream, cheddar)* and are asked to generate a fourth word (e.g. *cheese*) that will relate in some way to each of the three previously presented words. Vaid and colleagues (2015) had brokers and non-brokers solve remote associate problems ranging in difficulty in English and Spanish. No group differences were found for the easy items in either language; however for Spanish problems brokers outperformed non-brokers. This finding suggests that brokering experience may promote a search for coherence, not only at a sentence or discourse level (as in the joke detection study) but even at the level of isolated words.

Speeded translation verification tasks have also been utilized to investigate differences between brokers and non-brokers. In this task participants are asked identify correct translations of items presented on a computer screen as quickly and as accurately as possible. Adapting this task to examine speeded translation verification of expressions containing idioms, Vaid and Lopez (2014; see also Lopez et al., 2012) conducted two experiments. In the first experiment, brokers and non-brokers were shown idiomatic phrases in each language and had to decide if a phrase that followed the initial phrase was similar in meaning to it. The sentence pairs were of two types: phrases that had an

idiomatic meaning in only one language (e.g., *to kick the bucket*, which has the figurative meaning, "to die"), or phrases that also had an idiomatic equivalent in the other language (e.g., *made of steel*, which has a Spanish equivalent *ser de acero*). Brokers were found to be significantly faster than non-brokers and were equally fast at making translation judgments for Spanish or English idioms, regardless of whether the idiom was idiomatic in one language (unidirectional) or both languages (bidirectional). By contrast, non-brokers were much slower at verifying Spanish idiomatic phrases particularly if these phrases were idiomatic in only one language. In their second experiment, Vaid and Lopez (2014) presented participants with either a literal or a figurative translation of an idiomatic phrase. Brokers were found to be more accurate than non-brokers at correctly identifying idiomatic translations of the phrases, especially if the idiom was idiomatic only in Spanish (Vaid & Lopez, 2014). These findings suggest that prior language brokering experience has some influence on figurative language processing.

Recently, López, Vaid, and Tosun (2015) had brokers and non-brokers identify whether two word (adjective-noun) compound phrases presented in English or Spanish made sense or not. Participants were presented with nouns in each of the languages followed by an adjective; for example, they may be shown *golden rule* – an expression that is plausible in a figurative sense - vs. *golden key* – plausible in a literal sense - vs. *golden air* – not plausible. The results showed that for brokers mean reaction times for English vs. Spanish plausible phrases were about the same, but for non-brokers, reaction time for Spanish phrases was much slower than for English phrases. Furthermore,

whereas non-brokers were faster at making plausibility judgments to phrases with a literal than a figurative meaning, brokers were equally fast at making plausibility judgments about phrases, regardless of their literal or figurative status. This finding was taken to suggest that brokering fosters a tendency to process for meaning, whether the meaning is based on the literal meaning or involves a conventional, idiomatic meaning. Non-brokers, by contrast, appear to look for the literal meaning first.

Exploring Language Brokering in Bilingualism Research

Language brokering is not a new area of study although it is arguably new in the domain of psycholinguistics. Previous research has focused on the sociocultural and psychological effects of language brokering experience (Morales & Hanson, 2005, for a review). However, language brokering has not received as much attention in recent years as an important topic of academic study. Brokering comes in many different forms and it does not necessarily only involve language (Hall & Guéry, 2010). Brokers not only translate from one language into another, but they also interpret and translate cultural and social interactions. As Valdés (2003) has suggested young interpreters (i.e., brokers) exhibit abilities that may be above their age and grade level. The situations in which they are placed are also ones that their monolingual counterparts may not have the ability to take advantage of. The linguistic, social and cultural translation abilities that brokers engage in need to better understood in academia, but it appears that they are often marginalized or neglected for the importance that they may actually have in the cognitive and social development of the broker. In this regard Hall and Guéry (2010)

note that "the 'invisibility' of child language brokering more likely owes much to the low status of children and immigrants in society (p. 29)."

Incorporating language brokering research into bilingualism research may lead to a better understanding of bilingual phenomena. As already reviewed, studies by Vaid and colleagues have found differences between bilinguals with previous language brokering experience (i.e. brokers) and bilinguals without previous bilingual experiences (López & Vaid, 2013, 2014, 2015; López et al., 2015; Vaid et al., 2015; Milliken, 2009; Vaid et al,. 2006, 2011). Language brokering experience allows for the investigation of individual differences among bilinguals rather than placing all bilinguals in the same group. By doing so, differences among bilinguals that are commonly overshadowed when they are grouped together may be discovered. Also, by examining differences between brokers and non-brokers, a more nuanced understanding of the bilingual experience may be obtained.

In the present research the effects of language brokering were examined in three current domains of research within bilingualism, namely, figurative language processing, the issue of language non-selectivity, and code-switching. Figurative language is defined here as language that is not literal, i.e., the intended meaning of an utterance must be extrapolated or inferred from cues other than the meaning of the constituents of the phrase. Language non-selectivity is the idea that when bilinguals use language they cannot actively shut off one of their languages when processing in their other language (Dijkstra & Van Heuven, 2002). Finally, code-switching refers to bilinguals' ability to move between languages within a given utterance (Poplack, 1980). In the following

sections, brief reviews of figurative language, language non-selectivity and code-switching literature will be provided.

Figurative Language Processing

Figurative language is a broad term used to refer to any uses of language in which the meaning of the phrase is not directly computable from the meaning of the individual words. It includes such forms of language as jokes, metaphors, and idioms (Vaid, 2006). In this dissertation, the form of figurative language that will be investigated is idioms. Idioms are defined as expressions, utterances or phrases whose meaning cannot be predicted from the usual meaning of their constituent elements. The phrase *Kick the bucket* is an example of an idiomatic expression. *Kick the bucket* can literally mean to knock over a bucket, but its figurative meaning refers to someone dying.

Previous work on monolinguals has demonstrated that the meaning conveyed through idiomatic language can vary depending on whether or not context is present (Gibbs, 1994; Grice, 1975; Searle, 1979). If context is present it is suggested that speakers will attend to the intended meaning (e.g. figurative or literal) and if context is not present then speakers will attend to the literal meaning first (Grice, 1975; Searle, 1979). It has also been proposed that even out of context the more salient meaning (e.g., the one that comes to mind most often or most readily) is the figurative meaning for some expressions whereas for others it is the literal one. Thus, in the following sections I will highlight literature that demonstrates different ways in which idiomatic expressions

can be classified, how these classifications may affect semantic processing, and research on figurative language and bilingualism.

Decomposability

Idiom decomposability refers to how an idiom's individual components (i.e., words) contribute to the overall figurative interpretation (Gibbs, Nayak & Cutting, 1989; Giora, 1997). Decomposable idioms are those whose meaning can be directly derived from the words in the idiom. For example, *pop the question* is an idiomatic expression which means "to propose marriage". This idiom is classified as decomposable because the word "pop" can be related to the word "ask," while "question" can be related to "propose." Non-decomposable idioms are those idiomatic phrases whose meaning cannot be directly derived from the individual words within the idiom. An example of this is the idiomatic expression *kick the bucket*, which means to die. The words *kick and bucket* do not individually contribute to convey the figurative meaning "to die."

Gibbs and colleagues (1989) sought to investigate the role of meaning decomposition in idiomatic processing. In this experiment, participants were presented with idiomatic phrases and were told to decide whether or not the presented phrases were permissible English phrases. Gibbs and colleagues found that participants responded faster to decomposable idioms such as *pop the question* than non-decomposable idioms such as *kick the bucket*.

Effects of familiarity and decomposability have been investigated with respect to idiomatic processing in the monolingual literature. Libben and Titone (2008) had participants rate meaningfulness of idioms (Experiment 1), or complete online

meaningfulness judgments with complete sentences (Experiment 2), word by word with a fixed interval of presentation (Experiment 3) or in a self-paced reading task with comprehension questions (Experiment 4). These tasks allowed an assessment of the relationship between idiom familiarity and idiom decomposability and the ease with which figurative meaning is processed. Familiarity was found to have facilitative effects as indicated by higher meaningful ratings (Experiment 1) and faster reading times (Experiment 2-4) for highly familiar idioms. Reading times of idiomatic expressions presented in a self-paced or word by word presentation were not affected by the decomposability of the idiom. Idiom decomposability, specifically decomposable idioms (i.e., *spill the beans*) only affected idiom processing when participants were explicitly asked to think about the meaning of an idiom. This may suggest that decomposable idioms like *spill the beans*, whose constituents reveal something about the meaning of the idiom, may be processed differently than non-decomposable idioms. Moreover, it may be that when participants are asked to process the meaning of an idiom, if the individual words of an idiom such as *spill the beans* contribute to the overall meaning this presents the reader with lexical cues to meaning. This would be contrary to a non-decomposable idiom such as *kick the bucket*, whose meaning is derived from the entire phrase and not each of the idiom's constituents.

Recently, Titone and Libben (2014) investigated how idiom decomposability may affect meaning activation of an idiom. Using a cross-modal task, participants listened to sentences containing idiomatic expressions (e.g., *hit the sack*) while a visual target word was presented at either the offset of the idiom or at the second to last word

of the idiom. Participants were instructed to listen to the sentences and then decide if the visual target word was a real word or not, while reaction time was recorded. Faster reaction times were found when the target word was related to the idiom and was presented at the offset of the idiom than when it was presented in the penultimate position. This finding was taken to suggest that the meaning of an idiom is more quickly accessed after the idiom has been heard in its entirety (Titone & Libben, 2014). In a follow up study by the authors, a cross-modal task was again utilized, but the target word was presented at either the final word of the idiom or 1000 ms after the sentence offset. Faster reaction times were found for semantically related targets when presented 1000 ms after the sentence offset than at the offset of the idiom, suggesting that accessing idiomatic meaning takes time. Interestingly, target words related to the meaning of non-decomposable idioms showed faster reaction times than those related to the meaning of decomposable idiom target words. It may be that non-decomposable idioms are directly stored in the mental lexicon, which allows them to be more readily accessed than decomposable idioms, which may not be stored in their full form (Bobrow & Bell, 1973; Swinney & Cutler, 1979). Non-decomposable idioms are thus more likely to rely on rote retrieval as their meaning cannot be extracted from the idioms' parts (Cieslicka, 2015**).**

Bilingualism and Figurative Language

Previous research on bilingual and non-native speakers of a language has also demonstrated differences in figurative language processing (Cieslicka, 2006; Kecskes, 2006; Matlock & Heredia, 2002). Matlock and Heredia have suggested that language

proficiency may account for bilinguals' and monolinguals' processing of phrasal verbs (e.g., *Bob ate up the lasagna*). Particularly, Matlock and Heredia were interested in differences between bilinguals' and monolinguals' ability to complete sentences with phrasal verbs and reading times when sentences contained these phrases that can be read in terms of different meanings. Participants were instructed to either complete a sentence or read sentences containing phrasal verbs and then indicate whether a second phrase was a correct or incorrect paraphrase. Monolinguals were more likely than bilinguals to use phrasal verbs and reading times were faster for monolinguals than bilinguals. However, when the bilingual group was divided into early and late bilinguals, early bilinguals had faster reading times than late bilinguals; suggesting that early bilinguals and monolinguals may be simultaneously activating literal and figurative meanings then making a decision on which meaning is the more appropriate meaning based on what is read. These findings suggest differences in processing of figurative language based on language proficiency and experience.

It has been suggested that figurative language processing is affected by an individual's knowledge of a second language (Kecskes, 2006). Moreover, figurative language comprehension or saliency of idiomatic meaning can vary depending on the type of language speaker (i.e., native vs. non-native). Kecskes suggests that the salient meaning of a non-literal phrase may not be the same for a non-native speaker as it is for a native speaker. Thus, in the phrase, *kick the bucket*, for a non-native speaker of English the salient meaning may be to literally knock a bucket over. The case is then made that figurative meaning is acquired first through language experiences for native speakers of

a language, while second language learners will not acquire figurative meanings until they become more familiar with literal meanings in a second language. Kecskes's work is important to mention because figurative language models primarily focus on monolingual data in making their assumptions.

Cieslicka (2006) also notes the relative paucity of bilingual and L2 user research on figurative language. She was interested in testing on-line aspects of idiom processing to determine if there are differences in the accessibility of figurative and literal meaning by second language users. Using a cross-modal paradigm, Polish-English bilinguals were auditorily presented with sentences that contained English idioms, while participating in a lexical decision task. For example, participants might hear the phrase "Peter was planning to tie the knot later that month" followed by the word "marry," which relates to the figurative meaning of the phrase, or they might see the word "rope," which relates to the literal meaning of a word in the phrase (i.e., knot). Participants had to decide whether the letter string presented on a computer screen formed an English word or not. Cieslicka (2006) found faster and more accurate responses for targets related to the literal than the figurative meaning of the idioms. Her findings imply that for second language learners of English the literal meaning is more salient even if a phrase is presented in a figurative context, which is contrary to other models of figurative language that suggest that meaning can be derived from context (Grice, 1975; Searle, 1979). These findings led Cieslicka to propose the literal salience model of second language idiom comprehension, which suggests that the literal meaning is given

priority in figurative language when second language learners process idioms in their second language.

Siyanova-Chanturia, Conklin, and Schmitt (2011) studied idiomatic processing in native and non-native English speakers using an eye-tracking methodology. Participants were asked to read stories in English for comprehension. Stories contained idioms in either a figurative or literal context. First gaze duration, number of fixations, and first pass and overall reading times were measured. Non-native speakers of English were found to have longer first pass reading times, longer total reading times, and more fixations than native speakers, particularly when reading idioms in a figurative biasing context. This finding suggests that non-native speakers may incur more costs when reading figurative meanings as compared to native speakers of a language. Since the authors did not consider bilinguals or subdivide their non-native speakers in any way it remains unclear whether there might have been individual differences in figurative language processing among the non-native speakers.

Extending some of their previous work on figurative language, Carrol and Conklin (2014) investigated the effects of processing idioms in the first language (L1) on a second language (L2). English monolinguals and Chinese-English bilinguals were presented with idiomatic phrases (in English and Chinese) and translations of English and Chinese idioms. This was followed by a target word for which they had to decide whether a string of letters was a word or not. Bilinguals were found to have faster reaction times for reading Chinese phrases. Also, when Chinese-English bilinguals were presented with Chinese idioms in their English translation; reaction times were faster

than controls. This suggests that even in their second language bilinguals may be able to access the meaning of idiomatic phrases in the non-target language (e.g., Chinese), when processing idioms in English.

Much of the previously cited work has focused on the effects of second language learners who have acquired a second language as adulthood. How might figurative language be processed in bilinguals and when idiomatic phrases are similar across languages? Heredia, García, and Penecale (2007) investigated bilinguals' ability to process figurative language in relation to idiom similarity across languages. Using a self-paced reading task, Spanish-English bilinguals were asked to read idiomatic expressions in English that shared some form of overlap with Spanish. Phrases were either direct translations of a Spanish idiom (e.g., *point of view* vs. *punto de vista*), a similar English idiom (e.g., *to kill two birds with one stone*), or a completely different idiom. Spanish-English bilinguals were found to read different idioms much faster than idioms that were similar or identical between English and Spanish (e.g., *to pull his/her leg* vs. *tomar el pelo*). It seems counterintuitive that bilinguals would take longer to read idiomatic expressions that are dually represented. However, the study's findings suggest that when bilinguals encounter an idiom in one language that is also comparable or duplicated in their other language, both idioms must be processed, which could explain the longer reading times.

If differences in processing figurative language are found between non-native speakers of languages and native speakers, and between early versus late bilinguals, then what could be said about bilinguals who differ in their extent of prior language brokering

experience? Previous work on language brokering has shown some effects of brokering on the processing of humor. As mentioned previously, brokers were found to be more sensitive in detecting jokes, particularly in Spanish, compared to their non-broker counterparts (Vaid et al., 2006). Brokers have also been found to be able to equally fast at processing the figurative as the literal meaning of two word phrases in either language (López et al., 2015). Given that language brokering leads to enhanced metalinguistic awareness could it also lead to an enhanced semantic awareness across languages, as a kind of enhanced language non-selectivity?

Language Non-Selectivity

The language non-selectivity hypothesis posits that a bilingual cannot actively shut off one language when processing in another language. This phenomenon of bilingual language activation has been observed for words presented in isolation as well as in sentence contexts (Dijkstra & Van Heuven, 2002; Elston-Güttler, Paulmann, & Kotz, 2005, López, 2009; Schwartz & Kroll, 2006, Schwartz & Arêas Da Luz Fontes, 2008, Schwartz, Yeh, & Shaw, 2008). Many of these studies have used interlingual homographs (i.e., words that are spelled the same, but have different meanings such as "bank" as a financial institution or a river bank), cognates or words from different languages that have a semantic, orthographic, and/or phonological overlap (as in "hospital" in Spanish and English, for example) and interlingual homographs (i.e., words that look alike across languages, but have different meanings (as in the English word "attend," which means "to go to", and the Spanish word, *attender*, which means "to assist").

Language non-selectivity effects have been studied in relation to proficiency as well as sentence constraints, and whether sentences are presented in a first language (L1) or second language (L2) (Elston-Güttler, Paulmann, & Kotz, 2005, López, 2009; Schwartz & Kroll, 2006, Schwartz, & Arêas Da Luz Fontes, 2008; Schwartz et al., 2008). Schwartz and Kroll (2006) used high meaning constraining sentences and low constraining sentences in investigating the effects of cognates and non-cognates on Spanish-English bilinguals**.** Participants were presented with English sentences with one word presented in red text. This word was either a cognate or an interlingual homograph. When participants encountered a word in red, they were to say the word aloud as quickly and as accurately as possible. Cognates were named faster than non-cognate controls and no effects were found for interlingual homographs. Schwartz and Kroll (2006) suggest that cognates may facilitate processing since they are words that share similar properties across languages.

Similarly, Schwartz and Arêas Da Luz Fontes, (2008) investigated how context affected cross-language activation. Spanish-English bilinguals were presented with semantically related prime and target words (e.g., water-LIQUID) and unrelated prime-target word pairs (e.g., mask-LIQUID). However, some unrelated prime and target words shared either an orthographic form in Spanish (e.g. bark→*barco*: BOAT) or a semantic relationship (e.g., boat (*barco*): BARK). Prime-target word pairs were presented in either single word contexts or sentence contexts. Schwartz and Arêas Da Luz Fontes, (2008) found orthographic effects (i.e., delayed reaction time) in single word contexts, but not in sentence contexts. These findings suggest that even in

sentence contexts bilinguals may activate meanings from the non-target language when asked to make semantic verifications.

Other work in language non-selectivity has focused on the activation of meaning of individual words (López, 2009; Schwartz et al., 2008). First, Schwartz and colleagues (2008) were interested in examining the effects of meanings within sentence context in highly proficient Spanish-English bilinguals, using English homonyms (e.g. fast, novel) that were also Spanish-English cognates (e.g. novel/*novella).* Some of the Spanish-English cognates (e.g. novel) had a subordinate meaning that is not shared in Spanish. For example, in English the word "novel" means book, but can also mean new. The new meaning is not shared in Spanish. In the experiment sentences were created that either biased the subordinate or dominant meaning of the English homonyms (e.g. *Creative thinkers often generate ideas that are novel.).* Participants were presented with sentences followed by a target word that was not related to the homonym meaning used in the sentence (e.g. novel-BOOK). Participants were instructed to as quickly and as accurately as possible decide if the target word was related to the overall meaning of the sentence, thus requiring a "no" response on critical trials. The experimenters expected that bilinguals would activate both meanings of novel, but would have to suppress the more dominant meaning (e.g. novel-BOOK) in order to process the less salient meaning (e.g. novel-NEW), which would incur greater costs when the dominant meaning was shared in Spanish (e.g. cognates; novel/*novela).* They found greater costs when target words were also cognates in Spanish, which also shared a dominant meaning; suggesting that bilinguals activated both English and Spanish during the experiment. López (2009)

replicated and extended the effects of Schwartz (2008) by investigating the effects of word form and meaning overlap. Ambiguous English homographs were classified as cognates, non-cognates and false friends. Spanish sentences were then created that biased only one meaning of ambiguous words. For instance, in the sentence, *Él se comió parte del tamal y ella se comió el resto* (He ate part of the tamal and she ate the rest), participants were presented with sentences on a computer screen with the final word missing (e.g., *Él se comió parte del tamal y ella se comió el*_____). After a short delay, the final prime word was presented (e.g., *resto*:rest-what is left over); followed by target word that biased the irrelevant English meaning of the ambiguous word (e.g., *descansar:*to rest). Participants had to decide whether this second word was related to the overall meaning of the previously read sentence, to which the answer would be "no." López found significantly slower reaction times for critical targets than for controls. Participants also made more errors when encountering critical targets (e.g., *descansar*; to rest) than control words, by indicating that the word *descansar* was related to the overall meaning of the previously presented sentence *Él se comió parte del tamal y ella se comió el resto,*when the word was not actually related to the sentence. These errors suggest that even when reading highly constrained sentences in Spanish, bilinguals are still activating meanings of English words, the non-active language. Furthermore, these studies support the idea that, even when processing in one language bilinguals may not be able to prevent activation of the non-active language.

In the following section, I consider what happens when bilinguals switch between languages and what can be expected in terms of processing costs.

Language Switching and Code-Switching

Code-switching is typically defined as a bilingual's ability to move between two or more languages within a single utterance (Backus & Dorlejin, 2009; Clyne, 1987; Pfaff; 1979; Poplack, 1980). Psycholinguistic research on code-switching has primarily focused on determining switching costs and effects of lexical access (e.g., Gullifer, Kroll, & Dussias, 2003; Meuter & Allport, 1999; Moreno, Federmeier, & Kutas, 2002). However, code-switching can involve different forms of language switching and occurs for several reasons (Backus & Dorleijn, 2009; Lipski, 2005; Poplack, 1980), such as accessibility or retrieval issues (see Heredia and Altarriba, 2001).

Types of Code-Switching

Code-switching can take many shapes. Bilinguals can engage in insertional code-switching when they take one word from one language and embed it in an utterance of another language. In Spanish-English bilingual speech, we see this in the form of the insertion of the word "so" (Lipski, 2005). The phrase *Una vez íbamos a Mexíco y tenía que ir pa'l baño* so *nos fuimos para una gasolinera* (Lipski, 2005, p. 4) is an example of insertional code-switching. This type of switching is also a form of lexical borrowing, the processes where a lexical item from one language becomes engrained in another language.

Another form of code-switching that bilinguals engage in is alternational code-switching, which is defined as the exchange of linguistic material between two languages within bilingual discourse (Backus & Dorlejin, 2009). Two different kinds of alternational code-switching are íntersentential and intra-sentential (Poplack, 1980).

Intersentential code-switching refers to when language switching occurs at the end of an utterance and the beginning of a new utterance, for example, the phrase *Qué* pasa? [What's happening?] *Can't you come over today*? On the other hand, intra-sentential code-switching occurs within a single utterance. For example, in the sentence "Rafael started out *bien chico* [very young]" the switch between Spanish and English occurs within a single sentence. However, bilinguals also use other types of switching.

In addition to these types of switches, as previously stated, bilinguals often borrow lexical and structural items from their various languages. For example, bilinguals take structures from one language and begin using them in their other language, as is the case of the phrase "*para atrás* (backwards)." This phrase is not commonly used in Spanish with abstract meaning (cf. English write back, go back, take back, talk back). The following example demonstrates how bilinguals take a phrase structure from one language and transfer it to their other language. *Papi, tú me prestas esa pluma y yo te la doy para atrás**;*** (Daddy, you lend me that pen and I'll give it back to you**) (**Otheguy , 1993, p.22, as cited by Backus & Dorleijn, 2009), What is happening here is that Spanish English bilinguals who speak English are accustomed to the phrases involving a [Verb + *back*] and when they speak Spanish they then transfer this [Verb + *back*] structure to [Verb + *para atrás*], which is a result of interference from English when speaking Spanish.

Switching Costs in Language Processing

Psycholinguistic studies on code-switching have primarily focused on determining switching costs and effects of lexical access (e.g., Gullifer et al., 2003;

Meuter & Allport, 1999; Moreno et al., 2002). The seminal work by Poplack (1980; 1981) has laid the foundation for much of the literature on code-switching. Poplack's work argues that code-switching can only occur when two languages have structural equivalents that allow for the juxtaposition of the two languages. Moreover, the two languages switched must have a certain level of overlap that allows for a structure to remain grammatical even when switching occurs. Using natural observation, she noted the code-switching behavior of Puerto Rican Spanish speakers in New York must achieve a certain level of proficiency in both languages to be able to engage in code-switching. Furthermore, Poplack found that bilinguals who are more dominant in one language than another will code-switching from their dominant language to their less dominant language more often (see Heredia & Altarriba, 2001). These findings are of importance because they suggest that code-switching is not a linguistic phenomenon that occurs haphazardly; rather it requires a certain level of cognitive and linguistic ability. The question still remains: from a psycholinguistic perspective, what effects on language processing might switching between languages have?

Processing costs have been associated to situations when a bilingual has to engage in switching from one language to another (Green 1998; Gullifer et al., 2013; Finkbeiner, Almeida, Janssen, & Caramazza, 2006; Meuter & Allport, 1999; Moreno et al., 2011). The effects of switching between a bilingual's dominant and less dominant language were first investigated by Meuter and Allport (1999). Bilinguals were presented with a list of Arabic numerals and were asked to read the numbers aloud either in English (L1) or French (L2). The language of response was indicated using different

colored rectangles for the specific language. Participants' response latencies were recorded by indicating the number of consecutive trials in the same language as well as those that were in a different language. A greater cost of longer response latencies was found when switching from the L2, French which is also described as the weaker language to the L1, English, or the more dominant language, than when participants only had to respond in the same language. These findings suggest that whenever bilinguals switch from a more proficient language to their less proficient language, the switch may be more laborious and will result in delays in processing. Additionally, these effects may be a result of bilinguals having to inhibit their L1 when processing in their L2.

Green (1998) proposed that switching between two languages does incur costs in his inhibitory control (IC) model. Similar to the findings in Meuter and Allport (1999), when bilinguals switch between languages they have to switch between activated schemas (e.g. language 1 vs. language 2). The IC model posits that each language schema or tag is responsible for controlling and inhibiting competing language task schemas that is if a bilingual is processing in language 1 then the language schema must suppress activation of language 2. Finkbeiner and colleagues (2006) tested the IC model by having bilinguals name digits and pictures in each of their languages and recorded their responses for trials that had participants switch between languages or remain in the same language. For picture trials, there was no effect of language switching in that participants named pictures equally fast in trials that consisted of the same language and those where they had to switch between languages. However, for digit naming trials participants did take longer in naming digits when having to switch between languages.

For digit naming, digits were named slower when participants had to switch from the L2 to their L2. The findings suggest then that when naming pictures lexical items from one item may not necessarily have to be inhibited in the same manner as when naming digits. Naming digits may also be more language specific in that the language you acquire mathematical skills such as counting will be much faster in numerical naming than say an L2 (Meuter & Allport, 1999).

Other work by Prior and Gollan (2011) also investigated the association between language and task switching in two different bilingual groups, Spanish-English bilinguals, Mandarin-English bilinguals, and English monolinguals. Prior and Gollan hypothesized that Spanish-English bilinguals may be more efficient at task and language switching than Chinese-English bilinguals because of their frequent switching between languages. Bilinguals were measured for their ability to switching between languages when naming shapes and colors (i.e., a non-linguistic task) and naming digits aloud (i.e., linguistic task). Results demonstrated that when trials were repeatedly in the same language reaction times were faster than when the language was switched. Mandarin-English bilinguals and English monolinguals responded about the same, while Spanish-English bilinguals responded more slowly. However, when calculating switch costs (i.e., differences between language switch trials and repeated language trials), Spanish-English bilinguals had smaller switch costs than Mandarin-English bilinguals. In the linguistic task, participants had slower reaction times on switch trials, and Spanish-English bilinguals again had smaller switch costs than Mandarin-English bilinguals. This may be a result of more orthographic and lexical similarities between Spanish and

English than Mandarin and English. Spanish and English both share alphabetic orthography, while Mandarin has a logographic orthography. English and Spanish also share several lexical items such as cognates, while the same cannot be said about English and Mandarin. However, what about when the second language is mixed in with the first language?

The question of how introducing two languages might affect language processing in terms of language switching has been investigated using a variety of tasks and stimuli (Gullifer et al., 2013; Moreno et al., 2002; Titone et al., 2011). Titone and colleagues (2011) were interested in whether the presence of an L2 would affect participant's reading of sentences containing cognates in their L1. English-French bilinguals participated in a paragraph reading task, where their eye-movements were monitored while reading French sentences intermixed with English sentences. A cognate facilitation effect was found for gaze duration, where bilinguals' eye durations were shorter for cognates than matched controls. This suggests that the intermixing of L2 sentences affected activation of cognates which helped ease processing. If this is true, then what could happen to processing if phrases are code-switched?

Gullifer and colleagues (2013) sought to observe the relationship between intersentential code-switching and lexical access. Across two experimental studies, Spanish-English bilinguals read sentences using a rapid serial visual presentation (RSVP), where words were presented one by one on a computer screen. Sentences included target words that were either cognates (e.g., cable) or non-cognates (e.g., *chispa*/spark). Participants named the target word out loud as quickly and as accurately

as possible. Reaction time was measured from the onset the target word. In Experiment 1, a cognate effect was found where cognates were read faster than non-cognates, but no other effects were identified. In Experiment 2, however, the language of the sentences was presented in a blocked order rather than mixed order as it had been in Experiment 1. Following the same procedure as Experiment 1, Experiment 2 found that cognates and English sentences were read faster than non-cognates and Spanish sentences. Across both studies, English sentences and cognates had faster reaction times and blocked trials were responded to faster than mixed trials. The authors suggest that no cost is incurred when language switching and language mixing occur within a sentence. The argument is made that this may be a result of language non-selectivity in bilinguals, which states that bilinguals cannot inhibit one language when processing in another.

Moreno, Federmeier, and Kutas (2002) observed code-switching in bilinguals varying in language proficiency during reading comprehension and were interested in neurological effects when bilinguals encountered code-switches unexpectedly when reading and whether code-switches would be processed differently at the lexical and semantic levels. Particularly, the interest was on whether bilinguals would demonstrate an N400, which is an amplitude of negativity that peaks at 400 milliseconds (ms) after a stimulus is presented. N400 effects are strongly associated with linguistic processing at the semantic level. Spanish-English participants were instructed that they would be reading sentences in English, but that they would encounter some Spanish words. During the experimental phrase, words were presented one word at a time, while event-related potentials (ERPS) were recorded. Participants were presented with regular

phrases (e.g., *Each night the campers built …*) and idiomatic phrases (e.g., *Out of sight, out of …*) that were missing their final words. Participants then indicated the final word that they believed appropriately completed the idiom. For example, after the phrase *Out of sight, out of …* participants would either see an expected word (e.g., mind), a code-switch (e.g., *mente*), or a lexical switch, (e.g., brain). The authors found more negative N400 responses to expected completions as in completing the phrase *Each night the campers built…* with the word "fire," which would be expected for the context that did not require extra processing (i.e., semantic or lexical). For idiomatic contexts, no difference was found between expected completions, code-switches, or lexical switches. This may be a result of how idiomatic is meaning is processed. Either participants quickly thought of the literal interpretation of idiomatic phrases or bypassed the literal meaning and went directly to the figurative meaning. However, the negative N400 ERP component was found for sentences that contained a Spanish word. The effect was said to be a result of their being a greater need for working memory due to the integration of Spanish morphology within an English context. This study is one of the first investigations to observe code-switching in bilinguals and it utilized both idiomatic and non-idiomatic contexts as ERP domain.

These studies suggest that when bilinguals are required to switch between languages, switching costs occur and that switching between languages requires both more control of the language being processed as well as suppression of the language currently not in use. Moreover, it takes more effort to suppress the more dominant language.

While instructive, studies on language switching costs to date have not directly related switching as studied in a laboratory context to the relative frequency with which bilinguals actually engage in language switching behavior when speaking with other bilinguals, often referred to as code-switching ability. Furthermore, only one study to date examined code-switching in an idiom context (Moreno et al., 2002) but found no clear effects. None of the studies to date have systematically compared bilinguals' prior language experience as a possible factor moderating the processing of code-switched utterances. Instead, bilinguals have been treated as homogeneous. Yet it may very well be that bilinguals who more frequently move between two languages may show reduced disruption when encountering code-switched phrases. Whether this would also be the case in the processing of idiomatic phrases that contain code-switches has not been explored.

Rationale for Investigating the Effects of Language Brokering and Idioms

Although there is a sizeable literature on cross-language priming, or how semantically related items or translation equivalents affect language processing (see Basnight-Brown & Altarriba, 2007, for a review), this literature has been conducted primarily at the single word level and it has not examined individual differences among bilinguals (but see Cieślicka & Heredia, 2014). Specifically, the question of whether brokering may differentially affect the size of cross-language priming has not previously been entertained. Moreover, the investigation of cross-language priming effects in the context of the processing of idiomatic phrases has only been undertaken previously in second language learners (Cieslicka, 2006), not among proficient bilinguals. In these

later studies idiom transparency was also examined, but performance was tested only in the participants' second language. In the present research idiom processing will be examined in both languages (i.e., Spanish and English) in proficient bilinguals.

Examining idiom processing in the context of brokering allows us not only to address ongoing theoretical debates on whether the processing of non-literal expressions involves the computation of literal meaning prior to the figurative meaning (e.g., Gibbs et al., 1989; Giora, 1997), but more importantly it allows us to pose new questions. Specifically, when studying idiom processing in the context of speakers with knowledge of idiomatic expressions in two languages, it becomes possible to manipulate idiomaticity status across languages. In single language users, a given idiomatic expression (e.g., *he kicked the bucket*) has only one idiomatic meaning that can be expressed in a paraphrase (e.g., "he died"). In bilinguals, certain idiomatic expressions retain an idiomatic sense in translation (e.g., *made of steel/ser de acero*) whereas others do not (e.g., *importarle un pepino*/to care a cucumber). With two exceptions (Vaid & Martinez, 2001; Pritchett, Vaid, & Tosun, 2011), this variable has not been systematically addressed in the bilingual figurative language processing literature. Examining how this variable—in interaction with idiom transparency—may affect the processing of idioms by bilinguals will be an important theoretical contribution of the present study, irrespective of the outcome of the brokering variable.

Overview of Experiments

Three experiments were designed to explore effects of language non-selectivity, idiom decomposability, and brokering experience in the context of idiom processing.

Experiment 1 examined whether bilinguals activate meanings of the non-active language when processing unidirectional idiomatic phrases that have an idiomatic meaning in English only (e.g., *kick the bucket*). Experiment 2 examined this same effect in idiomatic expressions that have idiomatic meaning only in Spanish. Experiment 3 explored this effect in bidirectional idioms, which share figurative meaning across the two languages. In each experiment idiom decomposability was also manipulated. The central question of interest was whether language brokering experience facilitates greater activation of cross language semantic associates of idiomatic expressions. How decomposability might interact with target language and with brokering experience was also of interest.

CHAPTER II

PROCESSING OF UNIDIRECTIONAL ENGLISH IDIOMS: THE ROLE OF BILINGUAL STATUS AND IDIOM DECOMPOSABILITY IN SEMANTIC RELATEDNESS JUDGMENTS WITHIN AND ACROSS LANGUAGES

The purpose of this experiment was to investigate how prior language brokering experience may affect the processing of expressions that are idiomatic in English but that do not have idiomatic equivalents in Spanish (henceforth, unidirectional English idioms). The research questions were: Will brokers and non-brokers be equally fast at reading idioms presented in English? How does prior language brokering experience affect the latency and accuracy of idiom-target word semantic relatedness judgments when the target word is in the same language vs. different language as the idiom? Finally, how might idiom decomposability interact with idiom-target language relationship and with language brokering experience?

It was hypothesized that brokers and non-brokers would be equally fast at reading idioms and that same-language idiom-target pairings would yield faster and more accurate judgments than different-language pairings. Of particular interest was whether brokers would be less disrupted than non-brokers at making relatedness judgments in the different-language condition. Also of interest was whether performance in the different language condition would be better for non-decomposable idioms than for decomposable idioms. Finally, although no specific prediction was made with respect to a possible interaction of group and idiom type, it was predicted that prolonged

experience in language brokering might show a general facilitatory effect for the processing of both idiom types. If one assumes for the present purposes that non-decomposable idioms may have a stored entry in the mental lexicon whereas decomposable idioms may require computation of the idiom meaning, brokering experience may facilitate both retrieval and computation of phrase meaning.

Method

Participants

Forty-six proficient Spanish-English bilinguals from Texas A&M International University (TAMIU) were recruited from psychology subject pool and were compensated $8.00 for an hour of their time.

Brokering Experience Classification

Broker status was treated as a dichotomous variable. Bilinguals were classified into two groups – brokers (n=21) or non-brokers (n=25) - based on their self-reported frequency and pattern of informal translation experience, as determined from their responses on a detailed language background and brokering questionnaire (Vaid, 2012). Specifically, bilinguals were asked to rate on a scale of 1 to 5 (1=never, 2=rarely, 3=sometimes, 4=often; 5=always) how often they translated for parents, grandparents, or guardians, in which settings (e.g. home, school, work, restaurants), and for what types of materials (e.g., immigration forms, job applications, school notes, homework, doctors' notes). Those who indicated translating for parents, grandparents, or guardians sometimes, often, or always, in at least three different settings and for at least three different types of written materials were classified as brokers, whereas those who

reported translating for parents, grandparents or guardians rarely or never, in less than three settings, and for fewer than three types of written materials were classified as non-brokers. Bilinguals who reported speaking primarily Spanish with one or two parents were more likely to be classified as brokers than bilinguals who reported not having to speak Spanish with parents as frequently. Appendix A provides a copy of the questionnaire instrument.

Language Background by Broker Status

The majority of participants (N=39, or 84.8%) were born in the U.S. This group included 17 brokers and 22 non-brokers. Over half of the brokers self-identified as Hispanic (57.1%), followed by Mexican American (23.8%), or Mexican (14.3%). For non-brokers, approximately 45% self-identified as Hispanic, followed by Mexican-American (32.0%), Latina/o (8.0%), or Mexican (4.0%). The remaining responses were combinations of the above.

Spanish was the first spoken language for 71.4% of brokers; two brokers reported English as their first language and the remaining four reported using both English and Spanish from the outset. For non-brokers almost half of the participants (N=11) also reported Spanish as their first language, followed by seven (28.9%) reporting English, and six (24%) reporting both languages. The second language was typically acquired before the age of 8 years for both groups (brokers, 77.7% and non-brokers, 71%). The majority of both groups (over 70%) reported that their language of instruction from elementary school through college was English.

With respect to language use with family members, the vast majority of brokers (95.2%) as compared to slightly over half of non-brokers (52%) reported using more Spanish when speaking to their mother. The frequency of Spanish used when speaking with their father was slightly lower: *M*=76.2% for brokers and 44% for non-brokers. For speaking with grandparents, the vast majority of brokers and most non-brokers (*M*=90.5% and *M*=70.8%) reported using more Spanish. Interestingly, for language use with siblings, about half of the brokers reported using both English and Spanish (52.4%), while non-brokers reported using either English only (37.5%) or both English and Spanish (37.5%).

Language Proficiency

Self-report measures of language proficiency were prepared based on a composite of the self-ratings of participants' English and Spanish abilities in speaking, reading, writing, and understanding each of their languages. That is, participants rated their abilities on each modality on a 1-7 scale (1=not at all proficient; 7= highly proficient). An average of these ratings was computed per language (see Table 1). A composite score for language proficiency was calculated by taking the average for each modality per language. In other words, for English proficiency, the average self-reported ratings for English reading, speaking, writing, and understanding were added together and divided by four to create an English composite. The same was done for Spanish.

The composite language proficiency score for English was 6.40 (*SD* = .67) for brokers and 6.61 (*SD* = .54) for non-brokers. The difference between brokers' and non-brokers' self-rated English proficiency was not significant, $t(44) = -1.16$, $p > .05$. The

composite language proficiency for Spanish was 5.93 (*SD* = 1.13) for brokers and 5.59 (*SD* = 1.53) for non-brokers and the difference between these two means was also not significant $t(44)=0.84$, $p > .05$.

Similarly, independent samples t-tests revealed no significant differences between brokers and non-brokers on self-rated proficiencies for each of the component modalities (e.g., speaking, reading, writing and comprehension) for English or Spanish. That is, there were no differences between brokers and non-brokers on their English speaking abilities, $t(44)= -1.36$, $p >.05$. Brokers and non-brokers also did not differ on self-rated English reading abilities, $t(44)= -0.67$, $p > .05$. The difference between brokers and non-brokers on English writing ability was also not significant, $t(44)= -1.28$, $p>.05$. There was no difference between brokers and non-brokers on English comprehension, $t(39)= -0.83$, $p >.05$.

For Spanish, brokers and non-brokers did not differ in self-rated speaking ability, $t(44)= 0.76$, $p>.05$. There were no differences between brokers and non-brokers in self-rated Spanish reading ability, $t(44) = 0.72$, $p >.05$. Differences between brokers and non-brokers on Spanish writing ability was not significant, $t(44)=0.41$, $p >.05$ and the same was true for Spanish comprehension between brokers and non-brokers, $t(44)=1.53$, $p>.05$.

Table 1: Mean Proficiency by Broker Status, Language, and Modality (Exp. 1)

		English		
Group	**Speak**	**Read**	**Write**	**Understand**
Broker (N=21)	6.14 (.96)	6.48 (.68)	6.38 (.81)	6.62 (.59)
Non-broker (N=25)	6.48 (.71)	6.60 (.58)	6.64 (.57)	6.72 (.46)
		Spanish		
Group	**Speak**	**Read**	**Write**	**Understand**
Broker (N=21)	6.05 (1.11)	5.76 (1.51)	5.24 (1.84)	6.67 (.58)
Non-broker (N=25)	5.76 (1.39)	5.40 (1.83)	5.00 (2.06)	6.20 (1.29)

[a] Standard deviation scores are presented in parentheses

Materials

Fifty-six idiomatic phrases in English were selected from the Titone and Connine (1994) and Heredia and Cieslicka (2015) norms. All were unidirectionally idiomatic in English; that is, had an idiomatic meaning only in English. If the idiomatic phrase were translated into Spanish the translation would not be idiomatic. For example, *dressed to kill* in English means "to dress to impress". If this phrase were translated literally into Spanish, i.e., *Vestida para matar*, it would not make any sense as there is no equivalent idiomatic phrase in Spanish for the English idiomatic expression.

Phrases were also selected in terms of their relative degree of decomposability, based on prior research (e.g., Gibbs et al., 1989) and on pretest measures. Specifically, stimuli were rated for their relative decomposability by two bilingual undergraduate research assistants. Based on their judgments, the items were classified as decomposable

or non-decomposable. Specifically, of the 56 English idioms, 36 (18 decomposable; 18 non-decomposable) were used in critical trials, that is, trials in which a target word presented after the idiom was related to the meaning of the idiom, while the remaining 20 (10 decomposable, 10 non-decomposable) were used in control trials, that is, trials in which the target word was not related to the meaning of the idiom. As noted earlier, decomposable idioms refer to idioms whose meaning can derived from the individual words of the idiom (e.g., *Get the picture*) , while non-decomposable idioms are those whose meaning cannot be derived from the individual words (e.g., *Dressed to kill*).

There were a total of 28 decomposable English unidirectional idioms and 28 non-decomposable English unidirectional idioms. For each idiomatic phrase in English, critical target words were selected in English and Spanish that were related to the overall figurative meaning of the idiomatic phrase. For example, for the idiomatic phrase "Dressed to kill," the critical English target word was attractive while for Spanish the critical target word was *encanto* (meaning, pleasurable or likeable). Further, control target words (for the present example, the control word was available) were unrelated in meaning to the idiom and were presented in the same language as the idiom. Control words were matched to critical target words in frequency, part of speech, and word length (defined here as number of letters in each word). The EsPal database was used to arrive at appropriate matching of Spanish target words (Duchon, Perea, Sebastián-Gallés, Martí, & Carreiras, 2013) and the Subtlex-UK was used to find English target words (Van Heuven, Mandera, Keuleers, & Brysbaert, 2014). See Appendix B, for a complete list of Experiment 1 materials.

The set of 56 idioms were presented once and were then repeated. However, to maintain consistency with previous studies, only data from the first exposure are presented in the results.

Design

The experiment design was a 2 (Idiom type - decomposable vs. non-decomposable) X 2 (Target Language - English-Same vs. Spanish-Different) X 2 (Broker Status - broker vs. non-broker) mixed factorial with broker status as the between-subjects variables and idiom type and target language as the within subjects variables. Two lists were prepared such that participants were shown 9 critical trials where decomposable idioms were presented with English targets (i.e., List A) and the remaining 9 decomposable idioms with Spanish targets. For List B, the target words were in the opposite language of List A. For example, the 9 decomposable idioms with English targets (i.e., List A) in List B would be presented with Spanish targets and the same for the non-decomposable idioms.

Procedure

Participants were tested individually in a laboratory setting. The software package E-Prime 2.0 (Schneider, Eschman, & Zuccolotto, 2002) was used to control stimulus presentation and data collection on a microcomputer.

Participants were seated facing a computer and were instructed that they would be reading phrases in English followed by a target word presented in upper case letters in either the same or different language as the phrase. They were instructed first to read each presented phrase silently. Upon reading each phrase for its meaning they were to

press the space bar on the computer and a target word would then appear in upper case letters on the computer screen for 850 ms. Their task was to decide as quickly and as accurately as possible if this word was related to the meaning of the preceding phrase. If they judged it to be related in meaning, they were to press the 'p' key on the keyboard, which was labeled "Y." If they judged it not to be related in meaning to the phrase they were to press the 'q' key labeled "N."

Thus, for example, on a given trial a participant may have seen the phrase, *a piece of cake* followed by the target word EASY. They would have to respond "yes". If they instead saw a Spanish critical target word (FÁCIL) they would again have to respond "yes" response because this word is also related to the overall figurative meaning of the phrase. For control trials, participants would encounter an idiom such as *get the picture* followed by either an English or Spanish control target word. If the English control target word USED were presented then they would have to respond "no" response because USED is not related to the overall figurative meaning of the idiomatic phrase. Based on the counterbalancing a participant might see the Spanish word USADO and would also have to indicate a "no" response because USADO is not related to the overall meaning of the idiomatic phrase in the non-target language.

Participants were given a short practice set (12 trials) to get used to the task, and then the actual experiment began. There were a total of thirty-six critical trials, including 18 decomposable idioms and 18 non-decomposable idioms presented randomly, and twenty control trials, including 10 decomposable and 10 non-decomposable idioms. Per idiom type half of the targets were presented in English and the other half were in

Spanish. The target word language was counterbalanced across participants so that any given participant either saw a Spanish or English target word for any given idiom (but saw target words in each language equally often across the items).

There were three dependent measures. The first was how long it took participants to read each idiomatic phrase, as measured from phrase onset until participants hit the space bar to indicate they had finished reading the phrase. This also served as a proxy behavioral measure of reading comprehension proficiency (supplementing the self-reported ratings). The second was mean reaction time latencies to correct semantic verification judgments; latencies were recorded from target word onset until participants pressed the key designating the "yes" response. The third dependent measure was mean percent accuracy of semantic verification response. Idiom reading latencies were analyzed as a function of group and idiom type. The response time and accuracy judgments of semantic relatedness were each analyzed as a function of group, idiom type, and target language.

Language Background and Brokering Questionnaire

After completing the experimental portion, participants were asked to answer a detailed language background and brokering questionnaire (Vaid, 2012). Participants answered questions on age of acquisition of English and Spanish, frequency of language brokering (e.g. whom they brokered for, what they brokered and current brokering status). Participants also answered questions on their frequency and use of code-switching.

Analyses

For the idiom reading latencies a 2 Broker Status x 2 Idiom Type analysis of variance was run. For the semantic verification latencies and accuracy, two separate analyses of variance were run as a function of Idiom Type (decomposable vs. non-decomposable), Target Language (English vs. Spanish), and Broker Status (broker vs. non-broker). [1]

Results

Mean Idiom Phrase Reading Times

A 2 Idiom Type (decomposable vs. non-decomposable) X 2 Broker Status (broker vs. non-broker) analysis of variance was run on reading times for idioms with critical target words, with repeated measures on the first variable. The main effect for idiom type, $F(1,44)=3.44$, $p>.07$, $\eta_p^2=.07$, and group, $F(1,44)=1.89$, $p>.05$, $\eta_p^2=.04$, were not significant. The interaction between idiom type and broker status was also not significant, $F(1,44)=0.16$, $p > .05$, $\eta_p^2 =.004$. Response latencies were generally long, as participants were instructed to read the idioms for meaning. The mean idiom reading for brokers was 1872.15 ms and for non-brokers it was 1665.85 ms.

Mean Semantic Relatedness Judgment Latencies

A 2 Idiom Type (decomposable vs. non-decomposable) X 2 Target Language (English vs. Spanish) X 2 Broker Status (broker vs. non-broker) analysis of variance with repeated measures on the first two variables was run on reaction times for correct

[1] As noted previously, participants were presented with the stimuli twice in consecutive blocks. A preliminary analysis revealed that performance generally improved on second presentation. However, to be consistent with the prior literature, only data from the first presentation are presented and discussed.

semantic verification responses to the target words that were related in meaning to the idioms.

There was a significant main effect for target language, $F(1,44)=6.25$, $p=.02$, $\eta_p^2 =.004$, indicating that participants were faster to respond when the target words were in English (same language as the idioms) (M=642.40;SD=88.76) than when they were in Spanish (different language as the idioms), (M=668.34;SD=100.57).

Three-Way Interactions

The three-way interaction of idiom type, target language, and broker status was also significant, $F(1,44)=8.66$, $p=.005$, $\eta_p^2 =.16$. Further analysis of the interaction revealed that brokers and non-brokers were equally fast to decomposable idioms with same language (English) target words, $t(44)=0.69$, $p>.05$, decomposable idioms with Spanish target words, $t(44)=-1.25$, $p>.05$, non-decomposable idioms with English target words $t(44)= -1.39$, $p>.05$, and non-decomposable idioms with Spanish target words $t(44)= -0.10$, $p>.05$. See Figure 1**.**

However, the groups showed different patterns of interactions of idiom decomposability and target language. For non-brokers, reaction times to decomposable idioms were faster for English targets (M=632.45, SD=83.97) than Spanish targets (M=683.70, SD=89.66), $t(24)=-3.32$, $p=.003$, but for non-decomposable idioms, non-brokers were equally fast to English and Spanish targets.

For brokers, reaction times to decomposable idioms were equally fast for English and Spanish targets. However, for non-decomposable idioms brokers were significantly faster in response to English targets (M=621.25, SD=110.02) than Spanish targets

(*M*=668.64, *SD*=117.58), *t*(20)=-3.37, *p* =.003. Brokers also had faster reaction times for non-decomposable idioms with English targets (*M*=621.25, *SD*=110.02) than decomposable idioms with English targets (*M*=651.74, *SD*=106.16), *t*(20)=2.40, *p*=.03. See Figure 1. No other effects were significant.

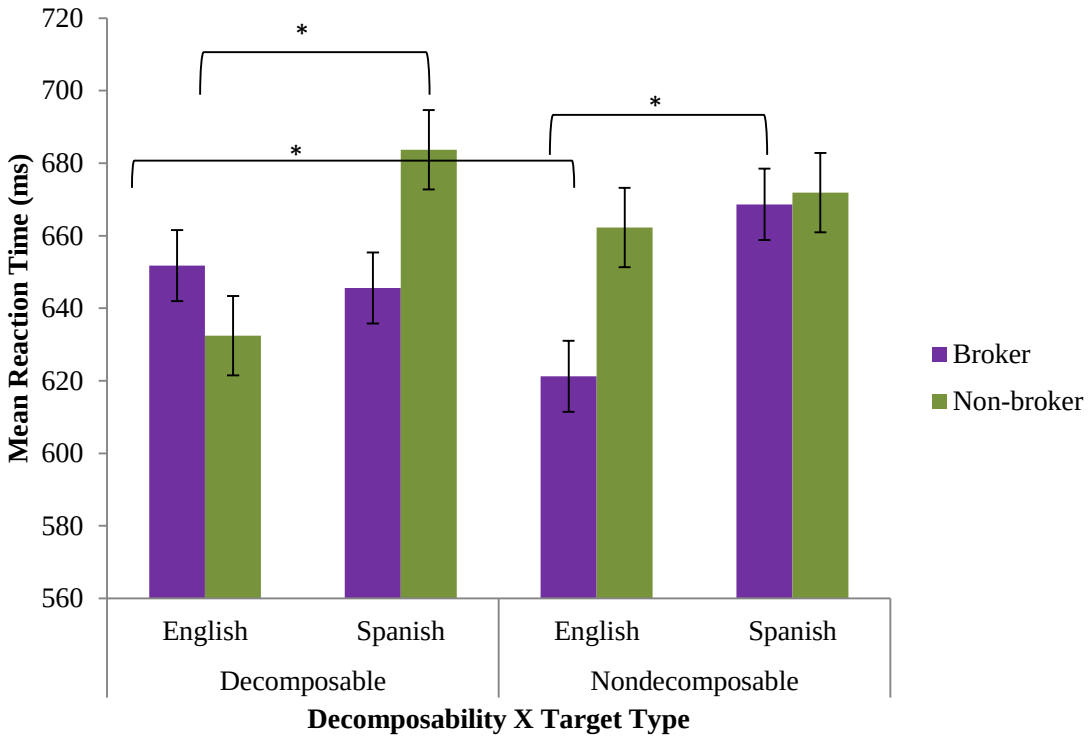

Figure 1: Semantic Relatedness Judgment Latencies for English Unidirectional Idioms by Idiom Decomposability, Target Language, and Broker Status (Exp.1)

Accuracy of Semantic Verification Judgments

A 2 Idiom Type (decomposable X non-decomposable) X 2 Target Language (English vs. Spanish) X 2 Broker Status (broker vs. non-broker) analysis of variance was

run with repeated measures on the first two variables. The main effect for target language was significant, $F(1,44)=4.18$, $p=.047$, $\eta_p^2=.09$, indicating that semantic verification accuracy was higher for English (or same language) targets ($M=.76$, $SD=.18$) than for Spanish (or different language) targets ($M=.69$, $SD=.17$). There was also a significant main effect for idiom type, $F(1,44)=10.83$, $p=.002$, $\eta_p^2=.20$, indicating that accuracy was higher for decomposable idioms ($M=.76$, $SD=.15$) than for non-decomposable idioms ($M=.70$, $SD=.15$).

Two-Way Interactions

A significant two-way interaction between idiom type and broker status, $F(1,44)=12.84$, $p=.001$, $\eta_p^2=.23$, indicated that the greater accuracy rate for decomposable idioms was restricted to non-brokers: decomposable idioms, $M=.77$, $SD=.12$, vs. non-decomposable idioms, $M=.65$, $SD=.13$, $t(24)=4.59$, $p=.0001$. This difference was not significant for brokers, $t(20)=-.23$, $p>.05$. See Figure 2. Further, while brokers and non-brokers performed equivalently for decomposable idioms, $t(44)=-.54$, $p>.05$, brokers had significantly higher accuracy than non-brokers for non-decomposable idioms ($M=.75$, $SD=.16$ vs. $M=.65$, $SD=.13$, respectively), $t(44)=2.28$, $p=.03$.

There was also a significant two-way interaction between target language and broker status, $F(1,44)=8.60$, $p=.005$, $\eta_p^2=.16$. See Figure 3. Follow up t-tests revealed no differences in accuracy rates between brokers and non-brokers for English target words, $t(44)=-.97$, $p>.05$. Brokers, however, had higher accuracy rates for Spanish target words ($M=.76$, $SD=.17$) than non-brokers ($M=.63$, $SD=.15$), $t(44)=2.75$, $p=.009$. Additionally, non-brokers had higher accuracy rates for English target words ($M=.79$,

SD=.14) than Spanish target words (*M*=.63, *SD*=.15), *t*(24)=3.98, *p*=.001. There was no difference for brokers in accuracy rates for English and Spanish target words, *t*(20)=-.56, *p*>.05. No other interactions were significant.

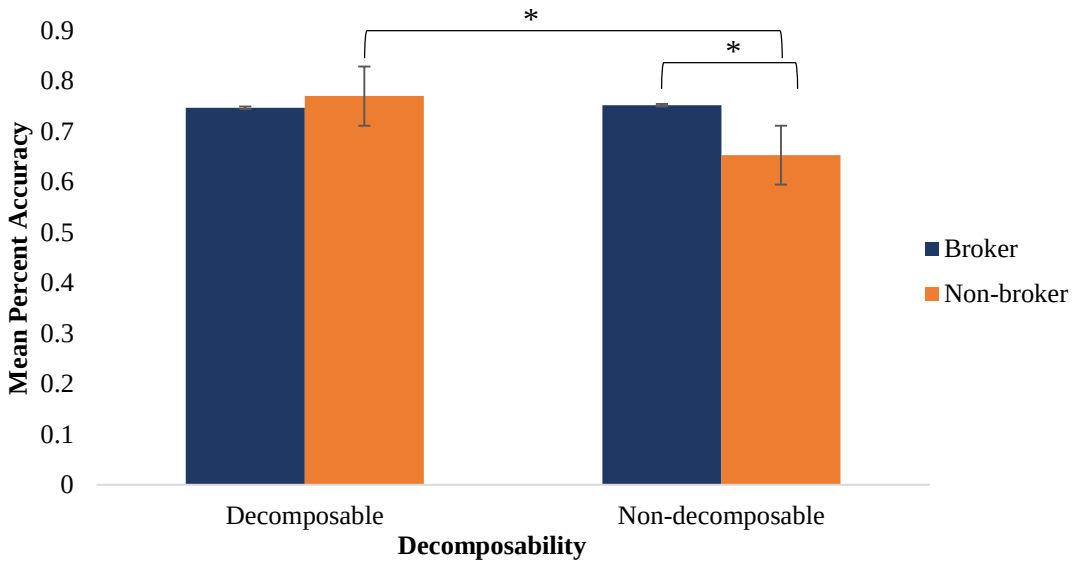

Figure 2: Analysis of Relatedness Accuracy for Unidirectional English Idioms by Idiom Decomposability and Broker Status (Exp. 1)

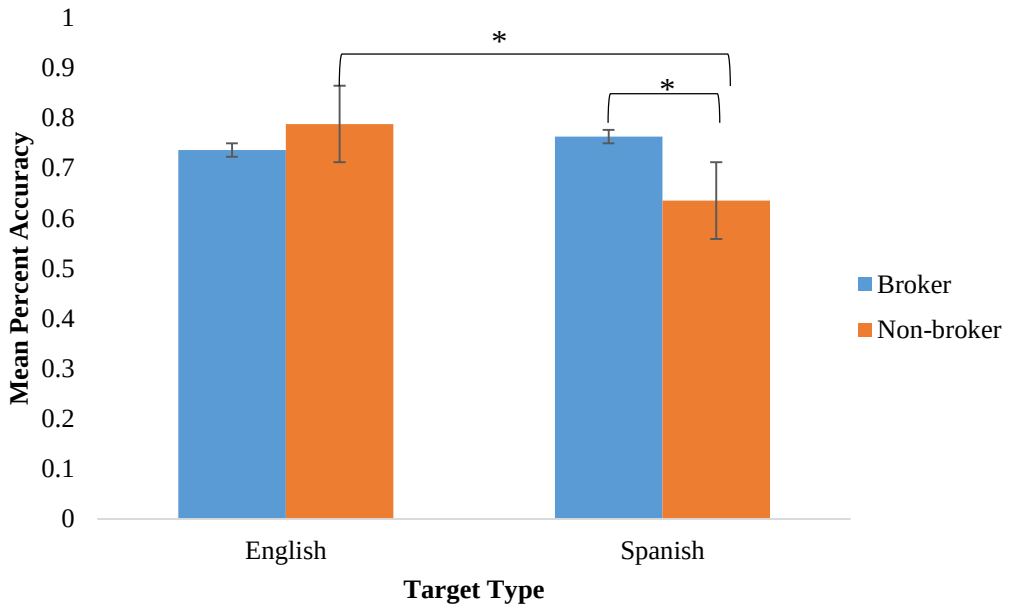

Figure 3: Analysis of Relatedness Accuracy for Unidirectional English Idioms by Target Language and Broker Status (Exp. 1)

Discussion

This experiment allowed for an examination of idiom processing across and within language boundaries. It was expected that brokers would be less disrupted when making semantic verification judgments across languages than within the same language, relative to non-brokers. The data supported this prediction. The interaction between broker status and target language (in the accuracy analysis) and in the three-way interaction with idiom type (in the response latency analysis) lend support to the suggestion that brokers tend to activate words with similar meaning in both languages when processing the meaning of unidirectional English idioms. This is especially demonstrated in the finding that brokers showed no differences in their accuracy rates

when the target item was in the same language as the idiom or in the other language, suggesting that brokers' semantic verification judgments were not affected by the language status of the target word; moreover, brokers were equally fast in responding to English and Spanish target words for decomposable idioms. By contrast, non-brokers demonstrated an English preference effect: they showed higher accuracy for English target words (i.e., words in the same language as the stimulus idiom) than for Spanish target words, and were faster in responding to English than to Spanish target words for decomposable idioms. These findings suggest that for brokers activation of the figurative meaning of an idiom as conveyed by a lexical target is not affected by whether the target word is in the same or different language as the idiom. By contrast, non-brokers perform better when the target word related to the idiom is in the same language as the idiom.

This pattern of results is similar to that of Carrol and Conklin (2014) who suggested that bilinguals may activate the non-target language when processing idiomatic language. Chinese-English bilinguals were given the task of reading idiomatic phrases in English and Chinese followed by a lexical decision task. Bilinguals showed faster reaction times on a lexical decision task involving English translations of Chinese idioms in comparison to control phrases in English.

The present findings demonstrate that for language brokers the language of a target word is less important than it is for non-brokers. Rather, brokers appear to focus on the underlying meaning, regardless of the language of presentation. By contrast, non-brokers' responses are more accurate when they are in the same language as the phrase language for which the semantic verification is required. More generally, the findings

from this experiment offer the first evidence that there are individual differences in cross-language activation among bilinguals related to language brokering experience in how the meaning of fixed expressions may be processed.

The findings from this experiment may also be understood in relation to previous studies of language switching. Previous literature on switching costs has demonstrated that there are greater processing costs (reflected in longer reaction times or incorrect answers) when bilinguals have to switch from their dominant language to their less dominant language (Meuter & Allport, 1999). Although these switch cost studies have not used tasks such as semantic verification, our results suggest that non-brokers may have more difficulty responding to different language targets when they are Spanish target words. Spanish may be non-brokers' weaker language when processing idioms in English. Brokers, however, did not have difficulty responding in either English or Spanish. Brokers in comparison to the non-brokers may thereby be seen as showing reduced switching costs when reading an idiom in English followed by making a semantic verification of an English or Spanish target word. This in turn reinforces the notion that brokers have no processing difficulty in moving between English and Spanish even when the task involves processing the meaning of a fixed expression that is typically encountered in one language only.

With respect to the variable of idiom decomposability, the findings also showed a difference related to brokering experience even though no clear prior prediction was made as to how brokers and non-brokers would react to idioms based on their decomposability. For non-decomposable idioms (e.g., *kick the bucket*) brokers were

more accurate than non-brokers at determining if a target word was related (e.g. DEATH/MORIR) to the idiom. Non-decomposable idioms could be seen as idioms which are more ingrained (Cieslicka, 2006). Non-decomposable idioms may require less processing if they are stored as whole entries. It may be that for brokers, non-decomposable English idioms may be more accessible as a result of not having to utilize each of the idiom's constituents to extract the figurative meaning.

Experiment 1 demonstrates that when bilinguals process idiomatic phrases that are figurative in only one language, English, brokers are better able to identify cross-language target words (i.e., , Spanish) words. This experiment would suggest that there are differences among bilinguals with varying experiences of language brokering and their ability to process cross language target words associated with unidirectional English idioms. Previous work has only investigated how second language learners process decomposable and non-decomposable idioms both in and out of context (Cieslicka, 2006; Gibbs et al., 1989; Giora, 1997). This experiment adds to prior literature because it demonstrates differences in idiomatic processing within bilinguals based on prior language brokering experience and how bilinguals process idiomatic expression with no context that could bias either a literal or figurative meaning. These differences in processing suggest that bilinguals are not all the same.

However, Experiment 1 only investigated effects using unidirectional English idioms. Experiment 2 investigated the possible effects of brokering when bilinguals process Spanish unidirectional idioms that are decomposable or non-decomposable.

CHAPTER III

PROCESSING OF UNIDIRECTIONAL SPANISH IDIOMS: THE ROLE OF BILINGUAL STATUS AND IDIOM DECOMPOSABILITY IN SEMANTIC RELATEDNESS JUDGMENTS WITHIN AND ACROSS LANGUAGES

The purpose of this experiment was to investigate how prior language brokering experience could affect non-target language activation when processing unidirectional Spanish idiomatic expressions. Similar to the experiment in Chapter II, the present experiment seeks to determine if language brokering experience affects a bilingual's ability to access English word meanings when presented with idiomatic expressions in Spanish. Additionally, the experiment examined whether the accessibility of English meanings will be affected by the decomposability of Spanish idioms.

Although no group differences were expected in the time needed to read an idiom in Spanish, brokers were expected to show less disruption in semantic relatedness judgments when the idiom and targets were in different languages than in the same language. Further, group differences were expected in the interaction of target language and idiom type.

Method

Participants

Thirty-nine Spanish-English bilinguals from Texas A&M International University were recruited from the psychology participant pool and were compensated $8.00 for an hour of their time.

Broker Experience Classification

Broker status was treated as a dichotomous variable. Bilinguals were classified into two groups – brokers (n=22) or non-brokers (n=17) - based on their self-reported frequency and pattern of informal translation experience, as determined from their responses on a detailed language background and brokering questionnaire (Vaid, 2012). Specifically, bilinguals were asked to rate on a scale of 1 to 5 (1=never, 2=rarely, 3=sometimes, 4=often; 5=always) how often they translated for parents, grandparents, or guardians, in which settings (e.g. home, school, work, restaurants), and for what types of materials (e.g., immigration forms, job applications, school notes, homework, doctors' notes). Those who indicated translating for parents, grandparents, or guardians sometimes, often, or always, in at least three different settings and for at least three different types of written materials were classified as brokers, whereas those who reported translating for parents, grandparents or guardians rarely or never, in less than three settings, and for fewer than three types of written materials were classified as non-brokers. Bilinguals who reported speaking primarily Spanish with one or two parents were more likely to be classified as brokers than bilinguals who reported not having to speak Spanish with parents as frequently. Appendix A provides a copy of the questionnaire instrument.

Language Background by Broker Status

The majority of participants (N=31, or 79%) were born in the U.S. Of these participants, seventeen brokers and fourteen non-brokers reported being born in the U.S; the remainder reported being born outside of the U.S. Over half of the brokers reported

that they self-identified as Hispanic (54.5%), followed by Mexican American (27.3 %), then Mexican (13.6%). For non-brokers, more than 50% identified as Hispanic, followed by Mexican-American (23.5%), Latina/o (11.8%), then Mexican (5.9%) and other Chicana/o (5.9%).

Most of the participants (N=26) reported Spanish as their first language. This was the case for 77.3% of the brokers; only two brokers reported English as their first language and the remaining three (13.6%) reported learning both English and Spanish from the start. For non-brokers, half of the participants (N=9) reported that Spanish was their first language, followed by four (23.5%) reporting English, and three (N=17.6 %) reporting learning English and Spanish at the same time. The second language was typically acquired around before the age of eight. For language of schooling, the majority of both groups (over 60%) reported their language of education from elementary through college was primarily in English.

With respect to language use with family members, the vast majority of brokers (*M*=90.9%) compared to about half of the non-brokers (*M*=52.9%) reported using more Spanish when speaking to their mothers. The same was true for the language used with their fathers, as Spanish was reported by both brokers (*M*=77.3%) and non-brokers (*M*=52.9%). For speaking with grandparents, the vast majority of brokers (*M*=95.5%) and non-brokers (*M*=87.5%) reported using more Spanish. Interestingly, for language use with siblings, brokers (*M*=59.1%) and non-brokers (*M*=43.8%) reported using both English and Spanish.

Proficiency

Self-report measures of language proficiency were based on a composite of the self-ratings on participants' English and Spanish abilities in speaking, reading, writing, and understanding each of their languages. Participants rated their abilities on each modality on a 1-7 scale (1=not at all proficient; 7= highly proficient).An average of each of their ratings per language was calculated. The composite language proficiency for English was 6.22 for brokers and 6.49 for non-brokers. The difference between brokers' and non-brokers' self-rated English proficiency was not significant, $t(37)=-1.06$, $p>.05$. The composite language proficiency for Spanish was 6.23 for brokers and 6.19 for non-brokers and the difference between these two means was also not significant $t(37)=.11$, $p>.05$. The mean self-ratings for English and Spanish speaking, reading, writing and comprehension were calculated (See Table 2). Independent samples t-tests revealed no significant differences between brokers and non-brokers on each of these modalities for English or Spanish.

Table 2: Mean Proficiency by Broker Status, Language, and Modality (Exp. 2)

			English	
Group	**Speak**	**Read**	**Write**	**Understand**
Broker (N=22)	6.05 (1.05)	6.23 (.97)	6.14 (1.04)	6.50 (.67)
Non-broker (N=17)	6.29 (.77)	6.47 (.62)	6.53 (.62)	6.65 (.49)
			Spanish	
Group	**Speak**	**Read**	**Write**	**Understand**
Broker (N=22)	6.41 (.85)	6.00 (1.23)	5.68 (1.46)	6.82 (.40)
Non-broker (N=17)	6.18 (1.13)	6.24 (1.25)	5.88 (1.50)	6.47 (.94)

[a] Standard deviations are presented in parentheses.

Materials

Fifty-six idiomatic phrases in Spanish were selected from the Titone and Connine (1994) and Heredia and Cieslicka (2015) norms. All idiomatic phrases were idiomatic in Spanish only, meaning that the literal translation of the idiomatic phrase is not itself an idiomatic expression. For example, *Importarle un pepino* in Spanish means to not care about something. If this phrase were translated into English "To care a cucumber," then this phrase would not make any sense.

Phrases were also rated in terms of decomposability (Gibbs et al., 1989; Heredia & Cieslicka, 2015). Chosen stimuli were rated by two undergraduate research assistants on degree of decomposability then the items were judged by the experimenter and research assistants to determine the degree of decomposability used for this experiment. Half of the items were decomposable and the other half were non-decomposable.

Specifically, of the fifty-six unidirectional Spanish idioms, 36 (18 decomposable; 18 non-decomposable) were used in critical trials, while the remaining 20 (10 decomposable; 10 non-decomposable) were used in control trials. Decomposable idioms are defined in the previous literature review as idioms whose meaning can derived from the individual words of the idiom (e.g., *pegarle al gordo*, which means "to win"), while non-decomposable idioms are those whose meaning cannot be derived from the individual words (e.g., *Sin duda alguna*, which means "without a doubt"). In this study, there were a total of twenty-eight decomposable English unidirectional idioms and twenty-eight non-decomposable English unidirectional idioms.

Critical target words were then selected from both English and Spanish words that related to the overall figurative meaning of the idiomatic phrases. Critical target words were selected as follows. For the Spanish idiomatic phrase *Pegarle al gordo*, the critical English target word was VICTORY, while for Spanish the critical target word was GANAR, and the control English word would be AVAILABLE. Control target words were presented in the same language or different language of the idiom and were matched to the critical target words in frequency and word length, and were not semantically related to the idiomatic phrase. Word length, part of speech, and word frequency were matched across critical and control targets using the EsPal database for Spanish target words (Duchon et al., 2013) and the Subtlex-UK was used to find English target words (Van Heuven et al., 2014). Each set of stimuli was presented once and then the entire set was repeated. See Appendix C for a complete list of Experiment 2 materials.

Design

The design was a 2 (Idiom Type - decomposable vs. non-decomposable) X 2 (Target Language - English-Different vs. Spanish-Same) X 2 (Broker Status - broker vs. non-broker) mixed factorial with broker status as the between-subjects variable and idiom type and target language as the within-subjects variables. Two lists were made such that participants would get 9 critical trials where decomposable idioms were presented with Spanish targets (i.e., List A) and the remaining 9 decomposable idioms, but with English targets (i.e., List A). Then for List B, the target words were in the opposite language of List A. For example, the 9 decomposable idioms with Spanish targets (i.e., List A) in List B would be presented with English targets and the same for the non-decomposable idioms.

Procedure

Semantic Verification Task

Participants were tested individually in a laboratory setting. The software package E-Prime 2.0 (Schneider et al., 2002) was used to control stimulus presentation and data collection. Participants were seated facing the computer and were instructed that they would be reading phrases in Spanish followed by a target word (in upper case) presented in either the same or different language as the phrase. They were instructed to read each of the phrases silently to themselves and upon finishing reading the phrase to press the "spacebar" in order to see a target word. After seeing the target word (850ms) they would have to decide as quickly and as accurately as possible if this word was related to the overall meaning of the preceding phrase. If the answer was "yes," then

participants had to press the ‘p’ key labeled “Y.” If the answer was “no,” then participants had to press the ‘q’ key labeled “N.”

On a typical trial a participant would have seen the following *Tomelo con calma,* which means to take it with ease” followed by a target word CHILL. The target word CHILL is a critical English target word that would require a “yes” response. If the Spanish critical target word TRANQUILO were presented this would also incur a “yes” response because this word is also related to the overall figurative meaning of the phrase *tomelo con calma*. For control trials, participants would encounter an idiom such as *Si dios nos da licencia,* which means if god were to grant us a license (i.e., if god wants it). This phrase would be followed by either an English or Spanish control target word. If the Spanish target word BAILAR were presented, then participants would have to respond “no” because BAILAR is not related to the overall figurative meaning of the idiomatic phrase. Based on the counterbalancing, a participant might see the English word DANCE and this participant would then have to indicate a “no” response because DANCE is not related to the overall meaning of the idiomatic phrase in the non-target language.

Participants were given a short practice set (12 trials) to get used to the task, and then the actual experiment began. Participants then saw a total of thirty-six critical trials with 18 decomposable idioms and 18 non-decomposable idioms. For decomposable and no-decomposable critical trials half of the targets were in English and the other half were in Spanish. The target word language was counterbalanced so participants either saw a Spanish or English target word for any given idiom. The same was done for the 20

control idioms (10 decomposable; 10 non-decomposable), half of the target words were in Spanish and half were in English.

Reading times were recorded for the amount of time it took participants to read each idiomatic phrase. Reaction times were recorded from target word onset. Accuracy rates were also recorded.

Language Background and Brokering Questionnaire

After completing the experimental portion, participants were asked to answer a detailed language background and brokering questionnaire (Vaid, 2012). Participants answered questions on age of acquisition of English and Spanish, frequency of language brokering (e.g. who they brokered for, what they brokered and current brokering status). Participants also answered questions on their frequency and use of code-switching. See Appendix A for a copy of the Language Background and Brokering Questionnaire.

Analyses

A 2 (Idiom Type) X 2 (Target Type) X 2 (Broker Status) analysis of variance (ANOVA) mixed factorial was run on the mean correct response times, and percent accuracy.[2]

Results

Mean Idiom Reading Times

A 2 Idiom Type (decomposable X non-decomposable) X 2 Group (broker vs. non-broker) repeated measures analysis of variance (ANOVA) was run on reading times

[2] As noted previously, participants were presented with the stimuli twice in consecutive blocks. A preliminary analysis revealed that performance generally improved on second presentation. However, to be consistent with the prior literature, only data from the first presentation are presented and discussed.

for idioms with critical target words. There was no main effect for idiom type, $F(1,36)=.06$, $p>.05$, $\eta_p^2 =.002$ or for group, $F(1,36)=.13$, $p>.05$, $\eta_p^2 =.004$ and no interaction effect. Mean idiom reading times were 2302.69 ms for brokers and 2407.41 ms for non-brokers.

Mean Semantic Relatedness Judgment Latencies

A 2 Idiom type (decomposable X non-decomposable) X 2 Target language (English vs. Spanish) X 2 Broker Status (broker vs. non-broker) analysis of variance (ANOVA) with repeated measures on the first two variables was run on reaction times for correct "yes" trials. There was a significant main effect for target language, $F(1,36)=5.25$, $p=.03$, $\eta_p^2=.13$, indicating faster relatedness judgments for English target words (M=671.68, SD=76.47) than Spanish target words (M=692.88, SD=91.49). The interaction between idiom type and target language was also significant, $F(1,36)=7.69$, $p=.009$. Follow up t-tests revealed the faster reaction times for English than Spanish target words characterized decomposable Spanish idioms only (M=657.51, SD=93.12, vs. *(*M=699.52, SD=103.65, respectively), $t(37)=-3.27$, $p=.002$. Furthermore, responses were faster to decomposable than to non-decomposable Spanish idioms with English targets (M=685.85, 71.41), $t(37)=-2.712$, $p=.01$. There were no significant differences in responses to non-decomposable idioms presented with English vs. Spanish targets, $t(38)=.20$, $p>.05$. See Figure 4. There were no differences in reaction time for Spanish target words regardless of whether they followed a decomposable or non-decomposable idiom, $t(38)=1.19$, $p>.05$. No other main effects or interactions were significant.

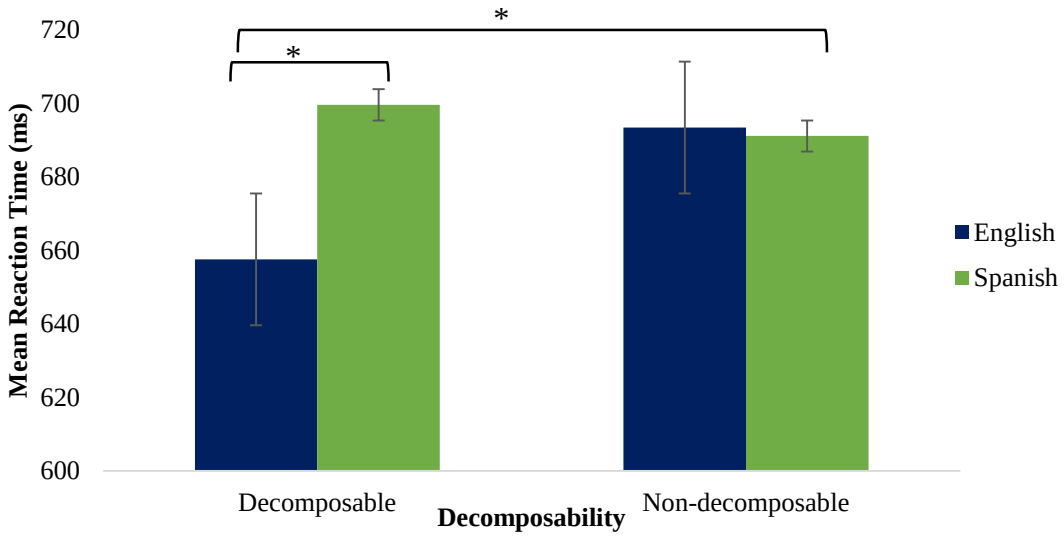

Figure 4: Relatedness Judgment Latencies for Unidirectional Spanish Idioms by Idiom Decomposability and Target Language (Exp. 2)

Accuracy of Semantic Verification Judgment

A 2 Idiom Type (decomposable X non-decomposable) X 2 Target Type (English vs. Spanish) X 2 Broker Status (broker vs. non-broker) repeated measures analysis of variance (ANOVA) was run. There was only a trend for a main effect of target type, $F(1,37)=3.65$, $p=.06$. The means indicated that responses were more accurate to English targets ($M=.72$; $SD=.17$) than to Spanish targets ($M=.67$; $SD=.16$). No other main effects or interactions were significant.

Discussion

In Experiment 2, Spanish-English bilinguals were presented with Spanish unidirectional idioms and had to decide whether target words in English or Spanish were related or not related to idioms. As hypothesized, brokers and non-brokers did not differ in their mean idiom reading times in Spanish. However, there were also no group differences in semantic relatedness judgment latency or accuracy, contrary to expectation. Furthermore, relatedness judgments by both groups were faster when the target word language was English (i.e., different language than the idiom) than when it was Spanish. This was particularly the case when the (Spanish) idioms were decomposable. That is, performance was not facilitated by a match in idiom language and target language. Rather, both brokers and non-brokers showed faster and more accurate relatedness judgments to English target-Spanish idiom pairings.

These findings differ from those obtained in the previous experiment, with English idioms. Experiment 1 found that brokers when reading unidirectional English idioms responded equally well to different language target words (i.e., Spanish) than same language target words (English). However, non-brokers demonstrated better performance with English target words. Thus, the performance of non-brokers across the two experiments shows a consistent facilitation when the target words are presented in English, independent of the language of the idioms paired with the target words.

Indeed, an English target word preference when processing unidirectional Spanish idioms characterized both non-brokers and brokers. Brokers as a result of having to translate and interpret for an extensive period of time may be able to more

easily navigate between languages, which would explain their ability to correctly identify both same and different language target words. However, for non-brokers, this is not the case; rather English is the language in which they apparently more easily access meaning, regardless of whether the idiom is English or Spanish.

Experiment 2 also demonstrated that decomposable and non-decomposable idioms are processed differently. Both groups were faster at responding to decomposable than to non-decomposable idioms when the target words were in English. Moreover, for decomposable idioms, responses were faster for English than Spanish language targets.

This pattern of results differs from that observed in the previous experiment and points to intriguing differences in how Spanish unidirectional idioms may be processed by brokers and non-brokers alike. There is a need for more research to probe whether these observed findings may be attributable in part to particular characteristics of the idioms used across the two experiments (e.g., possible differences in idiom frequency or transparency) or in the target words used (e.g., differences in degree of relatedness to the idioms) and/or whether they reflect differing characteristics of the participants across the two students. Presenting the idioms auditorily might be also be a way of reducing the possible artificiality of seeing idioms in Spanish (given that these idioms may have more likely been encountered in a spoken form by the participants, given that their schooling was largely in English).

The first two experiments examined only unidirectional idioms that were presented in only one language (e.g., Spanish or English) with corresponding same or different language targets. The results demonstrated that – at least when the idioms are in

English - prior language brokering experience may lead to different patterns of processing. However, these results are only based on expressions that are idiomatic in only one language. The effects of bidirectional or dually represented idiomatic expressions have not been explored in terms of language brokering and idiom decomposability. In Experiment 3, the question addressed is how language brokering and idiom decomposability might affect how bilinguals are able to access meaning across both languages if the idiom itself is represented in both languages.

CHAPTER IV

PROCESSING OF BIDIRECTIONAL IDIOMS: THE ROLE OF BILINGUAL STATUS AND IDIOM DECOMPOSABILITY IN SEMANTIC RELATEDNESS JUDGMENTS WITHIN AND ACROSS LANGUAGES

Whereas the previous two experiments were concerned with the processing of unidirectional idioms, the purpose of this experiment was to investigate how prior language brokering experience affects the processing of bidirectional English and Spanish idiomatic expressions. It was predicted that brokers will be better than non-brokers at accessing target words in either language regardless of the language in which the idioms are presented. Non-brokers are expected to be slowed down when presented with target words in the language different from the idiom language. As before, an additional question of interest is how idiom decomposability will interact with broker status and with target language.

Method

Participants

Thirty-six Spanish-English bilinguals with 24 brokers and 12 non-brokers from TAMIU were recruited from psychology subject pool and were compensated $8.00 for an hour of their time.

Broker Experience Classification

Broker status was treated as a dichotomous variable. Bilinguals were classified into two groups – brokers (n=24) or non-brokers (n=12) - based on their self-reported

frequency and pattern of informal translation experience, as determined from their responses on a detailed language background and brokering questionnaire (Vaid, 2012). Specifically, bilinguals were asked to rate on a scale of 1 to 5 (1=never, 2=rarely, 3=sometimes, 4=often; 5=always) how often they translated for parents, grandparents, or guardians, in which settings (e.g. home, school, work, restaurants), and for what types of materials (e.g., immigration forms, job applications, school notes, homework, doctors' notes). Those who indicated translating for parents, grandparents, or guardians sometimes, often, or always, in at least three different settings and for at least three different types of written materials were classified as brokers, whereas those who reported translating for parents, grandparents or guardians rarely or never, in less than three settings, and for fewer than three types of written materials were classified as non-brokers. Bilinguals who reported speaking primarily Spanish with one or two parents were more likely to be classified as brokers than bilinguals who reported not having to speak Spanish with parents as frequently. Appendix A provides a copy of the questionnaire instrument.

Language Background by Broker Status

The majority of our participants (N=28, or 77.8%) were born in the U.S. This group included seventeen brokers and eleven non-brokers. Over half of the brokers self-identified as Hispanic (54.2%), followed by an equal number of brokers who identified as Mexican (20.8%) or as Mexican American (20.8%). For non-brokers, 58.3% identified as Hispanic, followed by Mexican-American at 33.3%, Mexican, and other at 8.3%.

Most of the participants (N=21) reported Spanish as their first language. This was the case for sixteen (66.7%) of the brokers, while only four (16.7%) reported English as their first language and the remainder reported learning both English and Spanish at the same time. For non-brokers, 45.5% reported Spanish as their first language and 45.5% reported English as their first language; one person reported learning both English and Spanish from the beginning and one person did not respond. The second language was acquired by the majority of both groups (75%) before the age of eight. For both groups, English was the primary language of schooling.

With respect to language use with family members, the vast majority of brokers (83.3%) reported using more Spanish when speaking to their mothers, while less than half of the non-brokers (33.3%) reported using Spanish with their mothers. For use of Spanish with fathers, brokers reported using more Spanish when speaking to their fathers (95.7%), while less than half of the brokers (36.4%) reported using Spanish. For grandparents, over half of the brokers (95.8%) and non-brokers (58.3 %) reported using more Spanish. Interestingly, for language use with siblings, the majority of brokers (86.4%) reported using both languages while half of non-brokers reported using more English.

Proficiency

Self-report measures of language proficiency were prepared on a composite of the self-ratings of participant's English and Spanish abilities in speaking, reading, writing, and understanding each of their languages. That is, participants rated their abilities on a 1-7 scale (1=not at all proficient; 7= highly proficient),. An average of each

of their ratings was computed per language (See Table 3). A composite score for language proficiency was calculated by taking the average for each modality per language. That is, for English the average ratings for English reading, speaking, writing, and understanding were added together and divided by four to create an English composite. The same was done for each of the Spanish modalities to create a Spanish composite language proficiency score. The composite language proficiency for English was 6.54 (*SD*=.55) for brokers and 6.38 (*SD*=.63) for non-brokers. The difference between broker's and non-brokers' self-rated English proficiency was not significant, $t(34)=-1.56$, $p>.05$. The composite language proficiency for Spanish was 6.39 (*SD*=.63) for brokers and 5.08 (*SD*=1.40) for non-brokers and the difference between these two means was also significant $t(34)=3.89$, $p=.0001$. Independent samples t-tests were run for each of the language abilities comparing brokers' and non-brokers' self-ratings. There were no differences between brokers (*M*=6.50; *SD*=.66) and non-brokers (*M*=6.58; *SD*=.67) English speaking abilities, $t(34)=-.356$, $p>.05$. There were also no differences for English reading ability between brokers (*M*=6.46; *SD*=.66) and non-brokers (*M*=6.83; *SD*=.39), $t(34)=-1.81$, $p>.05$. For understanding English, there were also no differences between brokers (*M*=6.67; *SD*=.48) and non-brokers (*M*=6.92; *SD*=.29), $t(34)=-1.65$. However, for writing in English, non-brokers self-rated their abilities (*M*=6.92; *SD*=.29) higher than brokers (*M*=6.54; *SD*=.59), $t(34)=-2.08$, $p=.046$.

For Spanish, there were significant differences between brokers and non-brokers. For Spanish speaking, brokers (*M*=6.50; *SD*=.72) gave higher self-ratings than non-brokers (*M*=5.33; *SD*=1.37), $t(34)=3.37$, $p=.002$. Brokers also reported higher Spanish

reading ability (*M*=6.38; *SD*=.88) than non-brokers (*M*=4.92; *SD*=1.56), *t*(34)=3.60, *p*=.001. For Spanish writing, brokers (*M*=6.00; *SD*=1.10) also self-rated themselves higher than non-brokers *M*=), *t*(34)=3.72, *p*=.001. Finally, for understanding Spanish, brokers (*M*=6.67; *SD*=.57) self-reported higher scores than non-brokers (*M*=5.83; *SD*=1.27), *t*(34)=2.75, *p*=.01.

Table 3: Mean Proficiency by Broker Status, Language, and Modality (Exp. 3)

		English		
Group	**Speak**	**Read**	**Write**	**Understand**
Broker (N=24)	6.50 (.66)	6.46 (.66)	6.54 (.59)	6.67 (.48)
Non-broker (N=12)	6.58 (.67)	6.83 (.39)	6.92 (.29)	6.92 (.29)
		Spanish		
Group	**Speak**	**Read**	**Write**	**Understand**
Broker (N=24)	6.50 (.72)	6.38 (.88)	6.00 (1.10)	6.67 (.57)
Non-broker (N=12)	5.33 (1.37)	4.92 (1.56)	4.25 (1.71)	5.83 (1.27)

[a] Standard deviations are presented in parentheses.

Materials

One hundred and fifty-two idiomatic phrases in Spanish (N=76) and English phrases (N=76) were taken from the Titone and Connie (1994) and Heredia and Cieślicka (2015). Idiomatic phrases consisted of bidirectional idiomatic phrases that

have idiomatic meaning across both languages (e.g., *add fuel to the fire/ echarle leña al fuego*).

Phrases were also rated on decomposability (Gibbs, et al., 1989; Heredia & Cieślicka, 2015). Decomposable idioms are defined in the previous literature review as idioms whose meaning can derived from the individual words of the idiom (e.g., *Letter of the law*/*Al pie de la letra*), while non-decomposable idioms are whose meaning cannot be derived from the individual words (e.g.,, *Out of the blue*/*de la nada*). Chosen stimuli were also rated by two undergraduate research assistants on degree of decomposability then items were judged by the experimenter and research assistants to determine the degree of decomposability used for this experiment. Of the thirty six bidirectional English idioms, eighteen were decomposable and the other eighteen were non-decomposable. The same was true for Spanish with eighteen decomposable Spanish bidirectional phrases and eighteen non-decomposable Spanish bidirectional idioms.

Critical target words in English and Spanish were selected that are related to the overall figurative meaning of the idiomatic phrases. Critical target words were selected as follows: for example the phrase, *add fuel to the fire,* the English critical target word chosen was WORSEN, while the Spanish critical target word was EMPEORAR, Control target words were presented in the same language of the idiom and were matched to the critical target words in frequency and word length, and were not semantically related to the idiomatic phrase. Word lengths, part of speech, and word frequency were matched across critical and control targets. The EsPal database was used to arrive at appropriate matching for Spanish target words (Duchon et al.,2013) and the Subtlex-UK was used to

find English target words (Van Heuven et al., 2014). The variable of language order was implemented to determine if the order in which bidirectional idioms are presented would influence a bilingual's ability to access same versus different language target words. Idioms and target words were randomized and two experimental lists were created. See Appendix D for a complete list of Experiment 3 materials.

Design

The design was a 2 (Idiom language - English vs. Spanish) X 2 (Idiom Type - decomposable vs. non-decomposable) X 2 (Target type - English vs. Spanish) X 2 (Broker Status - broker vs. non-broker) x 2 (Language Order – English stimuli first vs. Spanish first) mixed factorial design, where idiom language, target language, and idiom type are within-subjects variables and language order and broker status are between-subjects variables.

Language order was blocked across participants in order to investigate the effects of order of language presentation. Target word language was counterbalanced across idiom language and decomposability. A total of four lists were made with two lists per language. This was to ensure that participants would not see the same target words for different idioms across languages. For example, if a participant were to see the English idiom *Swallow one's pride* followed by the target word HUMBLE; for Spanish trials they would not see the translation equivalent *Tragarse el orgullo* paired with HUMBLE rather they would see a Spanish target HUMILDE.

Procedure

Semantic Verification Task

Participants were tested individually in a laboratory setting. The software package E-Prime 2.0 (Schneider et al., 2002) was used to control stimulus presentation and data collection. Participants were seated facing the computer and were instructed that they would be reading phrases in English or Spanish followed by a target word in either the same or different language as the phrase, in uppercase letters. Participants were randomly assigned to either the English first or Spanish first condition. The order of language presentation was counterbalanced across participants as well as the type of target word (Spanish critical, English critical, and control). Participants were instructed to read each of the phrases silently to themselves and upon finishing reading the phrase to press the "spacebar" in order to see a target word. After seeing the target word (850ms), participants had to decide as quickly and as accurately as possible if this word is related to the overall meaning of the preceding phrase. If the answer is "yes," then participants had to press the 'p' key labeled "Y." If the answer is "no," then participants had to press the 'q' key labeled "N." On a typical trial a participant would have seen the an idiom such as *spill the beans* followed by a target word, such as REVEAL. The target word REVEAL is a critical English target word that would require a "yes" response. If the Spanish critical target word DESCUBRIR were presented this would also incur a "yes" response because this word is also related to the overall figurative meaning of the phrase *piece of cake*. For control trials, participants may encounter the idiom, *Rule with an iron fist*/*Con mano de hierro* followed by either an English target

word, DRAW or a Spanish target word, DIBUJAR. Both target words indicate a "no" response because both DRAW and DIBUJAR are not related to the overall meaning of the idiomatic phrase; either in the same or different language. The target language for control words was counterbalanced across participants so participants were presented with same versus different language targets equally across trials and idiom type.

Participants were given a short practice set (18 trials) to get used to the task, and then the actual experiment began. Participants saw a total of 72 critical trials, half were in English (36; 18 decomposable and 18 non-decomposable) and the other half were in Spanish (36; 18 decomposable and 18 non-decomposable). Per idiom type and language half of the target words were in English and half were in Spanish. The target word language was counterbalanced across participants so that any given participant either saw a Spanish or English target word for any given idiom, but saw target words in each language equally often across the items. Reaction times were recorded from target word onset. Accuracy rates were also recorded.

Language Background and Brokering Questionnaire

After completing the experimental portion, participants were asked to answer a detailed language background and brokering questionnaire (Vaid, 2012). Participants answered questions on age of acquisition of English and Spanish, frequency of language brokering (e.g., who they brokered for, what they brokered, and current brokering status). Participants also answered questions on their frequency and use of code-switching.

Analyses

A 2 Idiom language (English vs. Spanish) X 2 Idiom type (decomposable vs. on-decomposable) X 2 Target language (English vs. Spanish) X 2 Broker status (broker vs. non-broker) x 2 Language order (English first vs. Spanish first) repeated measures ANOVA was run on mean idiom reading times, semantic verification judgment latencies, and accuracy.

Results

Mean Idiom Phrase Reading Times

A 2 Language (English vs. Spanish) X 2 Idiom type (decomposable vs. on-decomposable) X 2 Target language (English vs. Spanish) X 2 Broker status (broker vs. non-broker) x Language order (English first vs. Spanish first) analysis of variance was run on reading times for idioms with critical target words. There was a main effect for language, $F(1,32)=33.81$, $p=.0001$, $\eta_p^2=.51$. Across both groups English idioms ($M=1551.41$, $SD=464.85$) were read faster than Spanish idioms ($M=2045.15$, $SD=611.58$). No other main effects were significant.

Two-Way Interactions

There was a significant interaction between idiom type and broker status, $F(1,32)=8.25$, $p=.007$, $\eta_p^2=.21$. Follow up t-tests revealed that brokers read non-decomposable idioms ($M=1664.59$, $SD=482.57$) faster than non-brokers ($M=2125.97$, $SD=469.55$), $t(34)=-2.73$, $p=.01$. There were no differences in reading times for decomposable idioms between brokers ($M=1741.59$, $SD=549.13$) and non-brokers ($M=1851.33$, $SD=406.92$), $t(34)=-0.61$, $p>.05$.

For brokers, there were no differences in reading times between decomposable (*M*=1741.59, *SD*=549.13) and non-decomposable idioms (*M*=1664.59, *SD*=482.57), *t*(23)=1.53, *p*>.05. For non-brokers, the differences between decomposable (*M*=1851.33, *SD*=406.92) and non-decomposable idiom reading times (*M*=2125.97, *SD*=469.55) showed a trend toward significance, *t*(11)=-1.98, *p*=.074.

There was also a significant interaction between broker status x language order, *F*(1,32)=7.583, *p*=.01, η_p^2=.19. Breakdown of the interaction revealed no differences between brokers (*M*=2026.77, *SD*=552.41) and non-brokers (M=1843.37, SD=199.22) when reading idioms when they were presented in English first, *t*(13)=.71, *p*>.05. However, when idioms were presented in Spanish first, brokers were faster than non-brokers in reading the idioms (*M*=1471.90, *SD*=310.41 vs. *M*=2092.43, *SD*=436.97), *t*(19)=-3.77, *p*=.001. Moreover, while non-brokers were not affected by language order, brokers who were in Spanish first condition (*M*=1471.90, *SD*=310.41) had faster reading times than those in the English first condition (*M*=2026.77, *SD*=552.41), *t*(22)=3.14, *p*=.005.

Mean Semantic Relatedness Judgment Latencies

A five-way analysis of variance was run on mean semantic judgments latencies to correct responses as a function of Idiom language (English vs. Spanish), Idiom type (decomposable vs. non-decomposable), Target language (English vs. Spanish), Broker status (broker vs. non-broker), and Idiom language order (English first vs. Spanish first). There were no significant main effects but several interaction effects were significant.

Significant Two-Way Interactions

Specifically, three two-way interactions were significant: idiom language x language order, $F(1,32)=9.23$, $p=.005$, $\eta_p^2=.22$, where participants in the Spanish first condition ($M=638.77$; $SD=87.27$) had faster reaction times for English idioms than participants in the English first condition ($M=702.71$; $SD=61.82$), $t(34)=2.43$, $p=.02$. Participants in the English first condition had faster reaction times on Spanish idioms ($M=646.11$; $SD=92.72$) than English idioms ($M=702.71$; $SD=61.82$), $t(14)=2.70$. $p=.02$. Thus, performance on English idioms was benefitted by prior exposure to Spanish idioms. No other effects were significant in this interaction.

The two-way interaction between idiom language x idiom type, $F(1,32)=6.13$, $p=.02$, $\eta_p^2=.16$ was also significant. Decomposable Spanish idioms ($M=639.90$; $SD=84.73$) had faster reaction times than non-decomposable Spanish idioms ($M=668.94$; $SD=89.62$), $t(35)=-3.12$, $p=.004$. Decomposable Spanish idioms ($M=639.90$; $SD=84.73$) were also faster than decomposable English idioms ($M=666.96$; $SD=73.11$), $t(35)=2.27$, $p=.03$. Thus, decomposability of idioms facilitated semantic judgments, but only for idioms presented in Spanish.

The interaction between idiom language x target language, $F(1,32)=14.57$, $p=.001$, $\eta_p^2=.31$ was also significant. Spanish idioms with Spanish target words ($M=636.19$; $SD=84.84$) had faster reaction times than Spanish idioms with English target words ($M=672.64$; $SD=90.21$), $t(35)=3.77$, $p=.001$. Spanish idioms with Spanish target words ($M=636.19$; $SD=84.84$) were also faster than English idioms presented with Spanish target words ($M=676.54$; $SD=94.63$), $t(35)=2.82$, $p=.008$. In summary, there was

a same-language advantage when the idiom language and the target language matched, but only when both were in Spanish.

Significant Three-Way Interactions

In addition, there was a near significant three-way interaction of target language x group x language order, $F(1,32)=3.95$, $p=.055$, $\eta_p^2=.11$. Follow up t-tests revealed that brokers in the Spanish first condition ($M=634.20$; $SD=93.91$) had faster reaction times for English targets than brokers in the English first condition ($M=707.73$; $SD=72.93$), $t22)=2.07$, $p=.05$. No other effects in this interaction were significant. Thus, only brokers appeared to show a practice effect of sorts, performing better in same idiom-target language pairs on English when these were preceded by Spanish idioms. Alternatively, non-brokers did not show any benefit on English from having been shown idioms in Spanish first. See Figure 5.

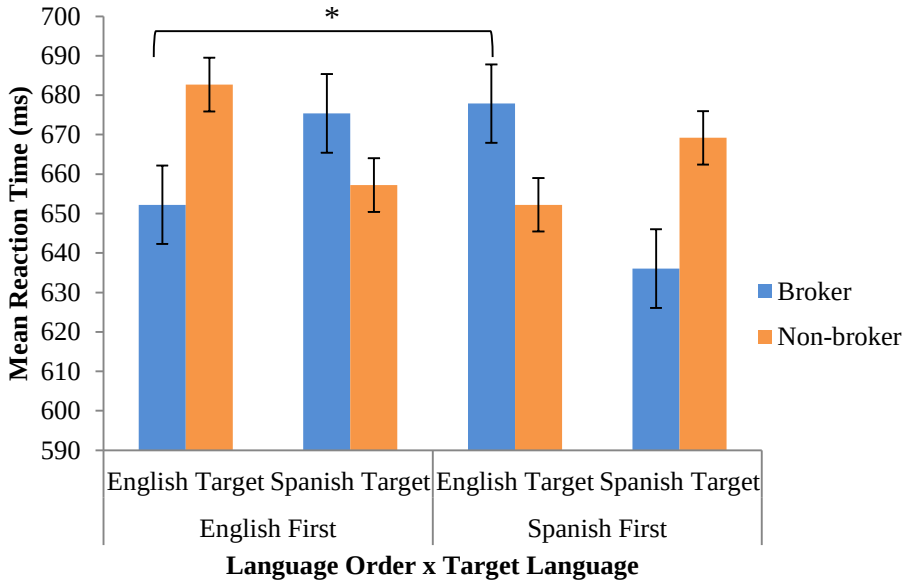

Figure 5: Relatedness Judgment Latencies by Language Order, Target Language, and Broker Status (Exp. 3).

Also, the three way interaction of idiom language x target language x language order was significant, $F(1,32)=6.78$, $p=.014$. See Figure 5. Follow up t-tests revealed that participants in the Spanish first condition ($M=619.41$, $SD=76.93$) had faster reaction times on English idioms with English target words than participants in the English first condition ($M=703.13$, $SD=57.40$), $t(34)=3.56$, $p=.001$. For English idioms with Spanish targets, there were no significant differences between participants in the English first condition *(*$M=702.30$, $SD=70.53$) and Spanish first condition ($M=658.14$, $SD=106.48$), $t(34)=1.40$, $p>.05$. For Spanish idioms with English targets, there were no significant

differences between participants in the English first condition (*M*=655.84, *SD*=103.48) or Spanish first condition (*M*=684.65, *SD*=79.89), *t*(34)=.01, *p*>.05. Finally, for Spanish idioms presented with Spanish targets, participants in the English first condition (*M*=636.38;*SD*=92.91) had no differences in reaction time compared to participants in the Spanish first condition (*M*=636.06, *SD*=80.94), *t*(34)=.01, *p*>.05. See Figure 6.

Follow up t-tests for the English first condition showed no significant difference for English idioms presented with English targets (*M*=703.13, *SD*=57.40) and English idioms with Spanish targets (*M*=702.30, *SD*=70.53), *t*(14)=.091, *p*>.05. There were also no differences in reaction time for Spanish idioms presented with English targets (*M*=655.84, *SD*=103.48) and those presented with Spanish targets (*M*=636.38, *SD*=92.91), *t*(14)=1.15, *p*>.05. For English target words, there were no significant differences on whether the target word was preceded by an English idiom (*M*=703.13, *SD*=57.40) or a Spanish idiom (*M*=655.84, *SD*=103.48), *t*(14)=1.99, *p*>.05. However, there were significant differences in reaction time for Spanish target words. Spanish target words had faster reaction times if the preceding idiom was in Spanish (*M*=636.38, *SD*=92.91) than when it was preceded by an English idiom (*M*=702.30,*SD*=70.53), *t*(14)=3.1, *p*=.008. For the Spanish first condition, follow up t-tests revealed that when an English idiom was followed by a English target word (*M*=619.41, *SD*=76.93) reaction times were faster than when an English idiom was followed by a Spanish target word (*M*=658.14, *SD*=106.48), *t*(20)=-2.791, *p*=.011. Similarly for Spanish idioms when the idiom was followed by a same language target (i.e., Spanish) (*M*=636.06, *SD*=80.94) reaction times were faster than when it was followed by a different language target

(*M*=684.65, *SD*=79.89), *t*(20)=4.43, *p*=.0001. For English target words reaction times were faster if the word was preceded by an English idiom (*M*=619.41, *SD*=76.93) than a Spanish idiom (*M*=684.65, *SD*=79.89), *t*(20)=-5.701, *p*=.0001. There were no differences in reaction times for Spanish target words regardless of whether it came after an English idiom (*M*=658.14, *SD*=106.48) or a Spanish idiom (*M*=636.06, *SD*=80.94), *t*(20)=1.18, *p*>.05. There were no other effects.

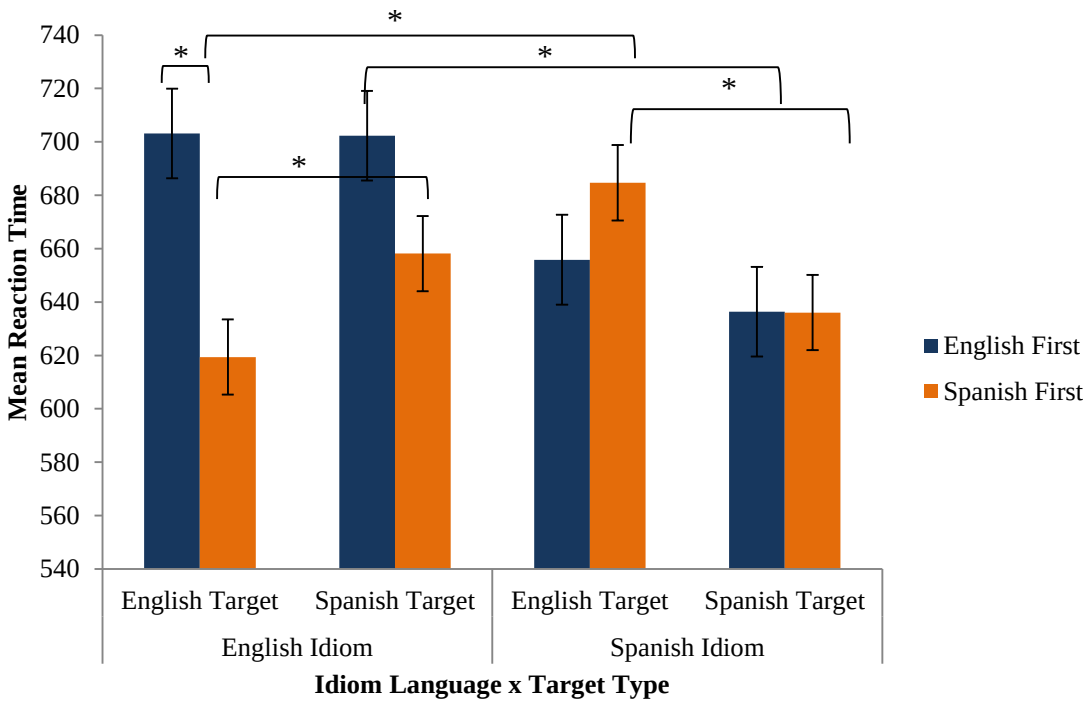

Figure 6: Relatedness Judgment Latencies by Idiom Language, Target Type, and Language Order (Exp. 3)

Accuracy of Semantic Verification Judgments

A 2 idiom language (English vs. Spanish) x 2 idiom type (decomposable vs. non-decomposable) x 2 target language (English vs. Spanish) x 2 broker status (broker vs. non-broker) repeated measures ANOVA was run**.** The only main effect that was significant was idiom type, $F(1,32)=56.06$, $p=.001$, $\eta_p^2=.64$. Decomposable idioms **(***M*=.76,*SD*=.10) had higher accuracy rates than non-decomposable idioms (*M*=.65,*SD*=.10). All other main effects were not significant.

Two-Way Interactions

The 2-way interactions between idiom type and language order, $F(1,32)=5.19$, $p=.03$, $\eta_p^2=.14$, idiom language and target language, $F(1,32)=5.23$, $p=.03$, $\eta_p^2=.14$, and idiom language and language order, $F(1,32)=20.66$, $p=.0001$, $\eta_p^2=.39$ were all significant. No other 2-way interactions were significant.

Three-Way Interactions

The 3-way interaction between idiom language x broker status x language order was significant, $F(1, 32)=4.69$, $p=.04$, $\eta_p^2=.13$ .See Figure 6. Follow up t-tests for the English first condition revealed no differences in accuracy rates between brokers (*M*=.69, *SD*=.10) and non-brokers (*M*=.67, *SD*=.18) on English target words, $t(13)=.25$, $p>.05$. There were also no differences between brokers (*M*=.74,*SD*=.09) and non-brokers (*M*= .81, SD=.06) on accuracy for Spanish targets when they were in the English First condition, $t(13)=-1.65$, $p>.05$. For the Spanish first condition, there were no differences in accuracy rates for brokers (*M*=.66, *SD*=.12) and non-brokers (*M*=.68, *SD*=.04) for English targets, $t(19)=-.491$, $p>.05$. The difference between brokers and

non-brokers for English target accuracy trended toward significance, $t(19)=-2.02$, $p=.057$. For brokers only, follow up t-tests revealed that accuracy for English target words did not differ on whether they were in the English first condition ($M=.69$,$SD=.10$) or Spanish first condition, $t(22)=.07$, $p>.05$. Similarly, there was no difference in accuracy rates between English first condition ($M=.74$,$SD=.09$) or Spanish first condition ($M=.66$,$SD=.12$), $t(22)=1.85$, $p>.05$. For non-brokers, there was no difference in accuracy rate between participants in the English first condition ($M=.67$;$SD=.18$) and Spanish first condition ($M=.79$;$SD=.10$), $t(10)=-1.45$, $p>.05$. However, for Spanish target accuracy rates, non-brokers in the English first condition (*M=.81;* SD=*.06)* had higher accuracy rates than those in the Spanish first condition ($M=.68$;$SD=.10$), $t(10)=2.54$, $p=.029$.

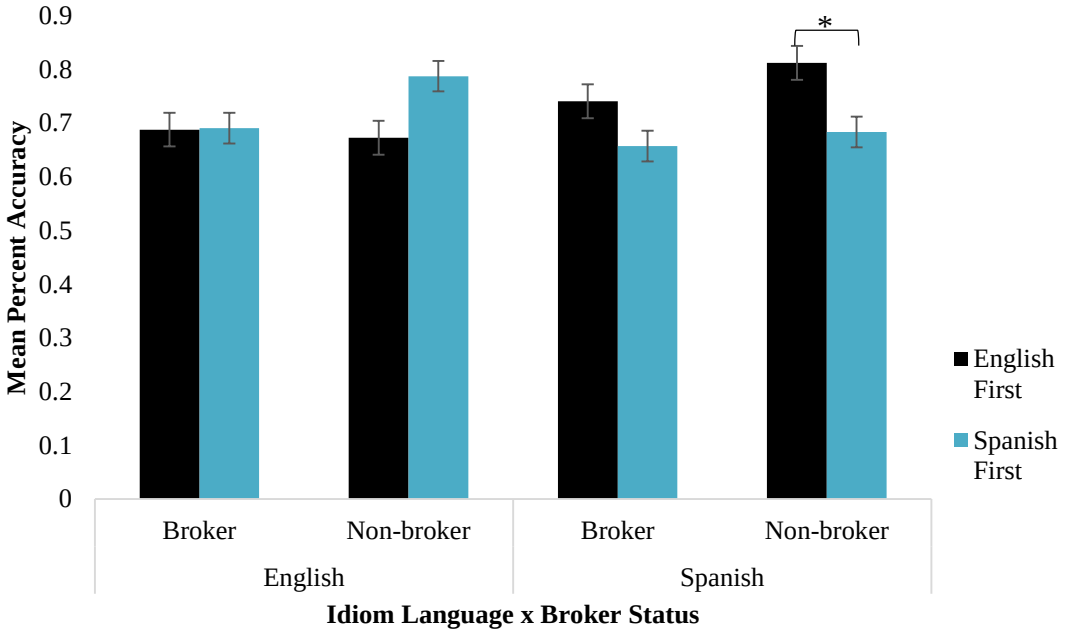

Figure 7: Analysis of Relatedness Accuracy by Idiom Language, Broker Status, and Language Order (Exp. 3)

Another 3-way interaction that was significant was between idiom language x target type x language order, $F(1,32)=9.802$, $p=.004$, $\eta_p^2=.23$. See Figure 7. Follow up t-tests revealed no differences in accuracy rates for English idiom with English target words regardless of participants being in the English first condition ($M=.70$, $SD=.15$) or the Spanish first condition ($M=.77$, $SD=.12$), $t(34)=-1.52$, $p>.05$. The same was true for English idioms presented with Spanish targets, there were no differences between accuracy rates for participants in the English first condition ($M=.67$, $SD=.16$) or the Spanish first condition ($M=.68$, $SD=.13$), $t(34)=-.25$, $p>.05$. There were no differences for Spanish idioms presented with Spanish target words based on whether participants were in the English first condition ($M=.75$, $SD=.13$) or the Spanish first condition

(*M*=.72, *SD*=.14), *t*(34)=.75, *p*>.05. There were differences for Spanish idioms presented with Spanish target words, participants in the English first condition (*M*=.78, *SD*=.10) had higher accuracy rates than participants in the Spanish first condition (*M*=.62, *SD*=.14), *t*(34)=3.78, *p*=.001. Follow-up t-tests for the English first condition participants revealed there were no differences in accuracy for English idioms presented with English targets (*M*=.70, *SD*=.15) or Spanish targets (*M*=.67, *SD*=.16), *t*(14)=.61, *p*>.05 and there were no differences for Spanish idioms presented with English targets (*M*=.78, *SD*=.10) or Spanish targets (*M*=.75,*SD*=.03), *t*(14)=.75, *p*>.05. For English target words, accuracy rates for Spanish idioms with English targets (*M*=.78, *SD*=.10) trended toward higher accuracy rates than English idioms with English targets (*M*= =.70, *SD*=.15), *t*(14)=-1.95, *p*=.072. For Spanish target words, Spanish idioms with Spanish targets (*M*=.75; *SD*=.03) similarly trended toward higher accuracy rates than English idioms presented with Spanish targets (*M*=.67, *SD*=.16), *t*(14)=-1.83, *p*=.089. Follow up t-tests for the Spanish first condition demonstrated that English idioms presented with English targets (*M*=.77, *SD*=.12) had higher accuracy rates than those presented with a Spanish target (*M*=.68, *SD*=.13), *t*(20)=3.61, *p*=.002. Spanish idioms presented with a same language target (e.g., Spanish) (*M*=.72, *SD*=.14) also had higher accuracy rates than those presented with a different language (e.g., English) (*M*=.62, *SD*=.14), *t*(20)=-2.54, *p*=.002. For English target words, English idioms presented with English target words (*M*=.77, *SD*=.12) had higher accuracy rates than Spanish idioms presented with English target words (*M*=.62, *SD*=.14), *t*(20)=4.81, *p*=.0001. For Spanish target words, there was no difference in accuracy rates between English idioms presented with a

Spanish target (*M*=.68, *SD*=.13) or a Spanish idiom presented with a Spanish target (*M*=.72, *SD*=.14), *t*(20)=-1.41, *p*>.05. All other interactions were not significant.

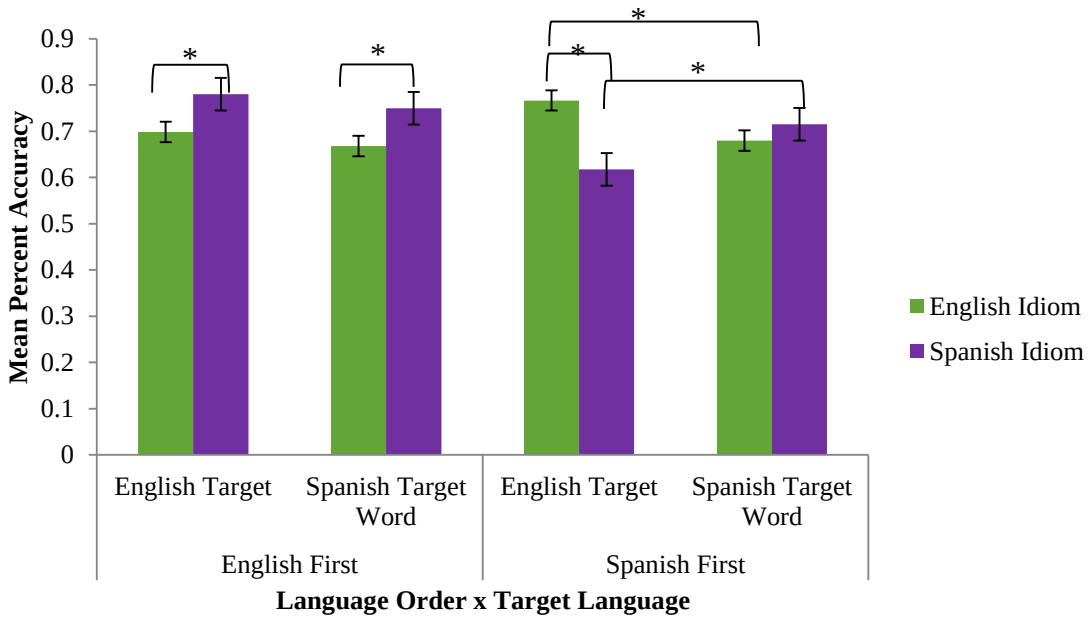

Figure 8: Analysis of Relatedness Accuracy by Language Order, Target Language, and Idiom Language (Exp.3)

Discussion

Experiment 3 was designed to investigate how bilinguals differing in prior language brokering experience would process idiomatic expressions that had equivalents in both their languages. As in the previous two experiments, three dependent measures were examined: idiom reading times, semantic relatedness judgment latencies, and

relatedness accuracy judgments. The key findings from each analysis are discussed below.

Idiom Reading Latencies

Brokers and non-brokers were expected to be equally fast at reading idioms for meaning. The findings from the present experiment showed that this was the case only under the following conditions: when English idioms were presented first rather than second, and when the idioms were decomposable rather than non-decomposable.

When the idioms were non-decomposable brokers read them faster than non-brokers. Brokers were also faster than non-brokers in the condition where idioms were presented in Spanish first. This was the case even though there was an overall faster response to idioms presented in English than in Spanish.

These results suggest that for brokers and non-brokers alike, reading idioms in Spanish is more effortful than reading idioms in English, even though the idioms in this experiment had counterparts in the other language. Although a direct comparison of idiom reading latencies across languages was not conducted for the unidirectional idioms presented in the first two experiments, inspection of the mean reading latencies across the two experiments suggests that those for the Spanish idioms were longer.

The reading time results from the present experiment also point to an effect of decomposability interacting with broker status: brokers and non-brokers were equally fast at reading decomposable items but brokers were significantly faster than non-brokers at reading non-decomposable idioms (in either language). This suggests that one

byproduct of brokering experience may be faster retrieval of stored meanings of idiomatic expressions.

Semantic Relatedness Judgments

It was hypothesized that brokers would be less disrupted than non-brokers at making semantic relatedness judgments for idioms when the idioms and target words were in different languages. This hypothesis was partially supported.

Brokers showed an apparent benefit in their performance on English idioms with English targets when the task was preceded by Spanish idioms. For non-brokers, there was no such benefit. They appear to treat English as a preferred language, similar to what was observed in Experiment 1 and Experiment 2.

For accuracy rates, non-brokers had higher accuracy rates for Spanish target words if they first viewed idioms in English followed by idioms in Spanish. This suggests that English serves as an anchor or facilitator for idiomatic meaning processing. For non-brokers, English enables them to extract meaning more easily than Spanish, which is similar to what was found in the first two experiments, where, non-brokers were able to identify English target words more accurately and faster than Spanish target words.

Brokers showed no preferred language when processing bidirectional idioms. Apparently, for brokers there is no language preference when processing semantically related lexical targets of idioms. Brokers are able to identify semantically related target words for idioms in either language (i.e., Spanish or English) regardless of the language of presentation of idiom. This may result from their extensive practice as language

brokers. The prolonged practice of informal translation may lead to a more integrated semantic store that crosses language boundaries. López and Vaid (2015) found that when bilinguals with brokering experience are asked to generate category exemplars in one language at one time and in another language at another time they generate more similar items than do bilinguals without brokering experience.

Although for the present experiment there was no clear prediction as to how language order would have an effect on processing it was found that when Spanish idioms were presented first, brokers read the idioms faster than non-brokers. Considering that brokers most likely have had to translate from Spanish to English more often than non-brokers, this experience may have made them faster at reading idioms even when they were not to be translated. For the non-brokers and brokers, English may be the language of instruction in which they have primarily interacted with the longest, while Spanish may serve as the heritage language used at home and with family. However, non-brokers have not had the same experience with Spanish (i.e., brokering) that brokers have, which may account for non-brokers' English preference.

An interesting effect found relatedness judgments for bidirectional idioms that were decomposable (e.g., *lie through one's teeth*/*mientes con todos los dientes*) across both languages of presentation were more accurate than those for non-decomposable idioms (e.g., *throw to the wolves*/*echar a la boca del lobo*). Bilinguals may be taking bidirectional decomposable idioms apart more easily because each constituent of the idiom has a contributing word or words for the overall meaning from two languages and not just one. This is contrary to recent work on monolinguals by Titone and Libben

(2014), which found that non-decomposable idioms were accessed faster than decomposable idioms in a cross-modal priming paradigm. However, the current study also looked at whether idioms were represented in one language or two, which is something not observed in Titone and Libben (2014). This would suggest that even the language or languages in which idiomatic meaning is stored or represented can have differing effects in the processing of decomposable or non-decomposable idioms.

CHAPTER VI

GENERAL DISCUSSION AND CONCLUSION

The aim of this research was to investigate a particular source of individual difference among bilinguals, namely, language brokering experience, and to determine if this may affect how bilinguals activate the meaning of idiomatic phrases presented in each language. Three experiments were designed with the purpose of examining the relative contribution of language brokering experience, idiom properties (related to decomposability and to idiom meaning equivalence across languages), and language of the task (judgments requiring within language vs. cross language comparisons) in processing idioms presented in each language of Spanish-English speakers. Experiments 1 and 2 addressed the processing of idioms that had idiomatic form in only one language (unidirectional); Experiment 3 examined the processing of idioms that had idiomatic equivalents in both languages (bidirectional).

Specifically, the first two experiments examined whether bilinguals are able to activate meanings of the non-active language when processing unidirectional English idiomatic phrases (Experiment 1) or unidirectional Spanish phrases (Experiment 2) and whether this activation would in turn be affected by the idiom's decomposability and whether a bilingual has had prior informal translation experience or not. The final experiment examined this issue in the context of processing idiomatic expressions that are dually represented (i.e., have idiomatic renditions in both languages). Based on prior work on how brokering experience may influence language processing, the motivating

hypothesis this research tested was that prior brokering experience would lead to a heightened activation of idiom meaning in both languages, regardless of the nature of the idiomatic expression (decomposable or non-decomposable) or the language (same or different) in which the idioms and target words are presented.

Before turning to a discussion of the findings bearing on this hypothesis, it is important to note that brokers did not differ from non-brokers in their reading latencies for unidirectional idioms presented in English (Exp. 1) or Spanish (Exp. 2), and no differences were obtained in reading latencies for decomposable vs. non-decomposable unidirectional idioms in either language. However, as the results from Exp. 3 demonstrated, idiom reading latencies were sensitive to group, idiom type, and idiom language presentation order effects, such that brokers were faster than non-brokers when the order in which the idioms was presented was Spanish first, and when the idioms were non-decomposable rather than decomposable.

Although the specific pattern of responses differed across the three experiments there were some converging sources of support for the hypothesis of a heightened sensitivity to idiom meaning across languages among brokers. First, brokers were found to be equally fast at making semantic verification judgments for same language as for different language target words. This indicates that whether the language of the target word was the same as or different from the language in which the idiom was presented had little impact on brokers' speed or accuracy of semantic processing. This in turn suggests that brokers tend to look for the underlying meaning of an utterance, and are equally skilled at searching for it whether the search is carried out within a particular

language or involves crossing language boundaries. However, for non-brokers there was a clear language preference: non-brokers were faster and better at judging the semantic relatedness of idioms when the target words were presented in English. This was the case even when the idiom language was in Spanish. That is, non-brokers appear to use a particular language (English, in this case) as an anchor in making semantic judgments of the figurative meaning of idiomatic expressions in either English or Spanish. Brokers, on the other hand, can operate with ease in either language, as one would expect, given their prolonged experience of having to move between two languages in conveying meaning.

With respect to the variable of idiom decomposability, we had expected either that non-decomposable idioms (e.g., *kick the bucket*) would be easier to identify same and different language target words for if they are stored as entire semantic entries or that decomposable idioms (e.g., *spill the beans*) would be easier considering each word of the idiom contributes to the overall meaning. Our results provide support for both options, in that we found that bilinguals in general were better at processing non-decomposable idioms as demonstrated with higher accuracy rates and short reaction and reading times. However, when group differences between brokers and non-brokers were found, brokers were better at correctly identifying non-decomposable idiom target words than non-brokers. Non-brokers also were better at processing decomposable idioms than non-decomposable idioms.

Further, as already noted, the variable of decomposability interacted with the variable of brokering status in idiom reading times as well, in Exp. 3. With respect to idiom reading times of unidirectional English both groups were faster at reading non-

decomposable idioms than decomposable idioms. With respect to idiom reading times of unidirectional Spanish idioms, there were no differences between brokers' and non-brokers' reading times of decomposable or non-decomposable idioms. With respect to idiom reading times of bidirectional idioms our results showed that brokers were equally fast at reading decomposable or non-decomposable idioms and non-brokers were faster at reading decomposable idioms than non-decomposable. When comparing the two groups, brokers were faster at reading non-decomposable idioms than non-brokers. Taken together, this pattern of findings suggests that prior language brokering experience may provide bilinguals with an added skill at determining meaning of a phrase without the need to deconstruct a phrase. This is evidence for how non-brokers take longer to read non-decomposable idioms than decomposable ones. For brokers, non-decomposable idioms may be stored as entire "chunks," which would facilitate their processing compared to decomposable idioms. That is, decomposable idioms require more attention since each part of the actual idiom (i.e., word) has to be processed in order to understand the figurative meaning. Brokers as a result of having to correctly understand and reformulate meanings across languages; they may be better than non-brokers at obtaining meaning from non-decomposable idioms.

Furthermore, idiom decomposability interacted with phrase verification judgments of brokers and non-brokers. For unidirectional English idioms, idiom decomposability interacted with group as follows: brokers had faster reaction times for non-decomposable idioms than decomposable, while non-brokers had faster reaction times for decomposable idioms than non-decomposable. For unidirectional Spanish idioms,

decomposability did not interact with group; both groups had faster reaction times for non-decomposable than decomposable idioms. Finally for bidirectional idioms, decomposability again did not interact with group.

The accuracy analyses for phrase verification judgments complicate the above pattern in the following ways: for unidirectional English idiom processing, accuracy of judging idioms was higher for decomposable idioms than non-decomposable idioms by non-brokers, and there were no differences in accuracy rates between decomposable and non-decomposable idioms for brokers. However, brokers did have higher accuracy rates for non-decomposable idioms than non-brokers. For unidirectional Spanish idioms, there were no differences in processing decomposable or non-decomposable idioms between brokers and non-brokers. Finally, for judging bidirectional idiom target/phrase relatedness, accuracy was higher for decomposable idioms than non-decomposable idioms by both brokers and non-brokers.

This dissertation suggests that variation in early bilingual language experiences such as engaging in the practice of language brokering may have long-term repercussions in terms of how idiomatic expressions in each language are processed. The fact that language brokers are not as disrupted as non-brokers by making semantic relatedness judgments across language boundaries (as when the target word is in one language and the idiom is in another language) is consistent with the notion that brokering experience results in a closer coupling of word/phrase meanings across language boundaries.

Further work, using other paradigms, is needed to pinpoint the underlying mechanisms by which the claimed difference in lexical processing and/or representation

is achieved, (e.g. whether it involves enhanced search of lexical entries, or a differential representation of semantic features associated with translation equivalents across languages, etc.). It would be beneficial to investigate these effects using an auditory presentation of the idioms, as bilinguals are not necessarily engaging with idioms in a written form. By presenting idioms orally across languages, this would allow for effects of language of schooling, and language dominance for reading and writing primarily in English to be more controlled. As noted in Experiment 3, the non-brokers reported significantly lower Spanish abilities than English, which could have affected the ease with which non-brokers correctly judged semantic relatedness of idioms and targets.

One option also to be directly tested in the future is that how might prior language brokering experience enhance language non-selectivity as compared to non-brokers; whether that means that brokers show reduced inhibition of activation of meaning in the non-target language (Dijkstra & Van Heuven, 2002) or increased vigilance of word meanings across languages. Even when processing unidirectional idioms or bidirectional idioms in Spanish or English, brokers are still able to activate the non-target language in semantic processing. However, for non-brokers, a clear English language preference effect was found even though they exhibit language non-selectivity as well. Non-brokers are still able to access the non-target language when processing idiomatic meaning whether the language they are reading is English or Spanish, but are much better at processing English targets than Spanish even when presented with Spanish unidirectional idioms (i.e., the other language). This somewhat unanticipated but consistent finding suggests that for non-brokers English serves as a base or anchor

language in which they may store, represent, and access meanings. Even when non-brokers are presented with another language in this case Spanish; non-brokers still retrieve meaning from English more easily than they do Spanish.

Ultimately, the set of findings reported in this research extend prior research in bilingualism on the issue of language non-selectivity (Dijkstra & Van Heuven, 2002; Elston-Güttler et al., 2005, López, 2009; Schwartz & Kroll, 2006, Schwartz, & Arêas Da Luz Fontes, 2008, Schwartz et al., 2008). Research in language non-selectivity has focused on the effects of word overlap in terms of semantic, orthographic, and phonological properties. The present research extends the scope of potential non-selectivity effects to the phrase level and particularly to the domain of idiomatic expressions and further suggests that there may be individual differences in degree of non-selectivity among bilinguals related to their history of language use. It appears that both brokers and non-brokers activate the non-target language while processing idiomatic language. Both groups were able to correctly identify English target words when reading Spanish idioms that were idiomatic in Spanish only or in English as well. The same was true for English idioms that were unidirectional or bidirectional. The interesting finding was in Experiment 2, where non-brokers demonstrated an English preference of non-selectivity. Non-brokers were better at identifying semantically related English target words than Spanish target words for corresponding Spanish unidirectional idioms. Non-brokers are able to activate English even when processing in Spanish; however they are able to processing English meaning more accurately than Spanish. Interestingly, non-brokers may be translating Spanish unidirectional idioms into English,

which then enables them to more readily correctly identify English target words in comparison to Spanish. For brokers, it appears that language is more fluid. Brokers can correctly identify semantically related target words regardless of what language they are processing idiomatically and no matter if the idiom is represented in one language or both languages.

Another explanation for some of the effects in this dissertation could be differences in being able to switch between languages for brokers and non-brokers. Brokers appear to not be as affected by the language in which an idiom is presented and whether a semantically related target word is in the same or different language. Non-brokers, however, demonstrate an English preference. Non-brokers use English as their linguistic vehicle for processing idiomatic meaning. Past brokering experience may enhance a bilingual's ability to actively have to switch between languages especially when this switching involves semantic processing. Language brokering requires bilinguals to translate between languages all the while maintaining the overall semantic integrity of a phrase or expression. For bilinguals with this type of practice experience, processing meaning of a phrase may then not be restricted to only one language, rather brokers may be more readily inclined to process meaning across languages. Non-brokers on the other hand, do not have an extensive language brokering background so their cross-language semantic processing abilities may not be as developed as those of brokers. This is not to say that they are not able to do this, but rather they may not have the sophisticated semantic processing abilities that brokers have acquired as a result of having to listen, maintain, and reformulate meanings within and across two languages.

Additionally, this dissertation examined effects of idiom decomposability across and within language boundaries. Although no specific predictions were made as to how brokering, decomposability, and idiom directionality would interact, there were a few interesting findings. While in Experiment 1 the only effect related to decomposability was that both groups read non-decomposable idioms faster than decomposable, in Experiment 2, both groups were faster at identifying target words for non-decomposable Spanish idioms (e.g., *A otra cosa mariposa*) than decomposable (e.g., *De tal para cual*). Although no differences were found between brokers and non-brokers, a majority of the participants, brokers and non-brokers alike, reported Spanish as their first language. Prior work has suggested that figurative language is affected by language acquisition (Cieslicka, 2006; Kecskes, 2006). If most of our participants' L1 is Spanish then it can be assumed that they have similar experiences with these Spanish idiomatic expressions so there should be no difference in their ability to process the idioms based on brokering experience. Experiments 1 and 2 resemble the findings of Titone and Libben (2014), where meaning of non-decomposable idioms is accessed faster than decomposable idioms. However, Experiments 1 and 2 utilized only idiomatic expressions that are represented figuratively in one language that is these idioms are not found nor represented in both Spanish and English.

Experiment 3 demonstrated decomposability effects that were different from those in the first two experiments. For bidirectional (English-Spanish) idioms, it appears that both groups were more accurate when having to identify semantically related target words for bidirectional decomposable (e.g., *lie through one's teeth*/*mientes con todos los*

dientes) than bidirectional non-decomposable idioms (e.g., *throw to the wolves*/*echar a la boca del lobo*). Although this finding is contrary to that of Titone and Libben (2014), the idioms in Experiment 2 were bidirectional idioms meaning they had similar representations in two languages. The study by Heredia and colleagues (2007) would suggest that when idioms are similar across languages processing is faster than when they are not similar; however idiom decomposability was not taken into account in that study. Bidirectional decomposable idioms as a result of having contributed lexical targets across both languages may be easier to extract meaning from than non-decomposable idioms that are treated as an entire unit. Bilinguals may be utilizing a different type of processing when determining the meaning of a bidirectional decomposable idiom than when processing a bidirectional non-decomposable idiom.

Broader Theoretical Implications

This dissertation sought to extend bilingualism research in various ways. First, current bilingualism research tends to categorize bilinguals as homogenous groups with monolinguals as comparison groups. Not much attention is given to how early bilingual experiences may ultimately affect language processing in different ways for different bilinguals. By taking into account how prior language brokering experience may have long term effects on language processing, a more complete understanding of bilingual phenomenon can be achieved. Differences between brokers and non-brokers were found in how they process and access idiom meaning across and within language boundaries. . Without this distinction, then these important effects of brokering would have gone unnoticed. However, it is important to note that in these experiments, we treated

language brokering as a dichotomous variable. Future work may benefit by treating language brokering as a continuous variable to determine a bilingual's degree of brokering which may influence results. Future work could also investigate whether or not there is a threshold level of brokering experience, which could also produce beneficial long term effects of brokering.

Researchers in bilingualism are beginning to acknowledge that the prior language history of bilinguals needs to be taken more seriously, and the variability in bilingual experience needs to be "embraced" rather than treated as a nuisance variable (Baum & Titone, 2014). Examining particular sources of variability in systematic ways can offer a way out of the current impasse in bilingualism research, in which the focus has been more on task parameters than on individual parameters. This is also important if we are to advance our current theoretical understanding of bilingualism and refine existing models of the bilingual mental lexicon that so far have not theorized differences among bilinguals (other than those related to language proficiency). Of course, noting the importance of taking bilingual language history and use seriously is not a new idea but was the cornerstones of the earliest psychological studies on bilingualism conducted by Lambert and his colleagues, and also by others (see Cook, 1991; Genesee, 2014; Green, 2014; Grosjean, 1997; López & Vaid, 2015). Proposed models of bilingual language processing will need to contemplate how a one-size fits all model may not include or describe all instances of bilingualism.

Additionally, research on bilingualism has shown that language non-selective access is a pervasive phenomenon. However, to date there has been little examination of

whether non-selective activation occurs in the processing of non-literal language and individual differences in process. This dissertation provides an extension of the literature by investigating how prior language brokering experience may affect idiomatic processing and even how a bilingual may access the non-target language. Presumably, bilinguals have both languages active at all times; however this experiment demonstrated that when accessing meaning via lexical targets there are differences within bilinguals based on language brokering experience. Brokers appear to demonstrate more fluidity between languages than non-brokers. Whereas non-brokers are creating a preferred language that serves as an anchor for idiomatic processing, brokers are processing meaning detached from a language. When brokers encounter a language target the language target becomes the lexical vehicle that moves semantic meaning from a non-visible cognitive form to the visible written lexical form. Future research should take into account individual differences within bilinguals when forming theories based on processing and the ability of a bilingual to access the non-target or not "active" language.

Limitations

There were a few limitations in the present dissertation. The task required bilinguals to read idioms in their L1 and L2. The limitation here is that bilinguals may not be as proficient reading idiomatic expressions in one language or reading idioms at all as a result of idioms being more of a spoken language form. In the future it would be important to use auditory presentation of the idioms to enhance ecological validity. Next, the first two experiments, allowed us only to observe the effects of correctly

identifying semantically related target words that were either in the same language or different language for idioms in one language; that is participants only viewed idioms that were idiomatic in one language only. It would be beneficial to randomize the language of presentation to investigate any interactions that may influence how quickly and accurately bilinguals (brokers and non-brokers) can identify related or unrelated target words. Also, our selection of brokers may be limited to our own definition of what constitutes a broker versus a non-broker. The selection of brokers was based on bilinguals who have an extensive background in having to translate and interpret for immediate family members (e.g., mothers, fathers, grandparents). Brokers were also selected based on the language use with these particular family members. The effects in this dissertation may be limited to bilinguals who have reached a particular level of broker status; that is there may be a threshold of brokering experience that bilinguals with brokering experience must reach in order to have any benefits of brokering. More specifically, future research could benefit from observing brokering experience as a continuous variable and not dichotomous as we have in the present studies.

Additionally, in Experiment 3, we observed that non-brokers, in contrast to brokers self-rated their Spanish proficiency much lower. This could have ultimately affected the ease with which non-brokers in Experiment 3, read and correctly identified related or unrelated target words. It is important to note that in some instances language brokering may provide bilinguals with a greater proficiency in their L1, which in this particular case was Spanish.

Finally, the two languages used in these investigations were Spanish and English, two languages that share similar orthography, syntax, phonology, lexical items (e.g., cognates) and even idiomatic expressions (e.g., bidirectional idioms). The present findings may be in part a direct result of language similarities. If other language pairs with fewer similarities had been utilized, then it is possible that a different pattern of effects could have been found. There is a need to investigate brokering effects using other language pairs to determine if these effects are a result of brokering in specific language pairs or not.

Practical Implications

Mental health professionals have cautioned against young bilingual children brokering in medical situations (Morales & Hanson, 2005). These precautions are just in suggesting that brokering may lead to negative mental health consequences in children (Weisskirch & Alva, 2002). However, language brokering research in terms of cognitive and linguistic repercussions offers a more constructive way of viewing the impact of brokering: that is, brokering may be seen as a form of expertise. Situations in which brokers are translating for their family and community members require young bilinguals to use language and pragmatic knowledge in ways that are often well above their current education level. Language brokering could thus be a cognitive and linguistic skill that educators and mental health professionals should seriously seek to model and apply in various settings.

As Valdés (2003) notes, "What is clear… is that young interpreters utilize resources of their two languages, search for available linguistic forms and structures, anticipate

and strategically avoid some linguistic and lexical challenges, and try out and discard possible forms and structures" (p.162). Brokers are not necessarily taught to translate and interpret the same way simultaneous interpreters or professional translators are taught. Brokers learn through first- hand experience and without the help of textbooks and instructors. In the future, it would be important for educators to take into account language brokering experience when constructing curricula that assess a student's language abilities. Language brokering experience gives bilinguals a distinctive capability with language and language use. It is imperative for instructors to consider language brokering as an important life-skill that certain bilingual children and adolescents acquire that may advance their development of critical thinking skills, language development, and heritage language maintenance. If these differences among bilinguals are addressed then more adequate forms of assessment may be created for measuring bilinguals' abilities in linguistic and non-linguistic domains.

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APPENDIX A

LANGUAGE BACKGROUND AND BROKERING QUESTIONNAIRE

UIN (last 5 digits): _____ Name: _____ Today's date: _____
Email:_____ Sex:____ Age:____Yr in college _____Place of Birth _____
If born outside of this country, your age of arrival in the US _____
Any siblings (sex and ages) _____
Mother's place of birth _____ Mother's Yrs of schooling (1-17)_____
Father's place of birth _____ Father's Yrs of schooling (1-17)_____
Maternal grandparents' place of birth: _____
Paternal grandparents' place of birth: _____

What is your first language, i.e. what you first learned to speak first? (If more than one, state all): _____
What other languages do you speak? (If more than one, state all):
_____
When did you learn your other language(s)? ___ 0-4yrs __ 5-8 __ 9-12 ____> 12

What hand do you predominately use to write, work, etc.? Right__ Left___Amb___

What was/is the main language of instruction in your:
a. Elementary School _____
b. Middle School _____
c. High School _____
d. College _____
How do you define yourself in terms of ethnic or cultural identity to others outside your ethnic group? (Please circle)

1. Mexican
2. Mexican American
3. Latino/a
4. Hispanic
5. Puerto Rican
6. Cuban American
7. Chicano/a
8. American
9. Other (please specify) _____

In your high school, about what percentage of students were the same ethnicity as you? (Please circle)

1. less than 10%
2. around 25%
3. around a third
4. 50%

5. 75%

Compared to when you were a child, how has your view of your ethnic or cultural identity changed?

1. I am more __ or less__ (choose one) conscious of my ethnic identity now than as a child.

__ No change in awareness

2. I am more___ or___ less (choose one) proud of my ethnic identity now than as a child.

___ No change in attitude

Please select one as appropriate:

1. I keep my heritage culture **separated** from ____ or **integrated** with ____ the culture of the majority community.
2. I am **comfortable** ____ or **uncomfortable** ____ moving between two cultures.
3. I identify culturally most strongly with _____ (fill in).

Use the scale below to answer the following two questions(Please circle):

mostly As	**mostly As & Bs**	**mostly Bs**	**mostly Bs & Cs**	**mostly Cs**	**mostly Cs & Ds**	**mostly Ds**	**mostly Ds & Fs**	**mostly Fs**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

1. What kinds of grades did you usually get in high school?	1	2	3	4	5	6	7	8	9
2. What kinds of grades do you usually get in college?	1	2	3	4	5	6	7	8	9

Use the scale below to answer to indicate how much you enjoy (Please circle):

Never	**Rarely**	**Sometimes**	**Often**	**Always**
1	**2**	**3**	**4**	**5**

1.Listening to music in Spanish	1	2	3	4	5
2. Watching TV programs or movies in Spanish	1	2	3	4	5
3. Eating food from your heritage culture	1	2	3	4	5
4. Travelling to Spanish-speaking countries	1	2	3	4	5
5.Listening to music in English	1	2	3	4	5
6. Watching TV shows or movies in English	1	2	3	4	5
7. Eating all American food	1	2	3	4	5
8. Travelling and visiting in the US	1	2	3	4	5

Please rate your language ability in English and Spanish on a 7 point scale where **1=very little knowledge and 7=use it like a native speaker:**

Very little knowledge **Like a native speaker**

1 2 3 4 5 6 7

Speak English	1	2	3	4	5	6	7
Read English	1	2	3	4	5	6	7
Write English	1	2	3	4	5	6	7
Understand English	1	2	3	4	5	6	7
Speak Spanish	1	2	3	4	5	6	7
Read Spanish	1	2	3	4	5	6	7
Write Spanish	1	2	3	4	5	6	7
Understand Spanish	1	2	3	4	5	6	7

What language(s) do you **mostly use** when speaking with each of the following (Please circle):

	English	Spanish	Both	Other
a. Mother	1	2	3	4
b.Father	1	2	3	4
c.Siblings	1	2	3	4
d.Grandparents	1	2	3	4
e.Friends	1	2	3	4
f.Classmates	1	2	3	4
g.Co-workers	1	2	3	4
h.romantic partner	1	2	3	4
i.Other (specify)	1	2	3	4

In which language(s) do you/would you **typically** do each of the following activities (Please circle):

	English	Spanish	Both	Other
a.Express affection	1	2	3	4
b.Express anger	1	2	3	4
c.Pray	1	2	3	4
d.Dream	1	2	3	4
e.Think to yourself	1	2	3	4
f.Mentally add, multiply	1	2	3	4
g.Tell jokes or funny stories	1	2	3	4
h.Keep a diary	1	2	3	4

In which language(s) do you feel you can communicate most effectively?

_____

Please check as appropriate: "My general comprehension of English is ___": (specify other language).

___ As good as that in my _____ (“)
___ Better than that in my _____(").
___ Worse than that in my _____ (").

Language use: Use the following scale to answer questions 1-4:

Only Spanish	**More Spanish than English**	**Both Equally**	**More English than Spanish**	**Only English**
1	**2**	**3**	**4**	**5**

1. In general, what language or languages do you currently speak?	1	2	3	4	5
2.what language or languages did you use as a child?	1	2	3	4	5
3.What language do you usually speak with your friends?	1	2	3	4	5
4.What language do you usually speak at home (with your parents)?	1	2	3	4	5

TRANSLATING

If you have translated informally in your childhood at what age did you begin that? ___
Do you still translate for others? ____ If not, how many years ago did you stop? _____

Please rate your feelings about translating using the scale below:

Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	**2**	**3**	**4**	**5**

1.I feel embarrassed when I translate for others	1	2	3	4	5
2.My parents leanred English slower because I translated for them	1	2	3	4	5
3.My parents know less about Americans because I translated for them	1	2	3	4	5
4.I feel nervous when I translate for others	1	2	3	4	5
5.My parents know more about Americans because I translated for them	1	2	3	4	5
6. I have to translate for others even when I don’t want to	1	2	3	4	5

7. Translating has helped me to better understand people who are from other cultures	1	2	3	4	5
8. I think translating helped me learn English	1	2	3	4	5
9. Translating for others made me feel more grown up	1	2	3	4	5
10. Translating helped me learn my other language	1	2	3	4	5
11. Translating has helped me to understand my parents better	1	2	3	4	5
12. I like to translate	1	2	3	4	5
13. I feel good about myself when I translate for others	1	2	3	4	5
14. My parents learned English faster because I translate for them	1	2	3	4	5
15.Translating has helped me to care more for my parents	1	2	3	4	5
16. Translating was a source of pride for me.	1	2	3	4	5
17. Translating gave me a greater self-esteem.	1	2	3	4	5
18. Translating was burdensome for me.	1	2	3	4	5

People you have translated for:
Please use the following scale in rating your responses below:

Never Rarely Sometimes Often Always

1 2 3 4 5

1.Mother	1	2	3	4	5
2.Father	1	2	3	4	5
3.Grandparent	1	2	3	4	5
4.Younger Siblings	1	2	3	4	5
5.Older Siblings	1	2	3	4	5
6.Other Family	1	2	3	4	5
7.Teachers	1	2	3	4	5
8.People who work at school	1	2	3	4	5
9.Friends	1	2	3	4	5
10.Neighbors	1	2	3	4	5
11.Strangers	1	2	3	4	5

Did you ever "misinterpret" on purpose for your own advantage? (Yes/No) _____
Under what circumstances did you misinterpret? (Explain) _____
Do you still translate for anyone?_____
For who?_____
In what situations?_____

Places/Domains where you have translated
Please use the following scale in rating your responses below:

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

1.Home	1	2	3	4	5
2.Stores	1	2	3	4	5
3.School	1	2	3	4	5
4.On the street	1	2	3	4	5
5.Doctor's office	1	2	3	4	5
6.Dentist's office	1	2	3	4	5
7.Restaurants	1	2	3	4	5
8.Post office	1	2	3	4	5
9.Bank	1	2	3	4	5
10.Where your parents work	1	2	3	4	5
11.Church	1	2	3	4	5
12.Parent-teacher conference	1	2	3	4	5
13.Car dealerships	1	2	3	4	5
14.Real estate agents	1	2	3	4	5
15. Pharmacy	1	2	3	4	5
16.Library	1	2	3	4	5
17.Government office (eg. Social security, welfare, city hall, court house, etc.)	1	2	3	4	5

Things you have had to translate for others at least once (using the scale above)

1.Notes from school	1	2	3	4	5
2.Credit card bills	1	2	3	4	5
3.Telephone bills	1	2	3	4	5
4.Insurance forms	1	2	3	4	5
5.Bank statements	1	2	3	4	5
6.Immigration forms	1	2	3	4	5
7.Job applications	1	2	3	4	5
8.Rental contacts	1	2	3	4	5
9.Forms from the doctor's office	1	2	3	4	5
10.Instructions for a new appliance	1	2	3	4	5
11.Making/cancelling appointments	1	2	3	4	5
12.Homework	1	2	3	4	5
13.Report cards	1	2	3	4	5
14.Traffic or other signs	1	2	3	4	5
15.TV shows	1	2	3	4	5

16.Radio shows	1	2	3	4	5
17.Movies	1	2	3	4	5
18.Newspaper	1	2	3	4	5
19.Story books	1	2	3	4	5
20.Letters or emails	1	2	3	4	5
21.Salespeople on the phone	1	2	3	4	5
22.Conversations	1	2	3	4	5

LANGUAGE SWITCHING/MIXING

"When speaking with other bilinguals I switch between languages during a conversation."

Please rate how often you switch languages for each of the reasons below:

Never Rarely Sometimes Often All the time

1 2 3 4 5

1.I might not know a word	1	2	3	4	5
2.To express myself more fully	1	2	3	4	5
3.There is no translation for a concept	1	2	3	4	5
4.For added emphasis	1	2	3	4	5
5.To express closeness	1	2	3	4	5
6.To express distance	1	2	3	4	5
7.To affirm my identity	1	2	3	4	5
8.To facilitate communication (for the listener)	1	2	3	4	5
9.To talk in code/secretly	1	2	3	4	5
10.To quote someone	1	2	3	4	5
11.To mimic someone	1	2	3	4	5
12.To be playful	1	2	3	4	5
13.Other (explain)					

1.At home	1	2	3	4	5
2.At school	1	2	3	4	5
3.At work	1	2	3	4	5
4.With girlfriend/boyfriend/spouse	1	2	3	4	5
5.At family gatherings	1	2	3	4	5

When speaking to other bilinguals I switch between languages during a conversation

Please rate how often you switch between languages	1	2	3	4	5

The following statements are possible descriptions of experiences you may have had while growing up, that is, the time during which you lived at home with your family. Please indicate if the statement describes your own experience or not by noting down **True or False**.

1.At times, I felt I was the only one my mother/father could turn to.	T	F
2. I often silently resented being asked to do certain kinds of jobs.	T	F
3. As a child I was often described as mature for my age.	T	F
4. I was more likely to spend time with friends than with family members.	T	F
5. Members of my family hardly ever looked to me for advice.	T	F
6. I often felt more like an adult than a child in my family	T	F
7. I was very active in the management of my family's financial affairs.	T	F
8. Members of my family rarely needed me to take care of them.	T	F

In the following questions please rate your response on a 1-5 scale as follows: 1=Not at all certain, 3= a little certain 5=very certain

Not at all certain	**A little certain**	**Certain**	**More Certain**	**Very Certain**
1	**2**	**3**	**4**	**5**

1. If I want, I can get a good grade in my classes.	1	2	3	4	5
2. How confident are you about being able to do your homework well?	1	2	3	4	5
3. How confident do you feel about studying well for a test?	1	2	3	4	5
4.How confident do you feel about understanding information presented in class by the teacher?	1	2	3	4	5
5. How confident are you about the overall quality of your work (homework, quizzes, tests, book reports and essays)?	1	2	3	4	5
6. When I have problems in class, I keep trying until I can find a solution to the problem.	1	2	3	4	5

Strongly Agree	**Somewhat Agree**	**Neither**	**Somewhat Disagree**	**Strongly Disagree**				
1	**2**	**3**	**4**	**5**				
1. I can usually get people to do what I want.					1	2	3	4	5
2. I can usually get my parents to go along with my point of view.					1	2	3	4	5
3. I can usually tell how other people are feeling.					1	2	3	4	5
4. My parents can usually count on me to do what I'm expected to do					1	2	3	4	5
5. My brothers and/or sisters often come to me for advice.					1	2	3	4	5
6. . It bothers me to have to ask strangers for directions.					1	2	3	4	5
7. I feel comfortable meeting and talking to new people.					1	2	3	4	5
8. I'm pretty good at getting people to solve their problems.					1	2	3	4	5
9. I'm pretty good at translating things from Spanish to English.					1	2	3	4	5
10. I'm more helpful than the rest of my brothers and sisters are to my parents.					1	2	3	4	5

THANK YOU!

APPENDIX B

Experiment 1 English Unidirectional Idioms for Critical Trials

Idiom	Decomposability	Critical Targets	
		English	Spanish
Blow someone's mind	Decomposable (DECOM)	AMAZE	ASOMBRAR
Learn the ropes	DECOM	LEARN	APRENDER
Call the shots	DECOM	AUTHORITATIVE	DOMINANTE
Two peas in a pod	DECOM	ALIKE	IGUAL
Beat to the punch	DECOM	PROMPT	PRONTO
Drive a hard bargain	DECOM	NEGOTIATE	NEGOCIAR
Talk a mile a minute	DECOM	SPEEDY	RÁPIDO
Blow your top	DECOM	ANGRY	ENOJAR
Back of one's mind	DECOM	LATENT	PENSANTE
Give the creeps	DECOM	FRIGHTEN	ASUSTAR
Cost an arm and a leg	DECOM	EXPENSIVE	COSTOSO
Back to square one	DECOM	BEGIN	COMENZAR
Fit as a fiddle	DECOM	HEALTHY	SANO
Hold your horses	DECOM	PATIENCE	PACIENCIA
Pull the plug	DECOM	END	TERMINAR
He hit the jackpot	DECOM	WINS	GANAR
Speak your mind	DECOM	HONEST	HONESTO
Lay down the law	DECOM	RULES	MANDAR
Climb on the band wagon	non-decomposable (NON-DECOM)	JOINS	UNIRSE
Pack a punch	NON-DECOM	POWERFUL	PODEROSO
Over the hill	NON-DECOM	OLD	VIEJO
Hit the sack	NON-DECOM	SLEEP	ACOSTARSE
Raise the roof	NON-DECOM	EXCITE	ALBOROTAR
Steal someone's thunder	NON-DECOM	TAKE	TOMAR
Tie the knot	NON-DECOM	MARRY	CASARSE
A piece of cake	NON-DECOM	EASY	FÁCIL
Run into the ground	NON-DECOM	WRECK	DESTROZAR
Have cold feet	NON-DECOM	NERVOUS	NERVIOS
Bite the bullet	NON-DECOM	ENDURE	AGUANTE
Jump the gun	NON-DECOM	RUSHES	PRISA
Kick up your heels	NON-DECOM	RELAX	RELAJAR
Let the cat out of the bag	NON-DECOM	REVEAL	REVELAR
Rack one's brains	NON-DECOM	THINKS	PENSAR
Bury the hatchet	NON-DECOM	FORGET	OLVIDAR
Give it a whirl	NON-DECOM	ATTEMPT	PROBAR
Pop the question	NON-DECOM	PROPOSE	PREGUNTAR

Experiment 1 English Unidirectional Idioms for Control Trials

Idiom	Decomposability	Control Targets	
		English	Spanish
Get the picture	(DECOM)	USED	USADO
Play the market	DECOM	INVENT	INVENTAR
In hot water	DECOM	TRUTH	VERDAD
Cramp someone's style	DECOM	LIVER	HIGADO
Nurse a grudge	DECOM	RUBBER	HULE
Nip in the bud	DECOM	STAY	QUEDAR
Praise to the skies	DECOM	PLANTED	SEMBRAR
Take the back seat	DECOM	TOUCH	TOCAR
Blow to kingdom come	DECOM	DISCUSS	DISCUTIR
Fish out of water	DECOM	AVERAGE	PROMEDIO
Dressed to kill	NON-DECOM	AVAILABLE	DISPONIBLE
With flying colors	NON-DECOM	EARLIER	USAR
In a pickle	NON-DECOM	THOUGHTFUL	PENSATIVO
Under someone's thumb	NON-DECOM	COMPANY	NEGOCIO
Foot the bill	NON-DECOM	PICK	ESCOGER
Bite someone's head off	NON-DECOM	HUMBLE	HUMILDE
Bust a gut	NON-DECOM	WANTED	DESEADO
Kick the bucket	NON-DECOM	DONE	TERMINAR
Feather one's nest	NON-DECOM	DUPLICATE	DUPLICAR
Carry a torch	NON-DECOM	HOMEMADE	HECHO

Experiment 1 English Unidirectional Idioms for Practice Trials

Idiom	Decomposability	Trial Type	Target Language	Target Word
Crack the whip	NON-DECOM	Control	English	SCRAMBLED
Have a fling	NON-DECOM	Critical	English	AFFAIR
Pay lip service	NON-DECOM	Critical	Spanish	APOYAR
Horse of another color	NON-DECOM	Control	English	DINNER
Come up roses	NON-DECOM	Critical	Spanish	TRIUNFAR
Pass the buck	NON-DECOM	Critical	English	BLAME
Up for grabs	DECOM	Critical	Spanish	TOMAR
To start from scratch	DECOM	Critical	English	BEGINNING
Bring home the bacon	DECOM	Critical	Spanish	DINERO
Straw that broke the camel's back	DECOM	Control	English	FOOT
Out of your element	DECOM	Control	English	CALENDAR
Get out of hand	DECOM	Critical	English	CONTROL

APPENDIX C

Experiment 2 Spanish Unidirectional Idioms for Critical Trials

Idiom	Decomposability	Critical Targets	
		English	Spanish
A tambor batiente	DECOM	EXCELLENT	MAGNÍFICO
Tomelo con calma	DECOM	CHILL	TRANQUILO
De tal para cual	DECOM	IDENTICAL	IDÉNTICO
Cortar la insipracion	DECOM	TERMINATE	DISMINUIR
Poner las condiciones	DECOM	COMMAND	DECLARAR
Sacar un ojo de la cara	DECOM	OVERPRICED	CARO
Estar como perro en barrio ajeno	DECOM	AWKWARD	INCÓMODO
Pegarle al gordo	DECOM	VICTORY	GANAR
Sentirse en plena forma	DECOM	FIT	SALUDABLE
Tomar la delantera	DECOM	RESPONSIBLE	ENCARGASE
Apantallar a alguien	DECOM	IMPRESS	ASOMBRAR
Tenerlo presente	DECOM	REMEMBER	RECORDAR
Bajo el yugo de	DECOM	CONTROL	DOMINAR
Pedir la mano	DECOM	PROPOSE	PREGUNTAR
Hacer mala cara	DECOM	RUDE	GROSERO
A darle duro	DECOM	ENDURE	SOPORTAR
No tener pelos en la lengua	DECOM	TRUTHFUL	VERDAD
Unirse al grupo	DECOM	UNITE	UNIRSE
Estar hecho una furia	NON-DECOM	RAGE	RABIA
Sin duda alguna	NON-DECOM	CERTAIN	CIERTO
Andar en la cuerda floja	NON-DECOM	UNCERTAIN	INCIERTO
A otra cosa mariposa	NON-DECOM	FORGET	OLVIDAR
Estar en aprietos	NON-DECOM	DILEMMA	CONFLICTO
Cortar de raiz	NON-DECOM	ENDS	TERMINAR
Dar una manita de gato	NON-DECOM	CLEAN	LIMPIAR
Planchar oreja	NON-DECOM	SLEEP	DORMIR
Guardar rencor	NON-DECOM	RESENT	CORAJE
Soltar prenda	NON-DECOM	EXPOSE	REVELAR
Sobarse el lomo	NON-DECOM	WORK	TRABAJAR
Ser harina de otro costal	NON-DECOM	ALTERNATIVE	DIFERENTE
Al mal tiempo buena cara	NON-DECOM	TOLERATE	AGUANTAR
No perder las esperanzas	NON-DECOM	OPTIMISTIC	ILUSIONISTA
Tener hasta la coronilla	NON-DECOM	BOTHER	FASTIDIAR
Irse de parranda	NON-DECOM	PARTY	FESTEJAR
Echarle a uno el caballo en sima	NON-DECOM	EXPOSE	REVELAR
Besando los pies	NON-DECOM	LOVE	QUERER

Experiment 2 Spanish Unidirectional Idioms for Control Trials

Idiom	Decomposability	Critical Targets	
		English	Spanish
Dar órdenes terminantes	DECOM	SEND	ENVIAR
Si dios nos da licencia	DECOM	DANCE	BAILAR
Empezar desde cero	DECOM	FAT	GORDO
Agarrar la onda	DECOM	ENTER	ENTRAR
Meter la pata	DECOM	POTATO	PAPA
Cerrar el pico	DECOM	LETTUCE	LECHUGA
Quemarse las cejas	DECOM	SMILE	SONREIR
En boa cerrada no entran moscas	DECOM	SLEEP	DORMIR
Importarle un pepino	DECOM	KISS	BESO
Pasar el charco	DECOM	GREEN	VERDES
Hacerlo tonto a uno	NON-DECOM	PICK	ESCOGER
Darle a uno en la torre	NON-DECOM	ASK	PREGUNTAR
Salió a pedir de boca	NON-DECOM	WAVE	ONDA
Traer alguien en sus mejores trapitos	NON-DECOM	BASIC	BÁSICO
Costar un ojo de la cara	NON-DECOM	VACANT	VACANTE
Andar con rodeos	NON-DECOM	START	EMPEZÓ
Hacer pedazos	NON-DECOM	DEDICATE	DEDICAR
Probar suerte	NON-DECOM	CAT	GATO
Estar nomas fregando a uno	NON-DECOM	THROW	TIRAR
Como quitarle un dulce a un niño	NON-DECOM	MONEY	DINERO

Experiment 2 Spanish Unidirectional Idioms for Practice Trials

Idiom	Decomposability	Trial Type	Target Language	Target Word
Dar órdenes terminantes	DECOM	Critical	Spanish	EXIGIR
Caer gorda	DECOM	Critical	English	DISLIKE
Soltar la sopa	DECOM	Critical	English	REVEAL
Dar a luz	DECOM	Critical	Spanish	NACER
Con las manos en la masa	DECOM	Control	Spanish	VIEJO
Pegar fuerte	DECOM	Control	Spanish	OJO
Hacer lo imposible	NON-DECOM	Critical	English	UNATTAINABLE
Estar nomas fregando a uno	NON-DECOM	Critical	English	ANNOYING
Pegar fuerte	NON-DECOM	Critical	Spanish	FIRME
Armarse la gorda	NON-DECOM	Critical	Spanish	FIESTA
Echar todo a perder	NON-DECOM	Control	Spanish	DEFINIR
Darle vuelo a la hilacha	NON-DECOM	Control	Spanish	SALUDAR

APPENDIX D

Experiment 3 Bidirectional Idioms for Critical Trials

Idiom		Decomposability	Critical Targets	
English	**Spanish**		**English**	**Spanish**
Lose face	Caerse la cara de vergüenza	DECOM	EMBARRASSED	APENADO
Miss the boat	Se le va el avion	DECOM	LOSE	PERDER
Button your lips	Con las bocas cosidas	DECOM	SHUT	CERRADA
Letter of the law	Al pie de la letra	DECOM	EXACTLY	PRECISO
Lend an ear	Prestar oidos a…	DECOM	LISTEN	ESCUCHAR
Lie through one's teeth	Mientes con todos los dientes	DECOM	DECEIVE	MENTIR
play with fire	Jugar con fuego	DECOM	RISK	RIESGO
Shut your trap	Cierra el pico	DECOM	QUIET	CALLADO
Spill the beans	Soltar la sopa	DECOM	REVEAL	DESCUBRIR
Swallow one's pride	Tragarse el orgullo	DECOM	HUMBLE	HUMILDE
Food for thought	Dar en que pensar	DECOM	CONSIDER	PENSAR
Bet your bottom dollar	Apostar hasta el último centavo	DECOM	GAMBLE	ARRIESGAR
Lose your cool	Perder la calma	DECOM	UPSET	ENOJAR
Handle with kid gloves	Tratar con guante blanco	DECOM	CAREFUL	CUIDADO
Slip one's mind	Se me fue	DECOM	FORGET	OLVIDAR
Steal the show	Robarse el show	DECOM	TAKES	TOMAR
Would give the world	Daria el mundo	DECOM	PROVIDE	DAR
Add fuel to the fire	Echarle leña al fuego	DECOM	WORSE	PEOR
Out of the blue	De la nada	NON-DECOM	UNEXPECTED	INESPERADO
Be on cloud nine	Estar en las nubes	NON-DECOM	HAPPY	FELIZ
Below the belt	Golpe bajo	NON-DECOM	UNFAIR	INJUSTO
Fall on deaf ears	A palabras necias, oídos sordos	NON-DECOM	IGNORE	IGNORAR
Wear the pants	Traer los pantalones bien puestos	NON-DECOM	DOMINATE	MANDAR
Armed to the teeth	Armed to the teeth	NON-DECOM	PREPARED	PREPARADO
Born with a silver spoon in his mouth	Nacer en pañales de seda	NON-DECOM	RICH	RICO

Experiment 3 Bidirectional Idioms for Critical Trials

Idiom		Decomposability	Critical Targets	
English	**Spanish**		**English**	**Spanish**
Get the eye	Echarle ojo	NON-DECOM	HOSTILE	DESFAVORABLE
Burn the midnight oil	Quemarse las pestañas	NON-DECOM	WORK	TRABAJAR
Play by ear	Tocar por oido	NON-DECOM	SPONTANEOUS	ESPONTÁNEO
Give the willies	Dar cosa	NON-DECOM	SCARY	MIEDO
Bite the dust	Morder el polvo	NON-DECOM	END	TERMINAR
Throw to the wolves	Echar a la boca del lobo	NON-DECOM	ABANDON	ABANDONAR
Keep an ace up your sleeve	Traer un as bajo la manga	NON-DECOM	RESOURCEFUL	INGENIOSO
Eat his words	Tragarse sus palabras	NON-DECOM	REGRET	REPENTIR
Pulling your leg	Tomar el pelo	NON-DECOM	DECEIVE	ENGAÑAR
To throw in the towel	Tirar la toalla	NON-DECOM	DEFEAT	PERDER
Hit the sauce	Chupar la botella	NON-DECOM	DRINK	BEBER

Experiment 3 Bidirectional Idioms for Control Trials

Idiom		Decomposability	Critical Targets	
English	**Spanish**		**English**	**Spanish**
In the nick of time	Caer a tiempo	DECOM	GASPS	GRITAR
dance to another tune	A otra cosa mariposa	DECOM	CHECK	REVISAR
Frighten out of one's wits	Un susto mayusculo	DECOM	SCORE	GANAR
Read between the lines	Leer entre lineas	DECOM	LIVE	VIVIR
Rule with an iron fist	Con mano de hierro	DECOM	DRAW	DIBUJAR
Take the bull by the horns	Tomar al toro por los cuernos	DECOM	PRAY	REZAR
Out of thin air	De la nada	DECOM	LOCALLY	LOCAL
Save your skin	Salvar el pellejo	DECOM	RIGOROUS	RIGOROSO
Seal one's fate	La suerte esta sellada	DECOM	PUNCTUAL	EXACTO
Swallow one's pride	Tragarse el orgullo	DECOM	CALL	LLAMAR
In seventh heaven	Estar en la gloria	DECOM	EXCITED	EMOCIONADO
Behind the times	Andas atrasado de noticias	DECOM	FACILITATE	FACILITAR
By word of mouth	De boca en boca	DECOM	SUSTAIN	SOSTENER
Frog in one's throat	Un pollo en la garganta	DECOM	PEACEFUL	TRANQUILO
Made of steel	Ser de acero	DECOM	EXCLUDE	EXCLUIR
Old wive's tale	Un cuento de viejas	DECOM	BEGINNING	INICIO
To have a heart of gold	Tener un corazón de oro	DECOM	CLOSE	CERCA
Bring home the bacon	Traer el pan a la casa	DECOM	HARD	DIFICIL
Bet the spitting image	Ser la viva imagen	DECOM	ENGLISH	INGLÉS
Pour one's heart out	Con el corazón en la mano	DECOM	NONE	NINGUNO
Make a pass	Lanzarse	NON-DECOM	COORDINATE	CORDINAR
Lose one's touch	Perder el toque	NON-DECOM	ELECT	ELECTO
Scream bloody murder	Gritar como si lo mataran	NON-DECOM	HUNGRY	HAMBRE
Lead up a blind alley	Guiar hasta un callejon sin salida	NON-DECOM	POOR	POBRE
Rest in peace	Descanse en paz	NON-DECOM	RIDE	MONTAR
Reap what you sow	Siembras lo que cosechas	NON-DECOM	LIKE	GUSTAR
Twist someone's arm	Hacer manita de puerco a alguien	NON-DECOM	COOK	COCINAR

Experiment 3 Bidirectional Idioms for Control Trials

Idiom		Decomposability	Critical Targets	
English	**Spanish**		**English**	**Spanish**
God willing	Si dios quiere	NON-DECOM	JOKE	BROMEAR
Break the ice	Romper el hielo	NON-DECOM	DIE	MORIR
To have a screw loose	Tener una canica suelta	NON-DECOM	LUCKY	AFORTUNADO
To turn a blind eye	Hacerse de la vista gorda	NON-DECOM	OUTDATED	ANTIGUO
Short tempered	Ser de corto genio	NON-DECOM	CLEVER	MAÑOSO
Force someone's had	Forzar la mano	NON-DECOM	EMPTY	VACIO
Give plenty of rope	Dar rienda suelta	NON-DECOM	RAIN	LLOVER
Waste your breath	Gastar saliva en balde	NON-DECOM	PANIC	PANICO
Long arm of the law	El brazo largo de la ley	NON-DECOM	SMASH	APLASTADO
Skate on thin ice	Ir pisando huevos	NON-DECOM	CHECK	REVISAR
Tip of the iceberg	En la punta del iceberg	NON-DECOM	SING	CANTAR
Get something stuck in your head	Meterse algo en la cabeza	NON-DECOM	WRECK	CHOCAR
Grease the wheel	Aceitar engranes	NON-DECOM	REPUTATION	REPUTACIÓN

Experiment 3 Bidirectional Idioms for Practice Trials

Idiom	Language	Decomposability	Trial Type	Target Language	Target Word
To throw shade	English	DECOM	Critical	English	INSULT
Caer de gracia	Spanish	DECOM	Critical	Spanish	FALLAR
Hacerse tonto	Spanish	DECOM	Control	Spanish	CHALECOS
To go against the tide	English	DECOM	Critical	English	REBEL
Ser de corto genio	Spanish	DECOM	Control	English	LISTEN
Cross the line	English	DECOM	Critical	Spanish	GROSERO
To die of laughter	English	DECOM	Control	English	ANGRY
Contar un chiste	Spanish	DECOM	Critical	Spanish	GRACIOSO
Rise to the bait	English	DECOM	Critical	English	LURE
Flash in the pan	English	NON-DECOM	Critical	English	FLASHY
Tener la cabeza fria	Spanish	NON-DECOM	Control	Spanish	CONTADA
Hacer teatro	Spanish	NON-DECOM	Critical	Spanish	ESCÁNDALO
A bird in the hand is worth two in the bush	English	NON-DECOM	Control	English	DEAFENING
En la punta de la lengua	Spanish	NON-DECOM	Critical	English	BEGINNING
Get up on the wrong side of the bed	English	NON-DECOM	Critical	Spanish	IRRITABLE
En tierra de ciegos, el tuerto es rey	Spanish	NON-DECOM	Critical	Spanish	RELEVANTE
Quedarse frio	Spanish	NON-DECOM	Control	Spanish	TRISTE
To put one's cards on the table	English	NON-DECOM	Critical	English	DISPLAY