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Second Language Learners' Performance on Non-Isomorphic Cross-Language Cognates in Translation

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SECOND LANGUAGE LEARNERS' PERFORMANCE ON NON-ISOMORPHIC CROSS-LANGUAGE COGNATES IN TRANSLATION

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Carlos I. Canizares

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To: Dean Michael R. Heithaus
College of Arts, Sciences and Education

This thesis, written by Carlos I. Canizares, and entitled Second Language Learners' Performance on Non-isomorphic Cross-language Cognates in Translation, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.

_____
Tometro Hopkins

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Feryal Yavas

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Virginia C. Mueller Gathercole, Major Professor

Date of Defense: November 9, 2016

The thesis of Carlos I. Canizares is approved.

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Dean Michael R. Heithaus
College of Arts, Sciences and Education

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Andrés G. Gil
Vice President for Research and Economic Development
and Dean of the University Graduate School

Florida International University, 2016

DEDICATION

I dedicate this thesis to my mother, Lidia, for her limitless dedication to my father; her tenacity and undefeatable will inspire me every day, and to my dearest friend, Sheryl Williams who has cheered me up and shored me up when no one else could. Thank you.

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First, I must thank my thesis major professor, Dr. Virginia C. Mueller Gathercole without who I could not have completed this work. Her guidance, insight, and patience were invaluable in this process. Her support and encouragement up to the very last minute is what kept me going. Thank you.

I must also thank Dr. Tometro Hopkins and Dr. Feryal Yavas for agreeing to be members of my thesis committee and for their guidance and support. Their inimitable instruction in linguistics informed me in such a way that made me believe I could take on this endeavor. They are each one of a kind. Thank you.

To Dr. Ellen Thompson who is responsible for my interest in this topic in the first place and for guiding me through the initial steps of the literature review process. To all my professors at FIU who have guided me and informed me and who have ultimately contributed to my understanding of linguistics, and to my classmates who have come and gone, but were there when I needed their help studying or simply understanding a concept that wouldn't sink in. Thanks for keeping me afloat.

ABSTRACT OF THE THESIS

SECOND LANGUAGE LEARNERS' PERFORMANCE ON NON-ISOMORPHIC CROSS-LANGUAGE COGNATES IN TRANSLATION

by

Carlos I. Canizares

Florida International University, 2016

Miami, Florida

Professor Virginia C. Mueller Gathercole, Major Professor

Do adult L2 English bilingual speakers have difficulty with cognate words whose meanings are distinct across their two languages? This study explored the extent to which variations in meaning in cross-language cognates affect translation performance in a translation task by L2 English (L1 Spanish) speakers who learned English as adults. A prep-phase experiment was conducted to test native English-speakers' predicted completions of the study's stimuli sentences, in order to choose the optimal stimuli for the primary experiment. The method for the primary experiment of this study consisted of a web-based translation task of 120 sentences from Spanish to English, while controlling for polysemy and frequency. The results showed that adult L2 learners of English did experience difficulty when translating cognates in sentences from their L1 to their L2. The interaction of the Spanish word's polysemous nature, Spanish word frequency, English target frequency and English cognate frequency played a role in the participants' performance.

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CHAPTER PAGE

1 INTRODUCTION

This study explores the extent to which variations in meaning in cross-language cognates affect translation performance in a sentence translation task. Do adult bilingual speakers, whose second language (L2) is English and whose first language (L1) is Spanish and who learned English as adults, have difficulty with cognate words whose meanings are distinct across their two languages? A considerable amount of research has examined this type of question in relation to second language learners, English language learners, English L2-ers, and late bilinguals. The present research involves adult English language learners who learned English as adults and whose L1 is Spanish. This research requires an understanding of three areas, namely (i.) cross-language interaction between L1 and L2, (ii.) cognates and (iii.) polysemy.

2 LITERATURE REVIEW

2.1 Cross-language Interaction

One aspect of cross-language interaction relates to how lexical selection works when two languages are involved. Lexical selection is the mechanism by which the retrieval of a word (corresponding to a concept a speaker wants to express) takes place. The selection of the target word is subject to competition from other activated lexical items (Caramazza, 1997). The lexical selection mechanism activates not just the target word but also other words that then compete to be selected to match the concept the speaker wanted to express. For example, if the concept the speaker wants to express is *horse*, it may be subject to competition from *mare*, *filly*, *colt*, *stallion*, and *pony*. Likewise, in reading and word recognition, information becomes active not only for the

target word itself but also for other words that share aspects of lexical form with the target word. Thus, word recognition is characterized as a parallel process in which information at different levels interacts until a single lexical option surfaces (Kroll, Sumutka, & Schwartz, 2005; McClelland & Rumelhart, 1981).

Moreover, research has shown that when the two languages of a bilingual are involved, both languages enter into competition during lexical selection (Costa, Caramazza, & Sebastián-Gallés, 2000). However, there are two views on how lexical selection takes place. One view assumes that the lexical selection mechanism considers only lexical nodes of the language currently being used (Language-Specific Selection Models). While the other view is that any activated lexical node of either language may enter into competition (Language-Non-Specific Selection Models). Costa, Colomé, Gómez & Sebastián-Gallés (2003) propose that these two views may not be mutually exclusive. They suggest it is possible that the degree to which lexical competition is present in bilingual speakers may depend on their proficiency level. Nonetheless, in a comprehensive review of experimental literature on the bilingual lexicon, Kroll, Sumutka, and Schwartz, (2005) concluded that the evidence does suggest that in both word recognition (reading) and production (speaking) there is language non-specific selectivity. Thus, there is competition across the two languages in which activated information interacts prior to selection. They point out, however, that the activated information is different for production and word recognition. In production, meaning-based representations in the form of the translation equivalent or semantic relatives as well as the phonology of the alternatives are initially active. In word recognition, it is aspects of lexical form and its representation in the two languages that become active.

Thus when bilinguals read words in one of their languages, information about orthography, phonology and semantics in the other language becomes active (Kroll, Sumutka, & Schwartz, 2005).

The Bilingual Interactive Activation plus model (BIA+), assumes that lexical information from a bilingual's two languages is represented in an integrated lexicon (Dijkstra & Van Heuven, 2002; Schwartz & Kroll, 2006). According to the BIA+ model, the initial stages of lexical access, consists of bottom-up, non-specific selective activation of lexical information across a bilingual's languages and the non-specific selectivity is not constrained by information outside of the integrated lexicon. This model also incorporates a distinction between a word identification system (the lexicon) and a task/decision system which is affected by extra-linguistic factors such as task demands and participant expectations. According to the BIA+ model the word identification system is directly affected only by linguistic factors such as lexical, syntactic, and semantic information. The important implication here is that by including both of these systems, the word identification system and the task decision system, the authors accommodated the wide range of evidence for language non-specific selectivity and the more specific differences that arise across different experiments, tasks, and contexts.

Jiang (2004) investigated semantic transfer in second language learning with Korean (L1) ESL speakers, replicating his earlier study (Jiang, 2002) with Chinese (L1) ESL speakers. The participants were asked to perform a semantic judgment task in which they decided whether or not two (2) English words were related in meaning. Two types of related word pairs served as critical stimuli: (i) word pairs whose two (2) members shared the same L1 translation and (ii) word pairs whose two (2) members did

not share the same L1 translation. The Korean (L1) ESL speakers responded to the same-translation pairs significantly faster than to the different translation pairs whereas no such same-translation effect was found for the control group of native speakers of English. The same-translation effect found in L2 speakers served as evidence for the occurrence of L1 semantic structures in L2 lexical representations and their ongoing interaction in L2 processing. In other words, the Korean (and Chinese in previous study) participants drew from their L1 lexicon to process the word pairs in English even though their task involved L2 stimuli with an L2 target.

2.2 Cognates

Cognates, defined here as words that have a similar form and meaning across languages, may significantly reduce problems of lexical mapping between a bilingual's two languages (Schwartz, Kroll & Diaz, 2007; Peeters, Dijkstra, & Grainger, 2013). With non-cognates there is no obvious indication of a relation between the two words of the learner's two languages. For example, for a native Spanish speaker the surface form of the English word *head* shows no obvious connection to the Spanish word *cabeza*. In contrast, with similarity of form learners may assume, a priori, a similarity of meaning. For example, a word such as *hotel* in English which has the similar (same orthographically) form *hotel* in Spanish could facilitate transferring the meaning from the source language to the target language quickly. In general, a word in a language learner's L1 language that matches the form and meaning of a word in the language learner's L2 language may provide an advantage in L2 word learning. Since the experiment in this research will involve a Spanish-English translation task, it is relevant that Spanish and English share a large number of cognates because of a common linguistic connection to

Latin (and Greek). However, the research discussed herein was not limited to English/Spanish cognates.

Despite the possible advantage aforementioned, there is evidence that at least in some cases, L2 learners may not in fact see a connection between cognates in their two languages. Peeters, Dijkstra, and Grainger (2013) found that, in late bilinguals, identical cross-language cognates may have two morphological representations because they typically have been acquired in different environments and social situations with different contexts; that is, late bilinguals generally learn their native language (L1) in one context (i.e., as a child at home) while they learn their second language (L2) in a different context (i.e., as an adult at school or in a foreign country). In a study regarding frequency, the findings by Baayen (2010) also emphasize the importance of context. He found that the context factor in frequency was more salient than the repetition factor. Baayen argued that frequency of occurrence, when understood in the sense of repeated experience, played only a minor role in lexical processing. Instead he claimed that other factors such as neighborhood density and context are important to the frequency effect. Baayen concluded that the word frequency effect is a secondary effect or byproduct (epiphenomenon) of learning that links form to lexical meaning. Consequently, frequency reflects a wide range of lexical distributional properties that are all co-determining learning, such as the context factor.

Nonetheless, other research supports the notion that cognates help speed language processing. Costa et al. (2000) had Spanish-Catalan bilinguals name pictures with cognate and non-cognate names. The authors argued that when the semantic system activated the lexical nodes of the two languages of a bilingual, and when the activation of

the lexical nodes spread to their phonological segments, pictures with cognate names were named faster than pictures with non-cognate names because the phonological information shared by the cognate and its translation was receiving activation from the two lexical nodes. In contrast the non-cognate word was receiving activation from only one source. Thus the retrieval of the target phonological representation was easier with pictures with cognate names producing what the authors call the cognate facilitation effect. In other words, bilingual participants named pictures with cognate names faster than the pictures with non-cognate names in both their L1 and L2.

2.3 Polysemy

Notwithstanding the above, cognates may be a double-edged sword for a developing L2 language learner. Even when words in the learner's two languages do share similar form and meaning their potential to be of a polysemous nature (in either or both languages) may lead to a mismatch or misuse when translating from L1 to L2. For example, Spanish uses one word *política* to refer to both *politics* and *policy*, two lexical forms in English. The following translations (a) through (f) further illustrate this point:

(a) La política de devoluciones de la compañía es justa.

(b) *The company's return *politics* is fair. [policy]

(c) Él se comporta bien porque los padres le dieron una buena educación.

(d) *He is well behaved because his parents gave him a good *education*. [taught him good manners].

(e) El alcalde de Madrid prometió erradicar todos los suburbios de su ciudad.

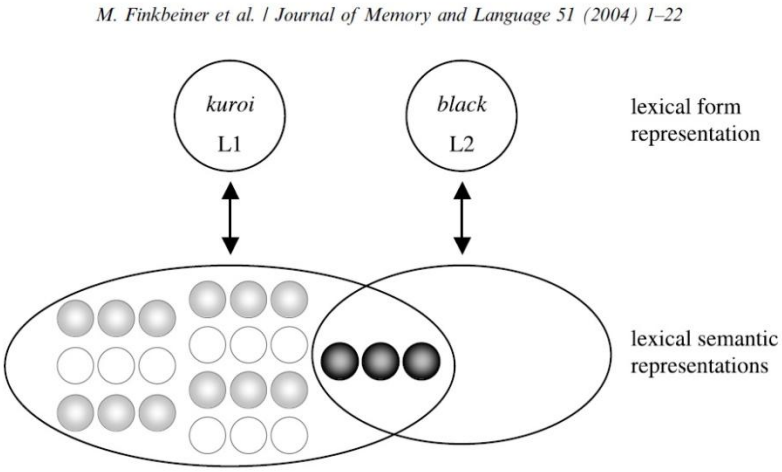
(f) *The mayor of Madrid promised to eradicate all the *suburbs* in his city. [slums]

Seeming cognates, sometimes called "false cognates" may make the mapping of surface

forms onto semantic representations difficult for L2 speakers when learning and translating such words. As the examples above illustrate, this is primarily a consequence of their polysemous and cross-language non-isomorphic nature.

According to Finkbeiner, M., Forster, K., Nicol, J., & Nakamura, K. (2004), most words are polysemous and the range of senses or meanings a word can have tends to be language specific and that words in one's L1 have many senses while words in one's L2 have few senses. In other words, an L2 speaker is aware of more meanings for words in his or her L1 than in his or her L2. Finkbeiner et al. (2004) conducted a number of translation lexical decision tasks (for example, measuring how quickly people classify stimuli as words or non-words) and semantic categorization experiments (for example, the difference between animal and non-animal) and found that in the translation lexical decision experiments, L1 words primed (influenced the response for) words in the L2 but L2 words did not prime the L1 targets. Put another way, the words with many meanings primed those with few but those with few did not prime those with many meanings. In contrast, these authors found that in the semantic categorization experiments, L1 primed L2 and L2 primed L1 as well. To explain this difference, these authors start with the assumption that L1 and L2 lexical semantic representations are asymmetrical, that is, L1 semantic representations are abundantly populated while L2 semantic representations are not. Finkbeiner's schematic representation in figure 1 below shows how the semantic representations (the sum of the grey, white and black circles) in L1 are more abundant than the semantic representations (just the black circles) in the L2.

Figure 1. A schematic representation of two translation equivalents according to the Sense Model.



Finkbeiner, et al.'s Sense Model proposes that priming between semantically related words depends on the proportion of shared senses. In lexical decisions it follows that the proportion of primed senses belonging to the target word will be much higher when an L1 word primes its L2 counterpart than when an L2 word primes its L1 counterpart. Consequently, according to this model, L2–L1 priming does not occur in lexical decision tasks because an insufficient proportion of the L1 lexical semantic representation is activated by the L2 prime. In semantic categorization tasks, however, the model proposes priming to be symmetrical because the semantic information recruited to generate a decision is restricted by the semantic category. In other words, the abundance of senses previously described in L1 over L2 is reduced since some of those senses fall outside of the category in question. The significance of this is that the amount of priming may not only depend on the overlap in the semantic senses activated by the prime and the target, but, critically, on the ratio of primed to unprimed senses associated with the target.

Elston-Guttler & Williams, (2008) investigated the influence of L1 lexicalization patterns on the processing of L2 words in sentential contexts by advanced German learners of English. Specifically, their focus was on cases where a polysemous word in the L1 was realized by independent words in the L2. They used an anomaly detection task in which participants had to indicate whether a target word formed an acceptable completion to a sentence. Their study found some evidence that L1 polysemy affects L2 meaning interpretation; that is, L1 activation occurs during L2 reading. Although the Jiang studies (2002, 2004) discussed above did not explicitly focus on cognates and polysemy as such, they did imply a polysemous nature regarding the word pairs that shared the same L1 translation. It is plausible that if the Jiang studies were to be replicated in languages typologically related to English (i.e., Spanish) cognates might play a greater role. These findings and those of Finkbeiner, et al. are relevant to the present research because the question addressed in this study is whether an abundance of meanings (senses) for the L1 cognate will mislead the L2 language learners to inappropriately use the L2 cognate equivalent in an L1 to L2 translation task.

The literature reviewed indicated that a number of variables including but not limited to frequency, context, and the proficiency of the L2 language learner play a role in the extent to which the L2 learner experiences and translates cognates. Jiang (2004) suggested that additional research and evidence from observing learners' actual word use is needed, such as an experiment that uses words that are not distinguished in the L1 (e.g., *política* in Spanish, *politics* and *policy* in English). He further suggested that the experiment should include sentences for which only one of the words is appropriate. Desmet and Duyck (2007) proposed that bilingual readers use the language found in a

sentence as an important prompt for the lexical search of words appearing in that sentence. That said, Jiang (2004) recommended that contextual cues other than meaning should be minimized in sentences. According to Jiang, if L2 word use is mediated by L1 semantic structures, the L2 speaker should have a difficult time choosing the right word. Otherwise, if the L2 participants can identify the right word for each sentence consistently, then one can conclude that substantial semantic development has occurred. Following these recommendations and suggestions for further research, the stimuli (see the method section for detail) for the present research will be presented within the context of a sentence in the participant's L1 language.

3 METHOD

The method for the primary experiment of this study consisted of a web-based translation task from Spanish to English by adult Spanish-English bilinguals. There was also a preparatory experiment to test native English-speakers' predicted completions of the study's stimuli sentences, for the purposes of choosing the optimal stimuli for the primary experiment. The overall design of the primary study will be described first, and then, in order to explain the full design, the preparatory phase experiment will be described and its role in finalizing the stimuli for the primary study, and this will be followed by the rest of the design for the primary study.

3.1 Overall Design

3.1.1 STIMULI

3.1.1.1 Words in target stimuli:

The goal was to develop a translation task that contained stimuli consisting of 80 target sentences - unambiguous sentences in Spanish that involve Spanish words that

have multiple translation equivalents in English. Each target test item was to be constructed using the Spanish word, the English target word – i.e., the appropriate (non-cognate) translation given the sentential context, and the English cognate (non-target) word that is also a potential translation for the Spanish word, but not in the given sentential context.

Each of the Spanish words in the final target stimuli set was to have multiple translational equivalents, one of which is the corresponding cognate and others that are not cognates. In order to establish the set of words to be tested, a set of 120 words was chosen. From these, the goal was to find the 80 words for which native speakers of English agreed on the best English word to fit the context. The initial sets of 120 words were to be subjected to the prep phase test with monolingual English speakers, and from those, the optimal set of 80 words would be chosen for the primary task.

The Spanish words are all nouns and were selected using Webster's New Spanish-English Dictionary (Merriam-Webster, 2006); Merrriam-Webster's Collegiate Dictionary (Merriam-Webster, 2006); wordreference.com (WordReference.com LLC, n.d.); and Davies (n.d.) [*Corpus of Contemporary American English* and *Corpus del Español*]. The choice of stimuli was controlled in relation to frequency and to polysemy, as follows:

3.1.2 FREQUENCY

3.1.2.1 Frequency of the Spanish words:

The Spanish words were grouped, first, with respect to frequency. The frequency of the Spanish words chosen was controlled by selecting equivalent numbers of high frequency Spanish words and low frequency Spanish words. The frequency was based on the KWIC (*key word in context*) function in the *Corpus del Español* (Davies, n.d.).

The KWIC function produces a raw frequency count and relative frequency rate per 1 million for each Spanish word searched. The KWIC relative frequency rate per 1 million was used. For the purposes of the present study, the Spanish words with a frequency rate of 10 occurrences per million or greater were classified as high frequency and words with a frequency rate of less than 10 occurrences per million were classified as low frequency. The 120 words and their frequencies are shown in detail in Appendix A-1 through A-4.

3.1.2.2 Frequency of the English target (non-cognate) words:

The English target (non-cognate) words in the target stimuli set were also nouns and were identified using Webster's New Spanish-English Dictionary (Merriam-Webster, 2006); Merrriam-Webster's Collegiate Dictionary (Merriam-Webster, 2006); wordreference.com (WordReference.com LLC, n.d.); and Davies (n.d.) [*Corpus of Contemporary American English*]. The English target words, like the Spanish words, were controlled for frequency with both high frequency and low frequency words. The frequency for each English target word was determined using the KWIC (*key word in context*) function in the *Corpus of Contemporary American English*. The KWIC function produces a raw frequency count and relative frequency rate per 1 million for each English target word. The KWIC relative frequency rate per 1 million was used. The frequency range cut-offs for the English target words varied from pattern type to pattern type as a result of the selection sequence and the possible words available within a condition. First the frequency for the Spanish word was determined and classified as either high or low, using the numbers given above. Then the frequency for all the English target words in the Spanish high frequency group was determined and the words were classified as either high or low, and the same process was then followed for all the English target words in

the Spanish low frequency group. The process was then repeated between the English Target word and the English Cognate word. Thus the resulting groupings reflect "absolute" polysemy and frequency for the Spanish words across conditions, but relative target frequency and cognate frequency across conditions. The words and their respective frequencies are also shown in Appendix A-1 through Appendix A-4.

3.1.2.3 Frequency of the English cognate (non-target) words:

The English cognate (non-target) words in the stimuli set are also potential translations for the Spanish words, but not in the given sentential context of the translation task. The English cognates were also nouns and were also identified using Webster's New Spanish-English Dictionary (Merriam-Webster, 2006); Merrriam-Webster's Collegiate Dictionary (Merriam-Webster, 2006); wordreference.com (WordReference.com LLC, n.d.); and Davies (n.d.) [*Corpus of Contemporary American English*]. Like the Spanish and English target words, the English cognates were also controlled for frequency, in this case using the KWIC (*key word in context*) function in the *Corpus of Contemporary American English*. Again, the relative frequency rate per 1 million words was used. The frequency range cutoffs for the English cognates varied from pattern type to pattern type and were determined as described above. These are also shown in Appendix C.

The control of Spanish word, English target, and English cognate frequency led to eight (8) sets of relative word frequency patterns, as follows:

Table 1. Relative word frequency patterns

Spanish Word Frequency	English Target Frequency	English Cognate Frequency
High	High	High
		Low
	Low	High
		Low
Low	High	High
		Low
	Low	High
		Low

3.1.3 POLYSEMY OF THE SPANISH WORDS

In addition to controlling for the frequency of the Spanish word, the English target (non-cognate) word, and the English cognate (non-target) word, the stimuli were controlled in relation to the relative number of meanings for the Spanish word. The Spanish words chosen for the stimuli set had either a relatively robust polysemous nature, with many meanings (senses) or a relatively low polysemous nature, with very few meanings (senses). For the purposes of this study a word with three (3) or more meanings (senses) was classified as having a relatively robust polysemous nature, while a word with two (2) meanings (senses) or less was classified as having a relatively low polysemous nature. Determining the Spanish word's number of meanings was a two-step process:

1) Two sources were consulted, and the total number of meanings was a composite of the meanings listed by the two sources. Webster's New Spanish-English Dictionary (Merriam-Webster, 2006) was examined first. As noun cognates were observed and documented, the total number of meanings and corresponding one-

word translation equivalents in English were also documented. Webster's New Spanish-English Dictionary numbers each meaning when more than one exists.

2) Each word was then looked up in the wordreference.com website (WordReference.com LLC, n.d.) to identify and document any additional meanings.

For the purposes of this study the composite of the meanings listed by the two sources was used to classify the Spanish words as either having a relatively robust polysemous nature or having a relatively low polysemous nature. The control of the polysemy of the Spanish words, in combination with the frequency matching, resulted in a total of sixteen (16) stimuli patterns as follows:

Table 2. The sixteen stimuli patterns

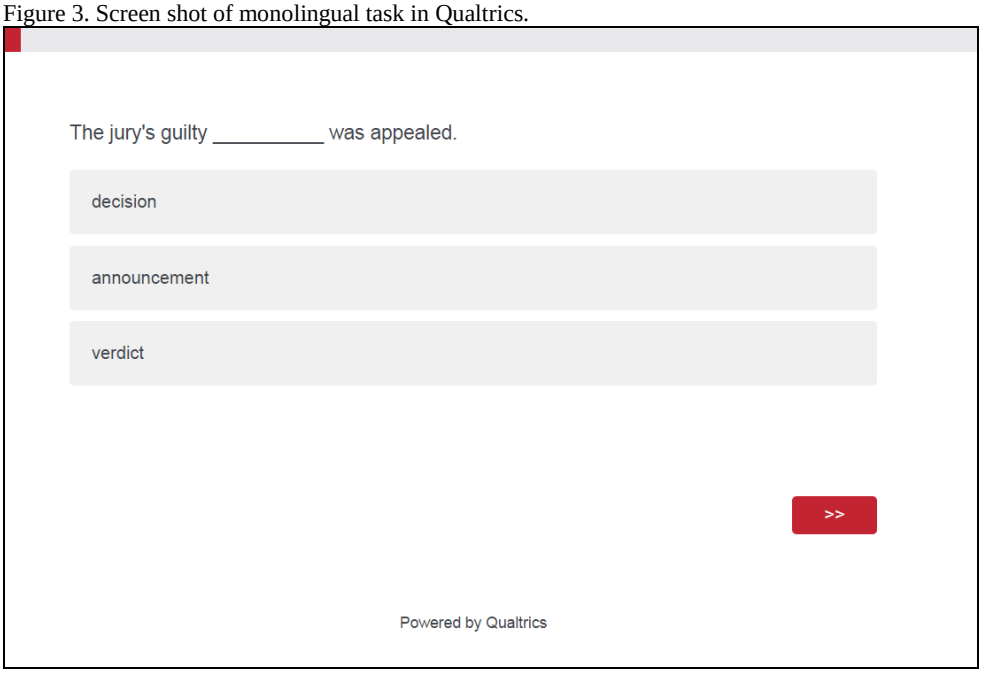
Polysemy (# of meanings)	Spanish Word Frequency	English Target Frequency	English Cognate Frequency
High (Many)	High	High	High
			Low
		Low	High
			Low
	Low	High	High
			Low
		Low	High
			Low
Low (Few)	High	High	High
			Low
		Low	High
			Low
	Low	High	High
			Low
		Low	High
			Low

For each of the 16 types of stimuli, seven (7) or more sets of words (Spanish word, English target word and English cognate) were selected for the prep phase of the study. This yielded a total of 120 target stimuli sets. From these, a final list of 80 words (5 per set) was determined / confirmed according to the results in the preparatory phase experiment.

3.1.4 PREPARATORY-PHASE EXPERIMENT

To ensure the best choice of English target (non-cognate) word stimuli for the primary task above, a preparatory-phase experiment was conducted with monolingual English speakers. The task consisted of the expected English translations of the target sentences of the primary task, with a blank space in place of the English words to be produced as the product of the translation. The monolingual English speakers' task was to choose from three (3) options which word they would expect to occur in that blank space. A sample screen shot from the task in Qualtrics is shown in Figure 3 below:

Figure 3. Screen shot of monolingual task in Qualtrics.



3.1.4.1 Participants:

There were 20 participants in the preparatory-phase. The participants were 9 males, 10 females, and 1 anonymous native speaker of North American English. The participants' ages ranged from 17 to 73 with a mean of 49.47 and a standard deviation of 20.07.

3.1.4.2 Design of preparatory phase experiment:

3.1.4.2.1 Stimuli

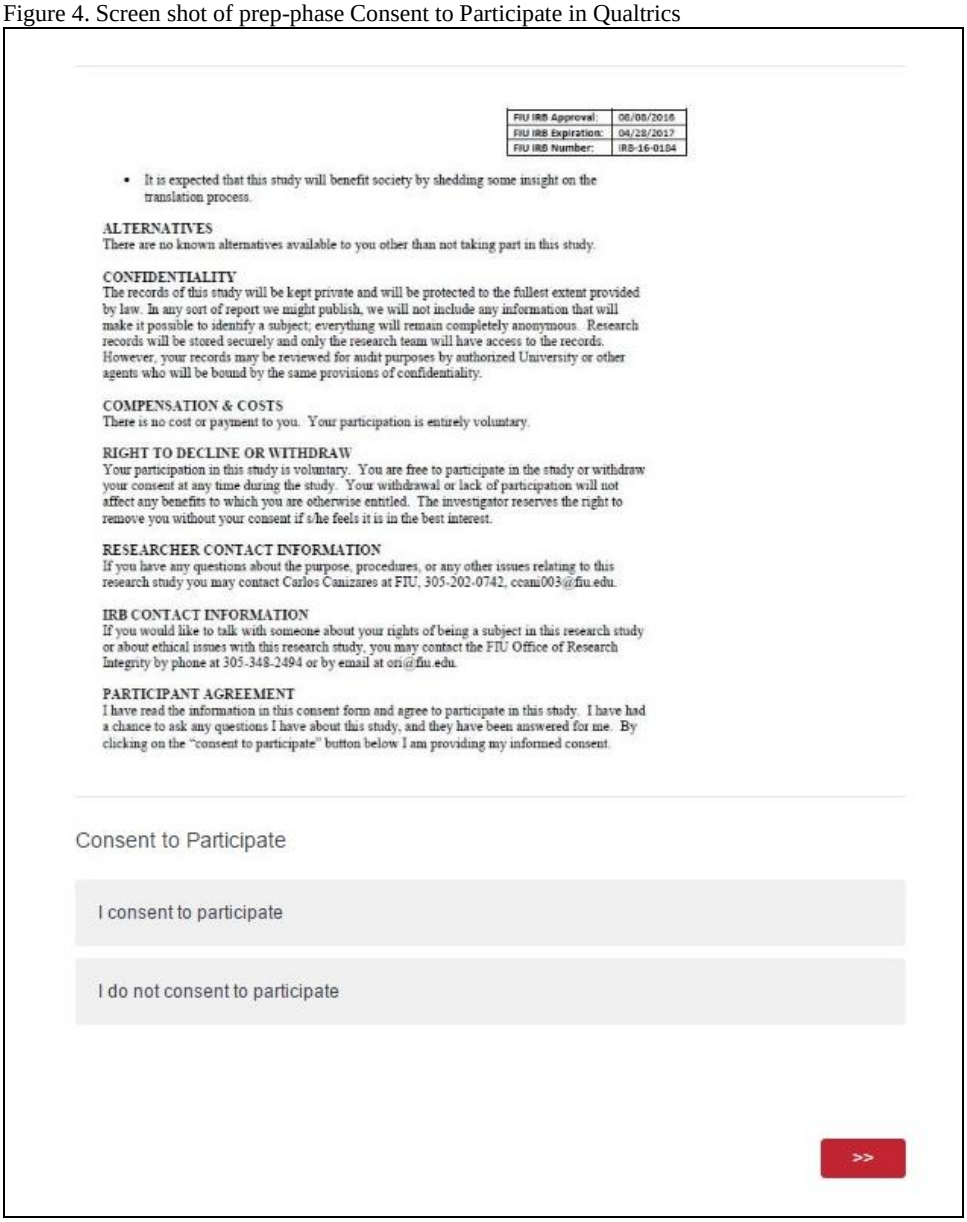
The preparatory-phase consisted of a multiple choice English sentence completion task. Each sentence had a blank space in the body of the sentence. Immediately below each sentence were three possible choices for the blank. The choices were nouns or short phrases including a noun; the choices included the English target (non-cognate) word, the English cognate (non-target) word, and one other synonym or related word. The stimuli consisted of 120 sentences. An example of the preparatory-phase stimuli is shown in Figure 3 above. The stimuli were randomized using a randomization function in the Qualtrics software to scramble the presentation order of the 120 sentences. The placement of the target word (non-cognate) response in each question was also controlled and randomized.

3.1.4.2.2 Preparatory-phase procedure

The participants of the prep-phase were invited to the Qualtrics-based (web-based) task by email. The email had a link to the Qualtrics-based task. At the website, the participants were first shown the IRB approved Consent Form for the prep-phase and asked to affirm or decline consent to participate by clicking on a corresponding button as shown in figure 4 below. Next the participants were given a brief language

questionnaire, Appendix D. In addition to collecting minimal demographic information, the questionnaire served to exclude participants that were not L1 English speakers or who spoke Spanish or other language as an L2. After completing the questionnaire the participants were given a brief instruction page that explained how to do the multiple choice English sentence completion task. The instruction page is shown in figure 5 below.

Figure 4. Screen shot of prep-phase Consent to Participate in Qualtrics



FIU IRB Approval:	08/08/2016
FIU IRB Expiration:	04/28/2017
FIU IRB Number:	IRB-16-0184

- It is expected that this study will benefit society by shedding some insight on the translation process.

ALTERNATIVES
There are no known alternatives available to you other than not taking part in this study.

CONFIDENTIALITY
The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject; everything will remain completely anonymous. Research records will be stored securely and only the research team will have access to the records. However, your records may be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality.

COMPENSATION & COSTS
There is no cost or payment to you. Your participation is entirely voluntary.

RIGHT TO DECLINE OR WITHDRAW
Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. Your withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove you without your consent if s/he feels it is in the best interest.

RESEARCHER CONTACT INFORMATION
If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact Carlos Canizares at FIU, 305-202-0742, ccani003@fiu.edu.

IRB CONTACT INFORMATION
If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study, you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT
I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. By clicking on the "consent to participate" button below I am providing my informed consent.

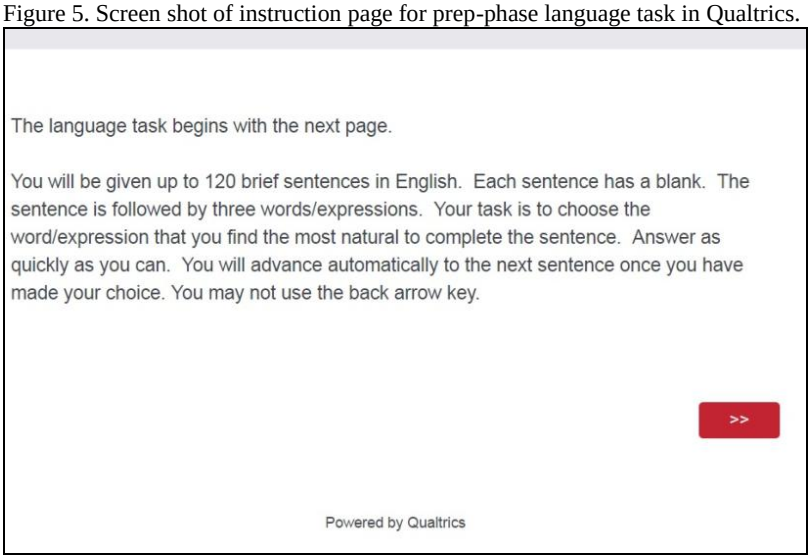
Consent to Participate

I consent to participate

I do not consent to participate

>>

Figure 5. Screen shot of instruction page for prep-phase language task in Qualtrics.



Of the 120 sentences, 112 sentences were evenly grouped in 16 sets of seven (7) sentences. Each group represents one of the 16 controlled polysemy-frequency patterns/sets discussed above. Each group included seven (7) English target (non-cognate) and English cognate (non-target) words from the same controlled polysemy-frequency pattern/set. Each group had two (2) extra sentences than required for the primary experiment stimuli set. Of the 120 sentences, 8 were extra sentences from various categories picked at random. The results of the prep-phase are shown in Appendix B-1 - B-4 and an excerpt of the words selected is shown below in Table 3.

Table 3. Sample list of words selected in prep-phase

Spanish Word	Spanish Word Freq.	English Target Word	English Target Freq.	English Cognate	English Cognate Freq.	Spanish Word	Spanish Word Freq.	English Target Word	English Target Freq.	English Cognate	English Cognate Freq.
armas	54.66	weapons	87.68	arms	133.67	historia	136.43	story	348.29	history	314.50
política	112.04	policy	224.70	politics	118.60	dirección	45.84	address	105.32	direction	85.43
título	35.31	degree	91.64	title	66.22	reunión	26.50	meeting	141.20	reunion	8.67
juicio	38.44	trial	95.54	judgement	1.56	publicidad	9.90	Advertising	79.80	publicity	12.78
educación	59.03	manners	7.99	education	355.98	tiempo	362.74	weather	70.47	time	1,821.63
decisión	24.95	verdict	15.89	decision	154.11	autor	46.38	perpetrator	2.76	author	129.49
necesidad	59.91	need	38.28	necessity	15.78	discusión	12.88	argument	63.07	discussion	85.70
destino	34.21	destination	16.04	destiny	11.57	presencia	58.54	appearance	45.14	presence	84.81
marca	10.85	brand	34.32	mark	137.26	argumento	8.96	plot	25.76	argument	63.07
cable	3.38	wire	30.99	cable	42.89	salario	6.69	wage	20.38	salary	24.56
intento	18.70	attempt	71.98	intent	25.16	pistola	4.25	gun	93.94	pistol	11.82
competencia	16.51	responsibility	79.00	competence	14.73	ingreso	8.15	income	88.22	ingress	0.16
asistencia	9.43	attendance	17.27	assistance	48.25	aborto	2.20	miscarriage	1.81	abortion	41.62
batería	2.17	drums	7.64	battery	20.22	cabina	1.45	booth	16.39	cabin	24.00
antigüedad	10.42	seniority	2.08	antiquity	3.01	suburbio	0.22	slum	2.18	suburb	8.00
acidez	0.75	heartburn	1.31	acidity	1.63	resentimiento	3.00	regret	14.41	resentment	8.77

The five English target words in each category picked the most by the monolingual English speakers, and with no or minimal choices of the (non-target) cognate, were chosen for the translation task. A target cut-off threshold was set at a minimum of 80% of the monolinguals choosing the target word. When there was a "tie" within a given group (i.e., more than one word was available for the fifth slot per category because the target word had been chosen by an equal number of monolinguals), then choices of the cognate were considered. The target word whose cognate was never picked or picked the least among the other choices was then selected. When this criterion was also a tie, then the choice with the least ambiguous sentence in Spanish was selected.

All but one of the final 80 words met this criterion: of the final 80 words, 43 were selected by 100% of the monolinguals, 18 were selected by 95%, 13 by 90%, 3 by 85%, and 2 by 80%. The one word (*basis*) that did not meet this threshold was selected by 75% of the monolinguals, and, while 25% of the monolinguals picked the distractor word (*foundation*) in that trial, none of the monolinguals selected the English cognate (*base*). Of the two words discarded in that category, one (*direction*) was only picked by 20% of the monolinguals. Although the other discarded word (*country*) was picked by 85% of the monolinguals, the cognate (*nation*) was picked by 15% of the subjects. Consequently, (*basis*) seemed a better choice for the purposes of the translation task.

3.1.5 PRIMARY TRANSLATION TASK

3.1.5.1 Target stimuli:

From the results of the prep phase task, the five (5) English target (non-cognate) words from each group with the greatest consensus were selected for the stimuli set of the

primary experiment. In addition to the target stimuli, fillers and control stimuli were constructed, as follows.

3.1.5.2 Words in filler stimuli:

Forty Spanish filler words were used in filler sentences. The filler words were selected using Webster's New Spanish-English Dictionary (Merriam-Webster, 2006); and the Merrriam-Webster's Collegiate Dictionary (Merriam-Webster, 2006) at random. Frequency and polysemy were not controlled for the filler words. The list of filler words are presented in Appendix E.

The target and filler Spanish words were presented in 80 target and 40 filler sentences that are unambiguous in Spanish. For each sentence, the target or filler Spanish word was included in a noun phrase or prepositional phrase. Sample sentences are presented in Figure 6 below, and the full target set is shown in Appendix A. The list of the filler sentences is attached as Appendix E.

Figure 6. Sample Spanish target sentences

Spanish Word	English - Target Sentence	Spanish - Target Sentence
armas	The police found all types of weapons in the suspect's car.	La policía encontró armas de todo tipo en el coche del sospechoso.
política	The store changed its return policy.	La tienda cambio su política de devoluciones.
título	Alex received her college degree in 1989.	Alex recibió su título universitario en 1989.
juicio	The start of the trial was set for next week.	El comienzo del juicio fue fijado para la semana que viene.
decisión	The jury's guilty verdict was appealed.	La decisión de culpabilidad del jurado fue apelada.
diferencia	They stopped being friends due to a disagreement.	Ellos dejaron de ser amigos por tener una diferencia.
necesidad	The needs of the poor are great.	La necesidad de la pobreza es grande.
destino	Alex left late and has not reached his destination.	Alex salió tarde y no ha llegado a su destino.
marca	Alex has a favorite brand of shampoo.	Alex tiene una marca favorita de champú.
cable	Alex had to connect the blue & red wires in the transistor radio.	Alex tuvo que conectar los cables azul y rojo en el radio de transistores.
intento	Alex gave up after the third attempt.	Alex lo dejó después del tercer intento.
competencia	That problem is not Alex's responsibility.	Ese problema no es competencia de Alex.
asistencia	Alex has perfect attendance in his class.	Alex tiene asistencia perfecta en su clase.
batería	Alex plays the drums in the rock band.	Alex toca la batería en la banda de rock.

The translation task was constructed using Qualtrics, a web-based survey platform. For the translation task, each sentence appeared in black text on a white background. The sentences were shown to the participants on the screen one at a time. Each sentence had a short phrase underlined and it was the participant's task to translate that phrase into English as used in the context of the sentence.

The software used consisted of MS PowerPoint, MS Excel, Windows 2010, Qualtrics and SPSS. The web-based task was available 24 hours/day from 9/05/16 to 9/15/16. After the completion of the translation task, the results were collected for coding into MS Excel and SPSS.

3.1.5.3 Participants:

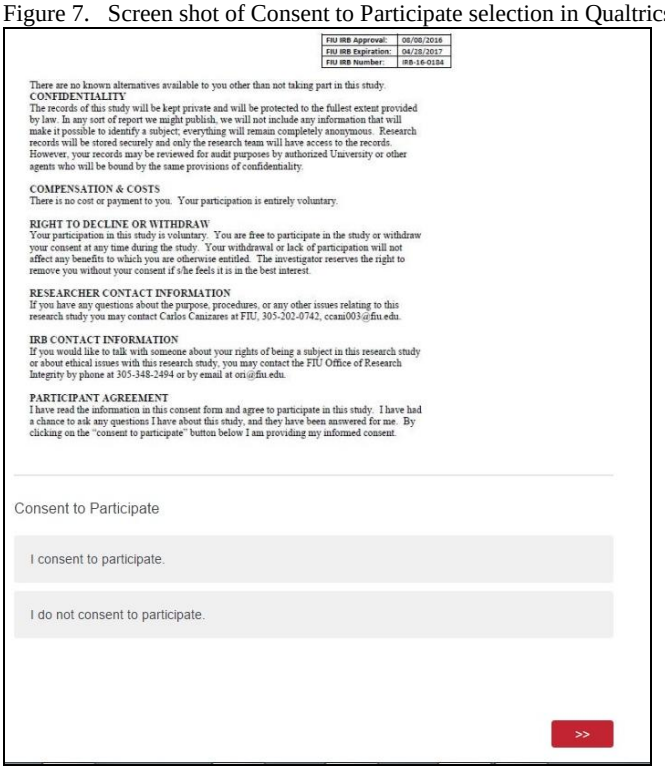
The participants for the primary task (translation task) were Spanish (L1) – English (L2) bilinguals -- in particular, adult intermediate to mastered English language learners. For the purposes of this research intermediate to mastered English language learners were defined to included bilinguals that met the following criteria: i) began learning English at post high school age, ii) self-reported their level as intermediate, advanced or mastered, and/or iii) was currently enrolled in intermediate level or higher level English classes of a post-secondary level English language program.

Acceptance of participants was based on a language background questionnaire, Appendix F. In aggregate the pool consisted of 50 participants. There were 13 male (26%) and 37 female 74% participants. The mean age was 31.8 with a standard deviation of 12.77, ranging from 18 to 61.

3.1.5.4 Procedure:

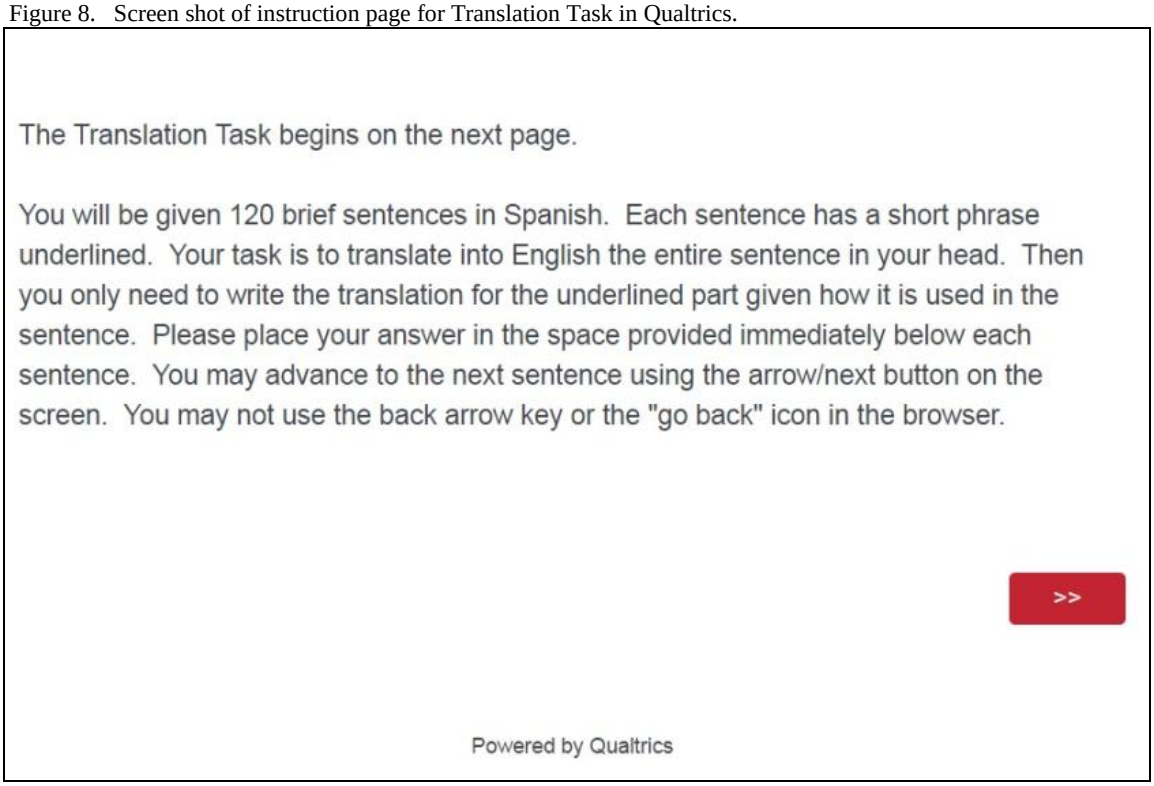
The participants were invited to the Qualtrics-based (web-based) task by email and flyer. At the website, the participants were first shown the IRB-approved Consent Form and asked to affirm or decline consent to participate by clicking on a corresponding button as shown in Figure 7 below.

Figure 7. Screen shot of Consent to Participate selection in Qualtrics.



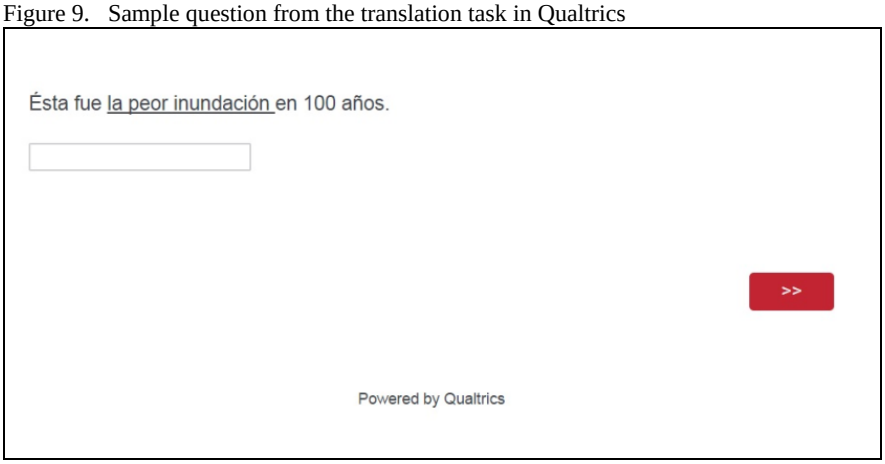
Next the participants were given a language questionnaire, Appendix F. In addition to collecting minimal demographic information, the questionnaire served to exclude participants who were not Spanish/English bilinguals or were native or near-native English speakers. On completing the questionnaire the participants were given a brief instruction page that explained the translation task of 120 sentences from Spanish to English as shown in Figure 8 below.

Figure 8. Screen shot of instruction page for Translation Task in Qualtrics.



The participants typed their answer in the blank space (box) immediately below the sentence. A sample of how each question appeared in Qualtrics is shown in Figure 9 below. The participants advanced to the next screen by clicking on the red arrows on the screen. The participants were not able to go back. The last sentence was followed by a final screen that thanked the participants for completing the translation task.

Figure 9. Sample question from the translation task in Qualtrics



4. RESULTS

The responses of the participants could consist of the (incorrect) English cognate, the (correct) English target, or some other expression. In most cases, the word used was either the cognate or the target, so the proportional choices of these two were generally inverses of each other. There was an occasional use of an expression other than the cognate or target. For the purposes of analyses, the use of the English cognate will be analyzed first, followed by an analysis of the use of the English target. Subsequent qualitative analyses will examine those cases in which there were high numbers of other expressions used.

4.1 **English Cognates**

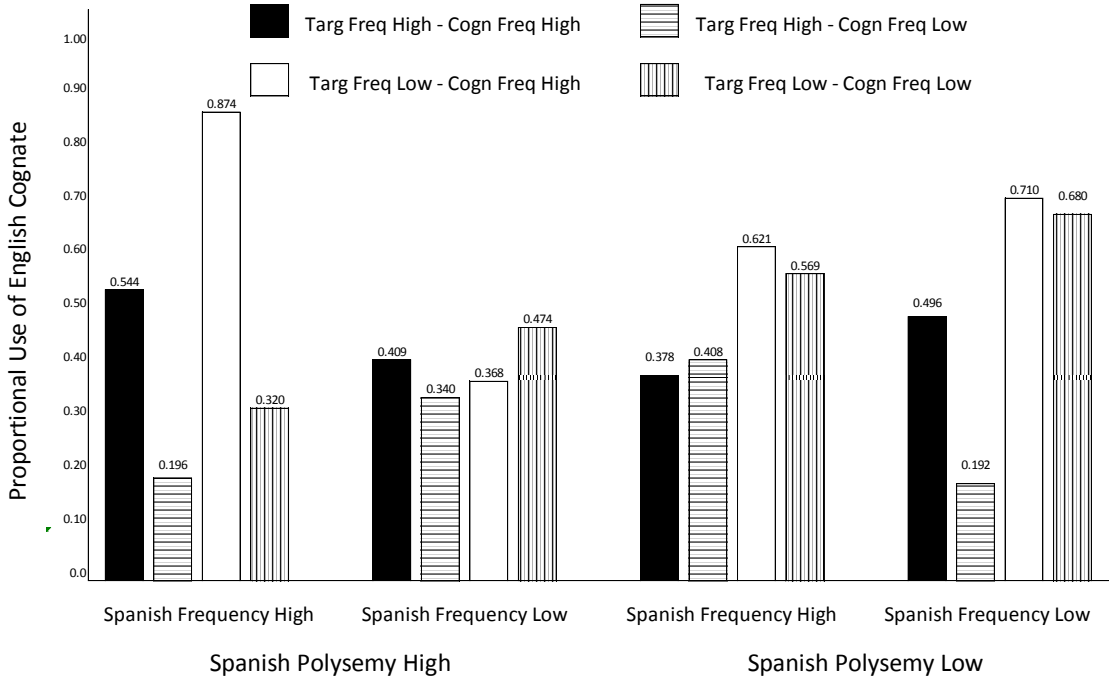
Participants were scored "1" if they translated the Spanish cognate to the English cognate non-target word. Participants were scored "0" if they translated the Spanish cognate to the English target or any other word. A repeated-measures ANOVA in which polysemy level (high, low) of the Spanish word ("polysemy"), frequency of the Spanish word (high, low) ("Span freq"), frequency of the English target word (high, low) ("targ freq"), and frequency of the English cognate word (high, low) ("cogn freq") were entered as independent variables, and proportional use of the English cognate was entered as the dependent measure.

The results showed a significant main effect for polysemy, $F(1, 49) = 19.669$, $p < .001$; targ freq, $F(1, 49) = 74.419$, $p < .001$; and for cogn freq, $F(1, 49) = 55.095$, $p < .001$. There were more uses of the cognate when the Spanish word had low polysemy (.51) than when it had high polysemy (.44); when targ freq was low (.58) than when it was high (.37); and when the cogn freq was high (.55) than when it was low (.40).

These main effects were modified by significant interactions of Polysemy X Span Freq, $F(1, 49) = 8.178$, $p = .006$; Polysemy X Targ Freq, $F(1, 49) = 17.911$, $p < .001$; Polysemy X Cogn Freq, $F(1, 49) = 9.087$, $p = .004$; Span Freq X Cogn Freq, $F(1, 49) = 15.283$, $p < .001$; Polysemy X Span Freq X Targ Freq, $F(1, 49) = 25.563$, $p < .001$; Polysemy X Span Freq X Cogn Freq, $F(1, 49) = 72.013$, $p < .001$; and Span Freq X Targ Freq X Cogn Freq, $F(1, 49) = 22.065$, $p < .001$.

Performance by polysemy level, Spanish frequency, target frequency, and cognate frequency is shown in Figure 10 below. To explore the interactions, follow up analyses were conducted in which the two polysemy levels were examined separately.

Figure 10. Means for proportional use of English cognate



4.1.1 HIGH SPANISH POLYSEMY

For the items involving high polysemy in Spanish, analyses showed a significant main effects for Span freq, $F(1, 49) = 13.004$, $p = .001$; targ freq, $F(1, 49) = 27.782$, $p < .001$;

and cogn freq, $F(1, 49) = 82.3$, $p < .001$. Again, the cognate was used in English more often when the Span freq was high (.48) than when it was low (.40). Similarly, the cognate was used in English more often when the targ freq was low (.51) than when it was high (.37). Finally, the English cognate was used more often when the cogn freq was high (.55) than when it was low (.33).

There were also significant interactions of Span Freq X Targ Freq, $F(1, 49) = 15.763$, $p < .001$; Span Freq X Cogn Freq, $F(1, 49) = 87.894$, $p < .001$; and Span Freq X Targ Freq X Cogn Freq, $F(1, 49) = 15.904$, $p < .001$.

To further explore these interactions, additional analyses were conducted controlling for the Spanish frequency. When the Spanish frequency was high, the results showed a significant main effect for targ freq, $F(1, 49) = 29.068$, $p < .001$, with a low targ freq (.60) yielding more cognate responses then high targ freq (.37), and cogn freq, $F(1, 49) = 156.453$, $p < .001$, with high cogn freq (.71) yielding more cognate responses than low cogn freq (.26). The results also show a significant interaction of Targ Freq X Cogn Freq, $F(1, 49) = 8.670$, $p = .005$. Use of the cognate was especially high when the target was infrequent and the cognate frequent.

When Spanish frequency was low, the results showed a significant interaction of Targ Freq X Cogn Freq, $F(1, 49) = 8.504$, $p = .005$. In this case it appeared that even when the cogn freq was high, it was avoided, possibly because the cognate in this condition was known (familiar enough) not to be the translation equivalent for the Spanish word.

4.1.2 LOW SPANISH POLYSEMY

For the items involving low polysemy in Spanish, analyses showed significant main effects for targ freq, $F(1, 49) = 75.264$, $p < .001$; and cogn freq, $F(1, 49) = 6.828$, $p = .012$. Here, the cognate was used in English more often when the tarq freq was low (.42) than when it was high (.37).

There were also significant interactions of Span Freq X Targ Freq, $F(1, 49) = 9.253$, $p = .004$; Span Freq X Cogn Freq, $F(1, 49) = 7.160$, $p = .010$; and Span Freq X Targ Freq X Cogn Freq, $F(1, 49) = 10.803$, $p = .002$.

To explore these interactions, additional analyses were conducted controlling for Spanish frequency. When the Span freq was high, the results showed a significant main effect for targ freq, $F(1, 49) = 23.529$, $p < .001$. The cognate was used in English more often when the targ freq was low (.60) than when it was high (.39)

When the Span freq was low, the results showed a significant main effect for targ freq, $F(1, 49) = 82.578$, $p < .001$; cogn freq, $F(1, 49) = 14.124$, $p < .001$; and a significant interaction of Targ Freq X Cogn Freq, $F(1, 49) = 13.026$, $p = .001$. More cognates were used when targ freq was low (.70) than when it was high (.34), and inversely the cognate was used more often when cogn freq was high (.60) than when it was low (.44). The fewest uses of the cognate occurred in the condition in which the targ freq was high but the cogn freq low.

4.2 **English Targets**

A second set of analyses examined the correct use of the English target words. Analyses were similar to those in the case of the use of the English cognates, but here analyses were conducted in which participants were scored "1" if they translated the

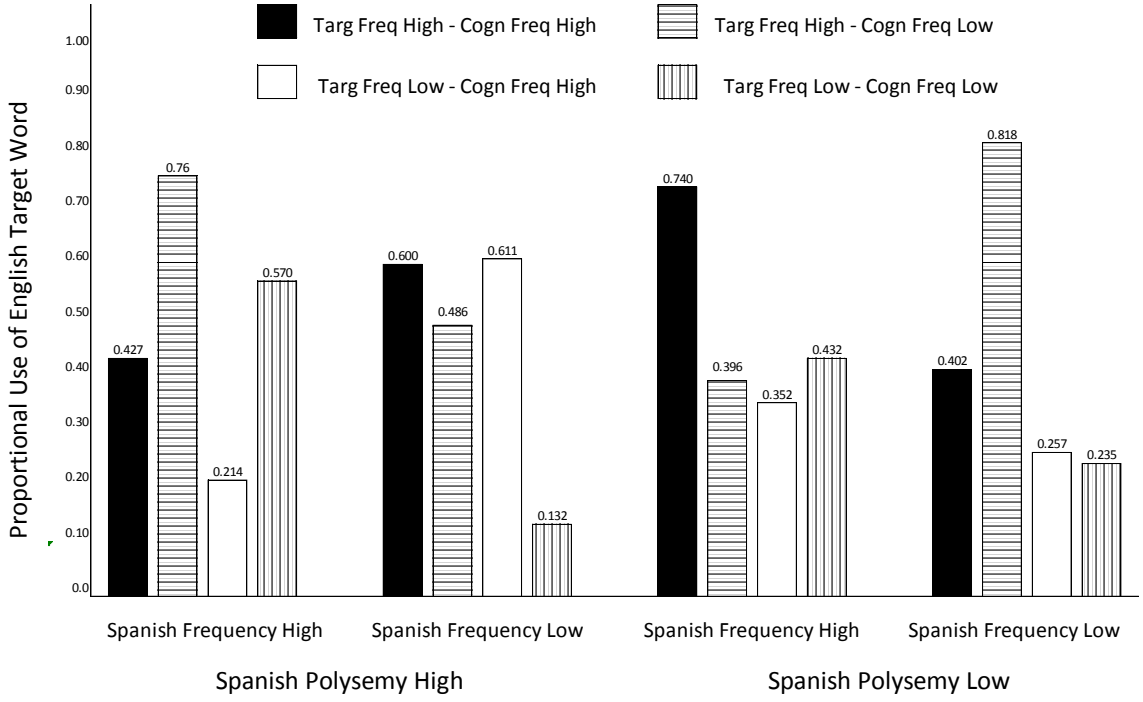
Spanish cognate to the English target non-cognate word (whereas in the previous analyses, scoring gave a "1" for the use of the cognate). Participants were scored "0" if they translated the Spanish cognate to the English cognate or any other word. A repeated-measures ANOVA in which polysemy level (high, low) of the Spanish word ("polysemy"), frequency of the Spanish word (high, low) ("Span freq"), frequency of the English target word (high, low) ("targ freq"), and frequency of the English cognate word (high, low) ("cogn freq") were entered as independent variables, and proportional use of the English target word was entered as the dependent measure.

The results showed a significant main effect for Span freq, $F(1, 49) = 6.429$, $p = .014$; and targ freq, $F(1, 49) = 139.279$, $p < .001$. The English target word was used only slightly more when the Span freq was high (.49) than when it was low (.44), and when the targ freq was high (.58) than when it was low (.35).

These main effects were modified by significant interactions of Polysemy X Targ Freq, $F(1, 49) = 6.674$, $p = .013$; Span Freq X Targ Freq, $F(1, 49) = 6.601$, $p = .013$; Span Freq X Cogn Freq, $F(1, 49) = 21.383$, $p < .001$; Targ Freq X Cogn Freq, $F(1, 49) = 6.205$, $p = .016$; Polysemy X Span Freq X Targ Freq, $F(1, 49) = 11.608$, $p = .001$; Polysemy X Span Freq X Cogn Freq, $F(1, 49) = 307.241$, $p < .001$; Polysemy X Targ Freq X Cogn Freq, $F(1, 49) = 6.780$, $p = .012$; Span Freq X Targ Freq X Cogn Freq, $F(1, 49) = 136.069$, $p < .001$; and Polysemy X Span Freq X Targ Freq X Cogn Freq, $F(1, 49) = 12.253$, $p = .001$.

Performance by polysemy level, Spanish frequency, target frequency, and cognate frequency is shown in Figure 11 below. Here again, to explore the interactions, follow up analyses were conducted in which the two polysemy levels were examined separately.

Figure 11. Means for proportional use of English target word



4.2.1 HIGH SPANISH POLYSEMY

For the items involving high polysemy in Spanish, analyses showed a significant main effect for targ freq, $F(1, 49) = 58.881$, $p < .001$. The English target word was used more often when it was a frequent word (.57) than when it was infrequent (.38).

There were also significant interactions of Span Freq X Cogn Freq, $F(1, 49) = 204.451$, $p < .001$; Targ Freq X Cogn Freq, $F(1, 49) = 12.944$, $p = .001$; and Span Freq X Targ Freq X Cogn Freq, $F(1, 49) = 23.054$, $p < .001$.

To further explore these interactions, additional analyses were conducted controlling for the Span freq. When the Spanish frequency was high, the results showed a significant main effect for targ freq, $F(1, 49) = 53.604$, $p < .001$; and cogn freq, $F(1, 49) = 135.314$, $p < .001$; and no significant interactions. The English target word was used more often when targ freq was high (.59) than when it was low (.39), and the English

target word was used more when cogn freq was low (.67) than when it was high (.32). Use of the target was especially high when the targ freq was high and the cogn freq was low. When Spanish frequency was low, the results showed a significant main effect for targ freq, $F(1, 49) = 22.701$, $p < .001$; and cogn freq, $F(1, 49) = 63.101$, $p < .001$; and a significant interaction of Targ Freq X Cogn Freq, $F(1, 49) = 32.137$, $p < .001$. Again here the target was used more often when targ freq was high (.54) than when it was low (.37). However, in contrast to the previous condition, here the target was used more when the cogn freq was high (.61) than when it was low (.31).

4.2.2 LOW SPANISH POLYSEMY

For the items involving low polysemy in Spanish, analyses showed a significant main effect for targ freq, $F(1, 49) = 106.998$, $p < .001$. The English target was used more often when targ freq was high (.59) than when low (.32).

There were also significant interactions of Span Freq X Targ Freq, $F(1, 49) = 16.059$, $p = < .001$; Span Freq X Cogn Freq, $F(1, 49) = 60.564$, $p = < .001$; and Span Freq X Targ Freq X Cogn Freq, $F(1, 49) = 88.657$, $p < .001$.

To further explore these interactions, additional analyses were conducted controlling for the Span freq. When the Spanish frequency was high, the results showed significant main effects for targ freq, $F(1, 49) = 20.630$, $p < .001$; and cogn freq, $F(1, 49) = 17.094$, $p < .001$, and a significant interaction of Targ Freq X Cogn Freq, $F(1, 49) = 45.433$, $p < .001$. When controlling for Spanish polysemy low and Spanish frequency high, the English target use was higher when targ freq was high (.57) and lower when low (.39). Likewise, the English target was used more when cogn freq was also high (.55)

than when low (.41). Further qualitative analyses were done to explain the absence of the inverse condition expected and observed in most of the other conditions.

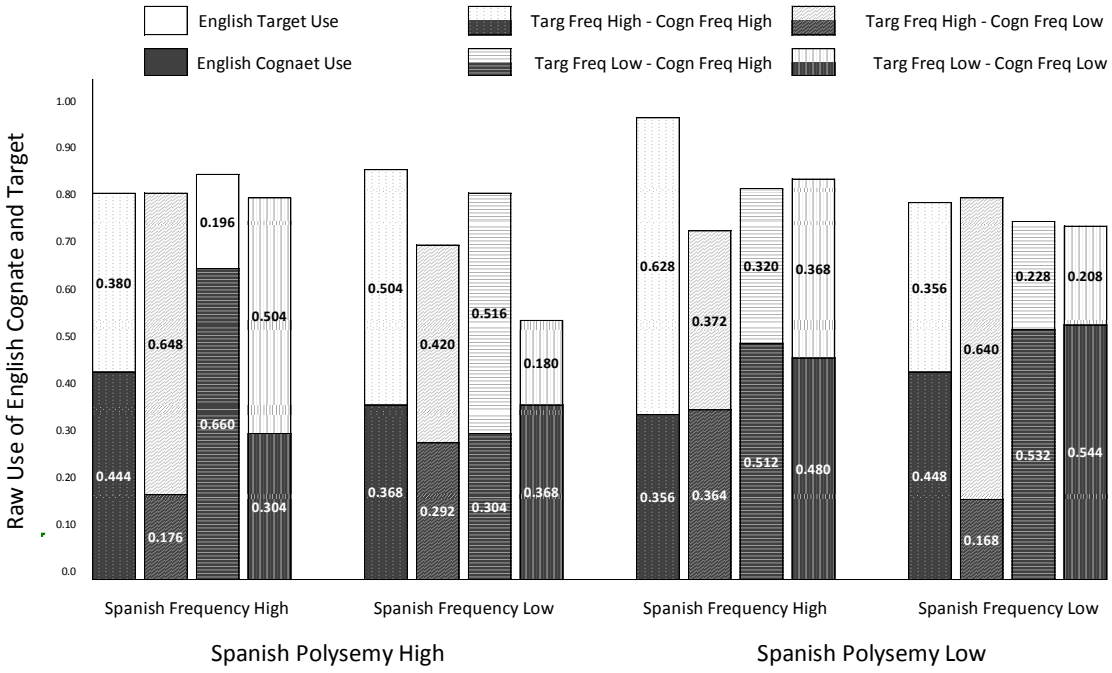
For Span freq low, the results showed significant main effects for targ freq, $F(1, 49) = 137.408$, $p < .001$, and cogn freq, $F(1, 49) = 36.071$, $p < .001$; and a significant interaction of Targ Freq X Cogn Freq, $F(1, 49) = 40.202$, $p < .001$. Here the expected inverse between English target use and English cognate use was present. The target was used more when the targ freq was high (.61) than when low (.25) and the target was used less when cogn freq was high (.33) than when it was low (.53).

4.3 **Other Expressions Used**

Although in most cases the responses of the participants were either the (incorrect) English cognate or the (correct) English target, there was some use of an expression other than the cognate or target. Figure 12 below shows cumulatively the cognate use plus the target use for each condition demonstrating that these two choices were generally inverses of each other. In one case in particular in which the use of alternative words in the translation was high Spanish polysemy was high, the English target frequency was low, and the English cognate frequency was low as well. This means that a significant number of participants chose neither the target nor the cognate in English. Specifically this occurred with two stimuli sentences: 1. *Las autoridades realizaron un examen del banco hoy*, for which the Spanish cognate, English target and English cognate were *examen*, *inspection*, and *exam*, respectively; and 2. *La vela tiene un olor estupendo*, Spanish cognate, English target and English cognate were *olor*, *scent*, and *odor*, respectively. However, 42% of the participants (21) translated the Spanish

cognate *examen* to *test*, and 26% (13) to various choices other than target or cognate. Likewise, 82% (41) of the participants translated *olor* to *smell*.

Figure R-3, Comparison of raw use of English Cognate vs Target.



5 DISCUSSION

In general, these results support the position that cross-language non-isomorphic cognates may impede an L2 English language learner's (ELL) ability to use the best translation equivalent for a given context under certain conditions. In this study, the conditions tested were the polysemous nature of the Spanish cognate word (two levels: high, low), the frequency of the Spanish cognate (high, low), the frequency of the English target non-cognate word (high, low), and the frequency of the English cognate, non-target word (high, low). This was done through a translation task experiment. Two sets of analyses were run to understand the conditions in which either the English cognate or the English target (non-cognate) was used as the translation equivalent.

5.1 **English Cognates**

The first set of analyses was conducted to measure the proportional use of the English cognate in the translation task experiment. The results showed that polysemy, the English target frequency, and the English cognate frequency were important in the participant's choice of translation equivalent. The participants used the English cognate more often when the Spanish word had a low polysemous nature, when the English target word's frequency was low, and/or when the English cognate word's frequency was high. This can be interpreted to mean that when the L2 English language learners' knowledge of the Spanish word was such that it had a more absolute singular or very limited meaning they would lean to the English cognate as their translation equivalent. Likewise, when the English cognate's frequency was high, the L2 learners were more likely to use it and map it onto the meaning of the Spanish cognate. In contrast when the English target word's frequency was low it was less likely to be known and less likely to overtake the cognate's use.

The statistical measures/results also indicated that there were significant interactions between the variables polysemy, Spanish frequency, English target word frequency, and the English cognate's frequency that affected the selection choice of the English cognate as a translation equivalent. Specifically the use of the English cognate was especially high when the English target word's frequency was low and the English cognate's frequency was high. However, there was some evidence that sometimes when Spanish frequency was low, even when the English cognate's frequency was high, the cognate was not used, possibly because the English cognate in this condition was known (familiar enough) and its meaning was not mapped onto a possibly unfamiliar Spanish

word. In general however, the English cognate was used the least in the condition in which the English target word's frequency was high but the English cognate's frequency was low.

5.2 **English Targets**

The second set of analyses was conducted to measure the proportional use of the English target word in the translation task experiment. The results showed that overall the Spanish word's frequency and the English target word's frequency were significant in the choice of the English target word as the translation equivalent. Analyses indicated that the use of the English target word was especially high when the target frequency was high while the cognate's frequency was low. Although under certain conditions such as when the Spanish word frequency was low the target word was used more often even when the cognate frequency was high. Again, this might be interpreted to mean that sometimes, even when the English cognate's frequency was high, the English cognate was not considered a match to the Spanish word because the L2 participant was more familiar with the meaning of the English cognate and knew it wasn't the best match.

5.3 **Other Expressions Used**

In general the L2 participants chose either the English cognate or the English target as the translation equivalent. In many of the conditions analyzed these two choices appear inverse to each other. However, there were some expressions/words used other than the cognate or target, particularly when the Spanish word was high in polysemy and the frequencies of the Spanish word, the target word, and the English cognate were all low.

5.4 **Cross-Language Interaction**

The results of this study seem to further evidence an aspect of cross-language interaction as it relates to how lexical selection works when two languages are involved. It appears that the selection of the English target word was subject to competition from other activated lexical items, namely the Spanish cognate and English cognate. This is consistent with research that has demonstrated that when the two languages of a bilingual are involved, they also enter into competition during lexical selection (Costa, Caramazza, & Sebastián-Gallés, 2000). Consequently, in reading the sentence in the translation task and in recognizing the Spanish cognate, information may have become active not only for the Spanish cognate word but also for other words that share aspects of lexical form with the Spanish cognate, such as the English cognate. Word recognition and use is characterized as a parallel process in which information at different levels interacts (Kroll, Sumutka, & Schwartz, 2005; McClelland & Rumelhart, 1981), in this case, until either the English cognate, English target or some other expression surfaced and was selected. Moreover, it is aspects of lexical form and its representation in the two languages that become active; when bilinguals read words in one of their languages, information about orthography, phonology and semantics in the other language becomes active (Kroll, Sumutka, & Schwartz, 2005). Thus, when the participants in this study read the Spanish cognate, information about orthography and semantics in the other language became active.

5.5 **Cognates**

Cognates have a similar form and meaning across languages, and generally are believed to significantly reduce problems of lexical mapping between a bilingual's two

languages (Schwartz, Kroll & Diaz, 2007; Peeters, Dijkstra, & Grainger, 2013). In contrast, with non-cognates, such as the English target words which were the best translation equivalent given the context of the sentence in the study, there is no obvious indication of a relation between it and the Spanish word in the translation task. A default assumption might be that similarity of form corresponds to a similarity of meaning between the Spanish cognate and the English cognate. Thus in certain conditions, the participants chose the English cognate (incorrect word given the context) over the English target word (correct word).

5.6 **Polysemy**

This study did find that relative polysemy was a significant factor in the participants' choice of word to use. Moreover, under certain conditions, as explained above, the cognates may have been a double-edged sword for some of the L2 language learners because of the Spanish word's multiple meanings. The number of senses or meanings each word had was language-specific. In other words, the Spanish cognate in the participants' L1 could have had four meanings while the English cognate only had two meanings in their L2. Moreover, the L2 learners in the study would have been aware of more meanings for words in their L1 than in their L2 (Finkbeiner, M., Forster, K., Nicol, J., & Nakamura, K. 2004).

5.7 **Frequency**

The word frequency of the Spanish word, English target word, and English cognate in this study were all significant in the participants' choice of translation equivalent in completing the translation task. In the overall statistical results the frequency of the English target word and the frequency of the English cognate were

important variables in the use of either the target or the cognate. However, the frequency of the Spanish word also had a significant impact on the choice of the translation equivalent.

5.8 **Other Factors**

In addition to the impact of cognates, polysemy and frequency on the choice of the best translation equivalent in this study, there were other factors that should be considered. The participants' proficiency level in English, attitudes toward the L2, ageat which learning English started, length of time in the country, length of time spent studying English, and whether or not they were currently taking English classes may have also been factors. However, the design of the experiment controlled, statistically speaking, for the polysemous level of the Spanish cognate and the frequency levels of the Spanish cognate, the English target and the English cognate only. The proficiency level was controlled in as much as only intermediate to highly advanced L2 English language speakers were recruited. These other factors remain to be explored in future research.

6 CONCLUSION

This study set out to determine if L2 English (L1 Spanish) bilingual speakers who learned English as adults had difficulty with cognate words whose meanings are distinct across their two languages. Thus specifically, this study and experiment explored the extent to which these variations in meaning in cross-language cognates affected L2 performance in a sentence translation task. The results of the experiment confirmed that the variations in meaning due to cross-language non-isomorphic cognates do affect adult L2 performance under certain conditions, controlling for the Spanish word polysemy, and

the word frequency of the three words involved: Spanish cognate, English target (non-cognate), and English cognate. The implication of these results include a better understanding of the translation process of an adult L2 in relation to how they maneuver through various conditions or patterns of frequency and polysemous nature of cognates. This in turn informs linguists and Second Language Acquisition professionals as to the potential of cognates to both facilitate and impede adult L2 speakers selecting the best translation equivalent.

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Appendix A-1 (1 of 4) Complete list of Stimuli: Spanish word, English target, English cognate, their frequencies, and Spanish & English target Sentences

	Spanish Word	Number of Meanings	Spanish Word Frequency	English (non-cognate) Target Word	English Target Frequency	English (non-target) Cognate	English Cognate Frequency	English - Target Sentence	Spanish - Target Sentence
Polysemy,Many -- Spanish Frequency High -- English Target Frequency High -- English Cognate Frequency High									
1	base	6	41.88	basis	81.52	base	104.48	Beauty was the basis of her choice.	La belleza fue la base de su elección.
2	naturaleza	4	70.63	environment	120.66	nature	158.84	Pollution destroys the environment.	La contaminación destruye la naturaleza.
3	armas	3	54.66	weapons	87.68	arms	133.67	The police found all types of weapons in the suspect's car.	La policía encontró armas de todo tipo en el coche del sospechoso.
4	política	3	112.04	policy	224.70	politics	118.60	The store changed its return policy.	La tienda cambio su política de devoluciones.
5	violencia	3	24.50	force	193.84	violence	108.68	The police had to use force to enter the apartment.	La policía tuvo que usar violencia para entrar al apartamento.
Polysemy, Many -- Spanish Frequency High -- English Target Frequency High -- English Cognate Frequency Low									
1	cámara	4	39.57	room	429.08	camera	94.86	Alex entered the dark room.	Alex entro a la cámara oscura.
2	carta	5	61.78	letter	97.44	card	74.94	Alex wrote his sister a 5-page letter.	Alex le escribió una carta de cinco paginas a su hermana.
3	título	6	35.31	degree	91.64	title	66.22	Alex received her college degree in 1989.	Alex recibió su título universitario en 1989.
4	noticia	3	31.67	news	349.54	notice	58.86	Alex watches the news everyday.	Alex escucha las noticias todos los días.
5	juicio	3	38.44	trial	95.54	judgement	1.56	The start of the trial was set for next week.	El comienzo del juicio fue fijado para la semana que viene.
Polysemy, Many -- Spanish Frequency High -- English Target Frequency Low -- English Cognate Frequency High									
1	educación	3	59.03	manners	7.99	education	355.98	The grandmother raised him with good manners.	La abuela lo crió con buena educación.
2	centro	3	69.86	downtown	45.28	center	331.32	Alex lives and works downtown.	Alex vive y trabaja en el centro.
3	figura	5	39.19	figurine	0.82	figure	207.89	Alex placed a small porcelain figurine on the shelf.	Alex puso una pequeña figura de porcelana en la repisa.
4	decisión	3	24.95	verdict	15.89	decision	154.11	The jury's guilty verdict was appealed.	La decisión de culpabilidad del jurado fue apelada.
5	diferencia	4	32.24	disagreement	8.25	difference	130.47	They stopped being friends due to a disagreement.	Ellos dejaron de ser amigos por tener una diferencia.
Polysemy, Many -- Spanish Frequency High -- English Target Frequency Low -- English Cognate Frequency Low									
1	frecuencia	3	25.56	regularity	2.30	frequency	27.3	Alex visits her doctor with regularity.	Alex visita su medico con frecuencia.
2	fortuna	4	38.88	luck	41.13	fortune	25.69	It was just good luck that Alex won.	Fue por nada menos de buena fortuna que Alex gar
3	necesidad	3	59.91	need	38.28	necessity	15.78	The needs of the poor are great.	La necesidad de la pobreza es grande.
4	destino	3	34.21	destination	16.04	destiny	11.57	Alex left late and has not reached his destination.	Alex salió tarde y no ha llegado a su destino.
5	habitación	4	22.54	bedroom	49.38	habitation	1.13	The new bed was placed in the bedroom.	La nueva cama fue colocada en la habitación.

Appendix A-2 (2 of 4) Complete list of Stimuli: Spanish word, English target, English cognate, their frequencies, and Spanish & English target

	Spanish Word	Number of Meanings	Spanish Word Frequency	English (non-cognate) Target Word	English Target Frequency	English (non-target) Cognate	English Cognate Frequency	English - Target Sentence	Spanish - Target Sentence
Polysemy, Many -- Spanish Frequency Low -- English Target Frequency High -- English Cognate Frequency High									
1	marca	6	10.85	brand	34.32	mark	137.26	Alex has a favorite brand of shampoo.	Alex tiene una marca favorita de champú.
2	planta	5	18.52	floor	157.54	plant	99.97	Alex lives on the 5th floor.	Alex vive en la 5ª planta.
3	banda	6	0.00	gang	26.39	band	74.33	The gang of boys terrorized the neighbors.	La banda de chicos aterrorizaron los vecinos.
4	solución	3	18.51	answer	170.56	solution	59.80	The second choice is the correct answer.	La segunda opción es la solución correcta.
5	cable	5	3.38	wire	30.99	cable	42.89	Alex had to connect the blue & red wires in the transistor radio.	Alex tuvo que conectar los cables azul y rojo en el radio de transistores.
Polysemy, Many -- Spanish Frequency Low -- English Target Frequency High -- English Cognate Frequency Low									
1	intento	5	18.70	attempt	71.98	intent	25.16	Alex gave up after the third attempt.	Alex lo dejó después del tercer intento.
2	lectura	3	18.83	reading	185.36	lecture	15.31	The teacher assigned a reading from the book.	El maestro asignó una lectura del libro.
3	competencia	3	16.51	responsibility	79.00	competence	14.73	That problem is not Alex's responsibility.	Ese problema no es competencia de Alex.
4	arco	6	11.67	bow	21.20	arch	8.88	Alex pulled on the bow and shot an arrow.	Alex tiró del arco y disparó una flecha.
5	inundación	3	2.16	flood	21.84	inundation	0.36	This was the worst flood in 100 years.	Ésta fue la peor inundación en 100 años.
Polysemy, Many -- Spanish Frequency Low -- English Target Frequency Low -- English Cognate Frequency High									
1	asistencia	3	9.43	attendance	17.27	assistance	48.25	Alex has perfect attendance in his class.	Alex tiene asistencia perfecta en su clase.
2	sustancia	7	8.46	ingredient	7.56	substance	33.08	The food has a secrete ingredient.	La comida tiene una sustancia secreta.
3	pila	4	3.69	faucet	2.83	pile	23.74	The faucet in the kitchen is leaking.	La pila en la cocina está goteando.
4	globo	3	6.13	balloon	9.79	globe	21.18	The balloon flew away.	El globo se fue volando.
5	batería	3	2.17	drums	7.64	battery	20.22	Alex plays the drums in the rock band.	Alex toca la batería en la banda de rock.
Polysemy, Many -- Spanish Frequency Low -- English Target Frequency Low -- English Cognate Frequency Low									
1	examen	3	14.12	inspection	14.56	exam	11.28	The authorities will conduct an inspection of the bank today.	Las autoridades realizarán un examen del banco hoy.
2	olor	3	16.16	scent	15.87	odor	9.18	The candle has a wonderful scent.	La vela tiene un olor estupendo.
3	decoración	5	5.45	decor	4.22	decoration	5.06	Alex designed the décor for the entire house.	Alex diseñó la decoración de toda la casa.
4	antigüedad	4	10.42	seniority	2.08	antiquity	3.01	Alex has seniority at work over all his coworkers.	Alex tiene la antigüedad en el trabajo sobre todos sus compañeros.
5	acidez	3	0.75	heartburn	1.31	acidity	1.63	Green bell pepers give Alex heartburn.	El ají verde le da acidez a Alex.

Appendix A-3 (3 of 4) Complete list of Stimuli: Spanish word, English target, English cognate, their frequencies, and Spanish & English target

	Spanish Word	Number of Meanings	Spanish Word Frequency	English (non-cognate) Target Word	English Target Frequency	English (non-target) Cognate	English Cognate Frequency	English - Target Sentence	Spanish - Target Sentence
Polysemy, Few -- Spanish Frequency High -- English Target Frequency High -- English Congnate Frequency High									
1	universidad	1	56.41	college	263.07	university	369.23	Alex went to college after high school.	Alex fue a la universidad después de la
2	historia	2	136.43	story	348.29	history	314.50	Alex told his story to the class.	Alex contó su historia a la clase.
3	colegio	2	29.75	school	727.69	college	263.07	Her child's school is in a good neighborhood.	El colegio de su hijo está en un buen barrio.
4	hora	2	104.33	time	1,821.63	hour	149.68	Alex asked her for the time.	Alex le preguntó por la hora.
5	dirección	2	45.84	address	105.32	direction	85.43	The document was sent to his address.	El documento fue enviado a su dirección.
Polysemy, Few -- Spanish Frequency High -- English Target Frequency High -- English Congnate Frequency Low									
1	suma	2	26.67	addition	122.67	sum	17.74	The addition of another expense is a burden.	La suma de otro gasto es una carga.
2	remedio	2	25.72	choice	122.80	remedy	8.86	They gave Alex no other choice.	No le dieron a Alex otro remedio.
3	reunión	2	26.50	meeting	141.20	reunion	8.67	Alex has a meeting at work at 9:00AM.	Alex tiene una reunión en el trabajo a las 9:00.
4	patron	2	10.01	standard	95.76	patron	6.00	Alex set the standard for everyone else.	Alex fijó el patrón para los otros.
5	publicidad	2	9.90	Advertisement/ Advertising	79.80	publicity	12.78	McDonald's spends a million dollars on advertising.	McDonald's gasta un millón de dolares en la publicidad.
Polysemy, Few -- Spanish Frequency High -- English Target Frequency Low -- English Congnate Frequency High									
1	tiempo	2	362.74	weather	70.47	time	1,821.63	Spring marks a change in the weather.	La primavera marca un cambio en el tiempo.
2	acto	2	34.22	event	79.90	act	183.60	The event is scheduled for 9:00AM	El acto está previsto para las 9:00AM.
3	resultado	2	43.18	score	62.03	result	168.71	The final score of the game was 92 to 43.	El resultado final del partido fue 92 a 43.
4	oferta	2	10.27	sale	44.97	offer	131.20	Everything in the store is on sale.	Todo en la tienda está de oferta.
5	autor	2	46.38	perpetrator	2.76	author	129.49	The perpetrator of the crime was aprehended.	El autor del crimen fue aprendido.
Polysemy, Few -- Spanish Frequency High -- English Target Frequency Low -- English Congnate Frequency Low									
1	discusión	2	12.88	argument	63.07	discussion	85.70	Alex and his brother started fighting after a heated argument.	Alex y su hermano empezaron a pelear después de una discusión acalorada.
2	presencia	2	58.54	appearance	45.14	presence	84.81	Alex doesn't worry much about his	Alex no se preocupa mucho por su presencia.
3	progreso	2	15.98	improvement	34.81	progress	77.44	The improvement in Alex's behavior was remarkable.	El progreso en el comportamiento de Alex era notable.
4	beneficio	2	13.38	profit	31.40	benefit	75.01	The company made a good profit this year.	La empresa obtuvo un buen beneficio este año.
5	equilibrio	2	11.84	balance	72.97	equilibrium	4.74	The new weapons changed the balance of powers.	Las nuevas armas cambiaron el equilibrio del poder.

Appendix A-4 (4 of 4) Complete list of Stimuli: Spanish word, English target, English cognate, their frequencies, and Spanish & English target

	Spanish Word	Number of Meanings	Spanish Word Frequency	English (non-cognate) Target Word	English Target Frequency	English (non-target) Cognate	English Cognate Frequency	English - Target Sentence	Spanish - Target Sentence
Polysemy, Few -- Spanish Frequency Low -- English Target Frequency High -- English Cognate Frequency High									
1	competición	2	2.25	tournament	28.90	competition	71.06	Alex is participating in the tennis tournament all week.	Alex está participando en la competencia de tenis la semana entera.
2	invitado	1	4.25	guest	41.69	invited	38.41	The dinner guests were escorted to the dining room.	Los invitados a la cena fueron acompañados al comedor.
3	argumento	2	8.96	plot	25.76	argument	63.07	The plot of the movie is complicated.	El argumento de la película es complicado.
4	disco	2	8.30	record	141.58	disc/disk	22.56	Alex likes listening to old records.	A Alex le gusta escuchar discos antiguos.
5	salario	1	6.69	wage	20.38	salary	24.56	Alex works for minimum wage.	Alex trabaja por el salario mínimo.
Polysemy, Few -- Spanish Frequency Low -- English Target Frequency High -- English Cognate Frequency Low									
1	parada	2	4.92	stop	214.95	parade	18.57	Alex got off at the last stop.	Alex se bajó en la última parada.
2	sugerencia	2	1.61	advice	63.84	suggestion	17.27	Alex did not take his father's advice.	Alex no siguió la sugerencia/el consejo de su
3	pistola	1	4.25	gun	93.94	pistol	11.82	Alex filled the spray gun with insecticide to treat the roses.	Alex llenó la pistola rociadora con insecticida para tratar las rosas.
4	acusador	2	1.11	prosecutor	23.69	accuser	2.08	The prosecutor approached the judge to explain his line of questioning.	El acusador fiscal se acerco al juez para explicar su preguntas al testigo.
5	ingreso	2	8.15	income	88.22	ingress	0.16	Alex has one source of income to live on.	Alex solo tiene una fuente de ingresos para vivir.
Polysemy,Few -- Spanish Frequency Low -- English Target Frequency Low -- English Cognate Frequency High									
1	aborto	2	2.20	miscarriage	1.81	abortion	41.62	Alex lost the baby due to a miscarrige.	Alex perdió el bebé debido a un aborto
2	cabina	2	1.45	booth	16.39	cabin	24.00	Superman changes in the telephone booth.	Superman se cambió en la cabina de teléfono.
3	ironía	1	5.72	sarcasm	2.47	irony	14.06	Alex speaks with streaks of sarcasm.	Alex habla con rachas de ironía.
4	invento	2	2.42	fabrication	2.78	invention	10.97	Everything Alex said was a fabrication.	Todo lo que dijo Alex fue un invento.
5	limón	2	3.35	lime	12.76	lemon	28.66	Lime is a green citrus fruit.	El limón criollo es una fruta cítrica verde.
Polysemy, Few -- Spanish Frequency Low -- English Target Frequency Low -- English Cognate Frequency Low									
1	suburbio	2	0.22	slum	2.18	suburb	8.00	The mayor of Madrid promised to eradicate the slums in his city.	El alcalde de Madrid se comprometió a erradicar los suburbios en su ciudad.
2	pigmento	1	0.90	dye	5.32	pigment	3.32	Alex used a special dye to color his shirt.	Alex utilizó un pigmento especial para darle color a su camisa.
3	accesorio	2	0.67	prop	8.46	accessory	2.92	The actor threw a prop from the stage.	El actor tiró un accesorio del escenario.
4	resentimiento	1	3.00	regret	14.41	resentment	8.77	Alex felt a deep regret about the lie.	Alex sintió un gran resentimiento por la mentira.
5	fluidez	2	0.91	fluency	8.30	fluidity	1.13	Alex speaks English with a high level of fluency.	Alex habla inglés con un alto nivel de fluidez.

Appendix B-1 (1 of 4). Detailed results of the preparatory-phase language task.

	Spanish Word	English (non-cognate) Target Word	count	%	English (non-target) Cognate	count	%	Distractor	count	%	Total count
Category 1											
1	base	basis	15	75.00%	base	0	0.00%	foundation	5	25.00%	20
2	naturaleza	environment	20	100.00%	nature	0	0.00%	life	0	0.00%	20
3	armas	weapons	20	100.00%	arms	0	0.00%	arcenals	0	0.00%	20
4	política	policy	20	100.00%	politics	0	0.00%	rules	0	0.00%	20
5	violencia	force	20	100.00%	violence	0	0.00%	kicks	0	0.00%	20
Category 2											
1	cámara	room	19	95.00%	camera	0	0.00%	chamber	1	5.00%	20
2	carta	letter	20	100.00%	card	0	0.00%	charter	0	0.00%	20
3	título	degree	18	90.00%	title	0	0.00%	diploma	2	10.00%	20
4	noticia	news	19	95.00%	notice	0	0.00%	announcements	1	5.00%	20
5	juicio	trial	20	100.00%	judgement	0	0.00%	jury	0	0.00%	20
Category 3											
1	educación	manners	20	100.00%	education	0	0.00%	ideas	0	0.00%	20
2	centro	downtown	20	100.00%	center	0	0.00%	in the middle	0	0.00%	20
3	figura	figurine	18	90.00%	figure	2	10.00%	item	0	0.00%	20
4	decisión	verdict	19	95.00%	decision	1	5.00%	announcements	0	0.00%	20
5	diferencia	disagreement	20	100.00%	difference	0	0.00%	debate	0	0.00%	20
Category 4											
1	frecuencia	regularity	19	95.00%	frequency	1	5.00%	normalacy	0	0.00%	20
2	fortuna	luck	18	90.00%	fortune	2	10.00%	vibes	0	0.00%	20
3	necesidad	need	18	90.00%	necessity	0	0.00%	requirements	2	10.00%	20
4	destino	destination	20	100.00%	destiny	0	0.00%	goal	0	0.00%	20
5	habitación	bedroom	20	100.00%	habitation	0	0.00%	chamber	0	0.00%	20

Appendix B-2 (2 of 4). Detailed results of the preparatory-phase language task.

	Spanish Word	English (non-cognate) Target Word	count	%	English (non-target) Cognate	count	%	Distractor	count	%	Total count
Category 5											
1	marca	brand	16	80.00%	mark	0	0.00%	type	4	20.00%	20
2	planta	floor	18	94.74%	plant	0	0.00%	level	1	5.26%	19
3	banda	gang	17	85.00%	band	1	5.00%	group	2	10.00%	20
4	solución	answer	19	95.00%	solution	1	5.00%	result	0	0.00%	20
5	cable	wires	20	100.00%	cables	0	0.00%	chains	0	0.00%	20
Category 6											
1	intento	attempt	20	100.00%	intent	0	0.00%	opportunity	0	0.00%	20
2	lectura	reading	19	95.00%	lecture	1	5.00%	novel	0	0.00%	20
3	competencia	responsibility	19	95.00%	competence	1	5.00%	compliance	0	0.00%	20
4	arco	bow	20	100.00%	arch	0	0.00%	archary	0	0.00%	20
5	inundación	flood	20	100.00%	inundation	0	0.00%	deluge	0	0.00%	20
Category 7											
1	asistencia	attendance	20	100.00%	assistance	0	0.00%	attention	0	0.00%	20
2	sustancia	ingredient	20	100.00%	substance	0	0.00%	item	0	0.00%	20
3	pila	faucet	20	100.00%	pile	0	0.00%	tap	0	0.00%	20
4	globo	balloon	20	100.00%	globe	0	0.00%	sphere	0	0.00%	20
5	batería	drums	20	100.00%	battery	0	0.00%	percusion instrument	0	0.00%	20
Category 8											
1	examen	inspection	19	95.00%	exam	1	5.00%	test	0	0.00%	20
2	olor	scent	18	90.00%	odor	0	0.00%	smell	2	10.00%	20
3	decoración	decor	18	90.00%	decoration	0	0.00%	style	2	10.00%	20
4	antigüedad	seniority	18	90.00%	antiquity	0	0.00%	priority	2	10.00%	20
5	acidez	heartburn	20	100.00%	acidity	0	0.00%	acid	0	0.00%	20

Appendix B-3 (3 of 4). Detailed results of the preparatory-phase language task.

	Spanish Word	English (non-cognate) Target Word	count	%	English (non-target) Cognate	count	%	Distractor	count	%	Total count
Category 9											
1	universidad	college	20	100.00%	university	0	0.00%	post s.school	0	0.00%	20
2	historia	story	20	100.00%	history	0	0.00%	detail	0	0.00%	20
3	colegio	school	20	100.00%	college	0	0.00%	academy	0	0.00%	20
4	hora	time	19	95.00%	hour	0	0.00%	minute	1	5.00%	20
5	dirección	address	20	100.00%	direction	0	0.00%	domicile	0	0.00%	20
Category 10											
1	suma	addition	19	95.00%	sum	1	5.00%	insertion	0	0.00%	20
2	remedio	choice	19	95.00%	remedy	0	0.00%	solution	1	5.00%	20
3	reunión	meeting	20	100.00%	reunion	0	0.00%	gathering	0	0.00%	20
4	patron	standard	20	100.00%	patron	0	0.00%	pattern	0	0.00%	20
5	publicidad	advertising	20	100.00%	publicity	0	0.00%	announcements	0	0.00%	20
Category 11											
1	tiempo	weather	18	90.00%	time	0	0.00%	climate	2	10.00%	20
2	acto	event	20	100.00%	act	0	0.00%	action	0	0.00%	20
3	resultado	score	19	95.00%	result	1	5.00%	tally	0	0.00%	20
4	oferta	sale	20	100.00%	offer	0	0.00%	price reduction	0	0.00%	20
5	autor	perpetrator	19	95.00%	author	1	5.00%	doer	0	0.00%	20
Category 12											
1	discusión	argument	16	80.00%	discussion	4	20.00%	talk	0	0.00%	20
2	presencia	appearance	20	100.00%	presence	0	0.00%	look	0	0.00%	20
3	progreso	improvement	18	90.00%	progress	2	10.00%	advancement	0	0.00%	20
4	beneficio	profit	19	95.00%	benefit	0	0.00%	income	1	5.00%	20
5	equilibrio	balance	20	100.00%	equilibrium	0	0.00%	status quo	0	0.00%	20

Appendix B-4 (4 of 4). Detailed results of the preparatory-phase language task.

	Spanish Word	English (non-cognate) Target Word	count	%	English (non-target) Cognate	count	%	Distractor	count	%	Total count
Category 13											
1	competición	tournament	18	90.00%	competition	2	10.00%	series	0	0.00%	20
2	argumento	plot	18	90.00%	argument	0	0.00%	story line	2	10.00%	20
3	invitado	guest	20	100.00%	invited	0	0.00%	visitors	0	0.00%	20
4	discos	records	20	100.00%	discs/disks	0	0.00%	formated music	0	0.00%	20
5	salario	wage	20	100.00%	salary	0	0.00%	pay	0	0.00%	20
Category 14											
1	parada	stop	20	100.00%	parade	0	0.00%	drop off	0	0.00%	20
2	sugerencia	advice	20	100.00%	suggestion	0	0.00%	thoughts	0	0.00%	20
3	pistola	gun	19	95.00%	pistol	1	5.00%	revolver	0	0.00%	20
4	acusador	prosecutor	19	95.00%	accuser	0	0.00%	state rep	1	5.00%	20
5	ingreso	income	20	100.00%	ingress	0	0.00%	funds	0	0.00%	20
Category 15											
1	aborto	miscarriage	20	100.00%	abortion	0	0.00%	procedure	0	0.00%	20
2	cabina	booth	20	100.00%	cabin	0	0.00%	closet	0	0.00%	20
3	ironía	sarcasm	18	90.00%	irony	1	5.00%	mockery	1	5.00%	20
4	invento	fabrication	20	100.00%	invention	0	0.00%	construction	0	0.00%	20
5	limón	lime	20	100.00%	lemon	0	0.00%	citron	0	0.00%	20
Category 16											
1	suburbio	slum	17	85.00%	suburb	0	0.00%	poor neighborhood	3	15.00%	20
2	pigmento	dye	19	95.00%	pigment	0	0.00%	product	1	5.00%	20
3	accesorio	prop	20	100.00%	accessory	0	0.00%	decoration	0	0.00%	20
4	resentimiento	regret	18	90.00%	resentment	2	10.00%	bitterness	0	0.00%	20
5	fluidez	fluency	17	85.00%	fluidity	1	5.00%	ease	2	10.00%	20

Appendix C. Relative frequency cut-off rates

Polysemy (# of meanings)	Spanish Word Frequency	English Target Frequency	English Cognate Frequency
High (Many) 3 meanings or more	High 20 or more words/million*	High 80 or more words/million*	High 100 or more words/million*
			Low less than 100 words/million
		Low less than 80 words/million	High 100 or more words/million
			Low less than 100 words/million
	Low less than 20 words/million	High 20 or more words/million	High 30 or more words/million
			Low less than 30 words/million
		Low less than 20 words/million	High 20 or more words/million
			Low less than 20 words/million
Low (Few) less than 3 meanings	High 10 or more words/million	High 80 or more words/million	High 80 or more words/million
			Low less than 80 words/million
		Low less than 80 words/million	High 100 or more words/million
			Low less than 100 words/million
	Low less than 10 words/million	High 20 or more words/million	High 20 or more words/million
			Low less than 20 words/million
		Low less than 20 words/million	High 10 or more words/million
			Low less than 10 words/million

Appendix D. Monolingual prep-phase language questionnaire

Language Questionnaire for Monolingual Prep-phase task.
Delivered as web-based Qualtrics-based format.

1. What is your name?(first and last)

2. What is your age?

3. Current city and state in which you live.

4. Childhood city and state in which you lived.

5. Do you only speak English at home?

6. Do you speak any other language?

7. If yes, What other language do you speak?

8. Since what age?

9. Rate your ability in this language
    - I know just a few words
    - I can understand simple directions and ask simple questions
    - I can carry on a brief conversation
    - I can converse about any subject for long lengths of time
    - I can read, write, and speak fluently in a language other than English

Appendix E. Complete list of filler sentences used for the primary translation task.

	Spanish	English	Filler Sentence
1	amigo	friend	John tiene un *amigo* especial.
2	amor	love	Lo que Jim y Sally sienten es *amor* .
3	boca	mouth	Esa medicina se toma por la *boca* .
4	cabeza	head	Aquel muchacho tiene la *cabeza* grande.
5	calle	street	La *calle* estaba oscura y solitaria.
6	cama	bed	El gato estaba escondido detrás de la *cama* .
7	camino	road	Jim se decidió por el *camino* viejo.
8	cara	face	El niño no se quiso lavar la *cara* .
9	casa	house	Sus padres tienen una *casa* hermosa.
10	cielo	sky	El *cielo* estaba oscuro.
11	corazón	heart	La chica le rompió el *corazón* .
12	cuerpo	body	Al muchacho le duele todo el *cuerpo.*
13	edad	age	La chica le dijo su *edad* .
14	fin	end	Después de dos horas llego el *fin* del desfile.
15	fuerza	strength	Se necesita *fuerza* para empujar un carro.
16	guerra	war	Esa *guerra* empezó hace 50 años.
17	hombre	man	La maleta pertenece a ese *hombre* .
18	libro	book	Ese *libro* es difícil de entender.
19	luz	light	La *luz* es necesaria para leer.
20	mano	hand	Los dos chicos se dieron la *mano* después de la pelea.
21	mar	sea	El pesquero salió al *mar* solo.
22	mesa	table	La *mesa* de roble era larga y ancha.
23	miedo	fear	EL *miedo* se le fue pasando.
24	muerte	death	La *muerte* es inevitable.
25	mundo	world	El *mundo* esta lleno de alegrías y tristezas.
26	noche	night	En Madrid la gente joven sale a la calle de *noche* .
27	nombre	name	El conejo también tiene un *nombre* .
28	película	movie	La *película* fue divertida.
29	pie	foot	Después de 50 millas le duele el *pie* izquierdo.
30	pueblo	town	El *pueblo* fue fundado en 1742.
31	puerta	door	El novio tiró la *puerta* cuando salió.
32	razón	reason	El jefe tiene *razón* .
33	sangre	blood	La victima perdió muchísima *sangre* .
34	sobre	envelope	Hace falta un *sobre* para esta carta.
35	suelo	floor	La abuela limpió el *suelo* con lejía.
36	sueño	dream	Su *sueño* se convirtió en pesadilla.
37	tierra	earth	Hay que mover la *tierra* para poder sembrar.
38	trabajo	work	El hombre cambió de *trabajo* la semana pasada.
39	verdad	truth	La *verdad* se suele ocultar.
40	vino	wine	El *vino* se puede tomar todo el día.

Appendix F. Language questionnaire for Translation Task participants.

Language Questionnaire for translation task.
Delivered as web-based Qualtrics-based format.

1. First and Last Name
2. Email or cell number
3. What is your age?
4. Can you read and write in Spanish and English?
    - Yes
    - No
5. Were you born in the U.S.?
6. If yes, where?
7. If no, where were you born?
8. At what age did you come to the U.S?
9. How long have you lived in the U.S.?
10. What was the normal language of instruction in the primary school (and middle school if applicable) that you attended?
    - Virtually 100% Spanish
    - About 80% Spanish, 20% English
    - About 60% Spanish, 40% English
    - About 50% Spanish, 50% English
    - More English than Spanish (any ratio)
    - Virtually 100% English
11. What was the language spoken outside of the classroom as a child (up to the age of 16)?
    - Virtually 100% Spanish
    - About 80% Spanish, 20% English
    - About 60% Spanish, 40% English
    - About 50% Spanish, 50% English
    - More English than Spanish (any ratio)
    - Virtually 100% English
12. What was the normal language of instruction in the secondary school that you attended?
    - Virtually 100% Spanish
    - About 80% Spanish, 20% English
    - About 60% Spanish, 40% English
    - About 50% Spanish, 50% English
    - More English than Spanish (any ratio)
    - Virtually 100% English
13. Are you currently taking English classes or have you taken English classes within the last three months?
14. Have you taken English classes within the last five years?
15. Have you ever taken English classes? Where and When?
16. How would you describe your current level of English?
    - Beginner
    - Intermediate
    - Advanced
    - Mastered