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Lexical Development in Adult Beginning Second Language Learners

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**LEXICAL DEVELOPMENT IN ADULT BEGINNING SECOND LANGUAGE
LEARNERS**

by

Angela M. Chouinard

A Thesis

Presented to the Faculty of

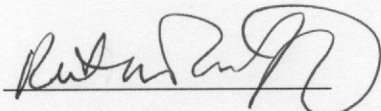
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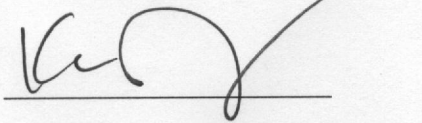
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Abstract

This research tests the hypothesis that knowledge of derivational morphology facilitates vocabulary acquisition in beginning adult second language learners. Participants were mono-lingual English-speaking college students aged 18 years and older enrolled in introductory Spanish courses. Knowledge of Spanish derivational morphology was tested through the use of a forced-choice translation task. Spanish lexical knowledge was measured by a translation task using direct translation (English word) primes and conceptual (picture) primes. A 2x2x2 mixed factor ANOVA examined the relationships between morphological knowledge (strong, moderate), error type (form-based, conceptual), and prime type (direct translation, picture). The results are consistent with the existence of a relationship between knowledge of derivational morphology and acquisition of second language vocabulary. Participants made more conceptually-based errors than form-based errors $F(1,22)=7.744, p=.011$. This result is consistent with Clahsen & Felser's (2006) and Ullman's (2004) models of second language processing. Additionally, participants with Strong morphological knowledge made fewer errors on the lexical knowledge task than participants with Moderate morphological knowledge $t(23)=-2.656, p=.014$. I suggest future directions to clarify the relationship between morphological knowledge and lexical development in adult second language learners.

Lexical Development in Adult Beginning Second Language Learners

Language comprises an essential part of our knowledge in its functions as a communication system and a cultural cornerstone. As children we acquire each of the different components of language: knowledge of sounds (phonology), knowledge of grammatical word endings (morphology), knowledge of meaning (semantics), and knowledge of phrase structure (syntax). One distinctive aspect of human language is how our language knowledge develops. We acquire a native language (or languages) as young children with little apparent effort through exposure to everyday conversation, assuming no social deprivation or disabilities. In contrast to the rapid and effortless learning of a first language, learning a second language later in adulthood is slower and more effortful and consequently adult learners rarely achieve the same level of fluency in their second language as in their native language (Johnson & Newport, 1989).

Adults learning a second language represent a unique population of language learners. They learn in a varied set of contexts, from formal classroom settings with explicit instruction to immersion in everyday conversations in foreign cultures (Bialystok & Hakuta, 1994). While bilingualism may be the global norm, in the United States and other cultures the majority of second language learning occurs in the classroom (Grosjean, 1982). One common strategy in formal language instruction is to start with vocabulary, as learning words allows the learner to explore each of the previously mentioned aspects of language: phonology, morphology, semantics, and syntax.

Consequently, the study of vocabulary or lexical development in second language learners provides unique, ecologically valid insights into the beginning stages of second language acquisition. As second language learners are exposed to words in their second language, they acquire not only the words themselves but also morphemes. For example, in English one may add the morpheme *-y* to the base or stem form *cat* to form a new word, *catty*. Morphemes can be applied to various stems systematically, thus enabling the learner to at least partially understand new lexical items that would otherwise be unknown. The present study investigates a possible relationship between learners' implicit acquisition of morphological knowledge and their lexical development.

Approaches to Investigating Vocabulary Development in Adult Second Language Learners

Researchers investigating lexical development in adult second language learners have approached this area of inquiry from various perspectives: applied, basic, and hybrid approaches using basic research techniques in applied settings. Applied second language acquisition researchers examine the impact of context on second language acquisition. In contrast, second language researchers utilizing a basic research perspective focus on the processes inherent in second language acquisition. To borrow an analogy from Bialystok & Hakuta (1994), basic researchers study gravity by dropping objects in a vacuum, while applied researchers drop objects from the roof and study the effects of the wind. The research presented here, however, stands at the intersection of applied and basic

psycholinguistic research by examining the problem of understanding how new learners first acquire vocabulary in an ecologically relevant way.

Applied second language acquisition research has focused on a number of areas, including the role of teacher-student interaction in the acquisition of second language grammar, identifying reading strategies used by successful language learners, and other socio-cultural aspects of language learning (Kramsch, 2000). In addition to these issues, applied second language acquisition often translates the implications of basic research findings to classroom learning environments, assisting educators in understanding the student's contribution to learning, how teaching methods work, and what the goals of language teaching should be (Cook, 2009).

One example is the Learnability/Teachability hypothesis, which resulted from analyses of descriptive studies of second language acquisition and suggests that the acquisition of grammatical structures follows a pattern, such that certain structures must be learned before others (Lafford, 2000). Pienemann (1989) gives examples of such a pattern, where Italian learners of German progress through several stages in their acquisition of German. Initially they transfer their L1 structure (Stage X): using subject-verb-object order for all German phrases. In the next stage (Stage X+1) they then make an adjustment to put adverbs first. By Stage X+2 the learners are separating verbs by placing the second verb at the end of the sentence. They then progress to inverting verbs and subjects when an adverb is placed first in a sentence so that verbs consistently maintain their position as the second item in a sentence (Stage X+3). Note that at the

last stage, knowledge of the Stage X+1 tendency to put adverbs first is required to properly acquire the inversion rule. The specific implications of the Learnability/Teachability hypothesis are explained further in Pienemann (1984), but the possible implications of applied research of this type on classroom teaching methodology are numerous.

Whereas applied research focuses on contextual influences on second language acquisition and way to improve progress among second language learners, basic research into second language acquisition seeks to identify and understand the core structures and processes involved. For example, Ullman (2004) proposed a model to explain the role of memory in the acquisition of a second language. He proposed that lexical and syntactic information are stored in two different memory systems. Lexical information is encoded into declarative memory: memory one encodes explicitly, such as historical dates. In contrast, syntactic knowledge is encoded through procedural memory: memory for skills, like tying a shoe. The ability to encode knowledge in the declarative memory system remains available throughout the lifespan, while the procedural memory system is thought to become less available after puberty. The declarative-procedural model predicts that the adult second language learner's mental dictionary, the lexicon, which Ullman argues is stored as declarative knowledge, will be crucial in the development of his or her second language proficiency. Specifically, it predicts that the learner will use her lexical knowledge to compensate for knowledge that has been unable to be encoded into the procedural memory system, above and beyond the usual status of words as the building blocks for language in first language acquisition. Basic research of this kind

provides insight into one aspect—the processing aspect—of how second language learners begin acquiring language.

Models of Second Language Lexical Knowledge

Basic research on second language acquisition also focuses on how second language learners structure the knowledge they acquire. In adult second language acquisition research the consensus is that first language lexical entries mediate their second language counterparts' access to the speaker's conceptual store, which encompasses knowledge about basic facts of the world (Heredia, 1997) (Kroll & Stewart, 1994). Consequently, the structure of second language lexical entries depends on the structure of the first language lexical entries that they are associated with. Kroll and Stewart (1994) proposed the Revised Hierarchical Model to explain second language word production. In their model, speakers can eventually access conceptual knowledge utilizing second language lexical entries, but initially all access to conceptual knowledge in the second language is mediated by the first language lexical entry (as illustrated by the dark arrows in Figure 1). With increasing proficiency, second language entries strengthen their connections to the conceptual store and their direct connections to the first language weaken. Connections from the second language to the conceptual store are strengthened by the process of translating first language entries to their requisite concepts to second language entries.

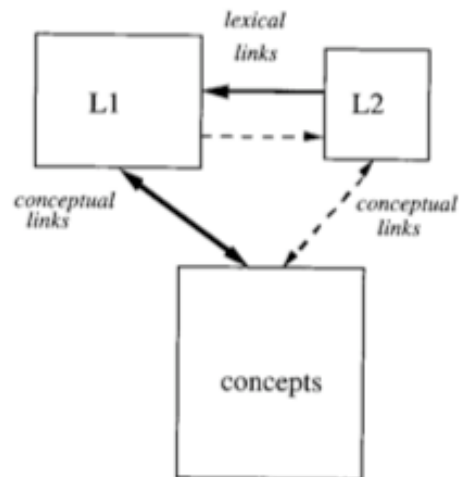


Figure 1. Kroll & Stewart's Revised Hierarchical Model. Box L1 represents first language vocabulary and box L2 represent second language vocabulary. Dark arrows represent strong connections, and dotted arrows represent weak connections. This figure was reprinted from Sunderman & Kroll (2006).

The Revised Hierarchical Model (Kroll & Stewart, 1994) represents one of the first major steps in understanding the developing structure of second language learners' knowledge. It continues to be relevant today, although it has undergone transformations since its original conceptions to account for new data. For example, the weak link between second language words and concepts has been shown not to be bi-directional, as in Figure 1, but asymmetric. For second language learners, access from word to concept may often come easily, but access from concepts to words is often more effortful (Kroll, Van Hell, Tokowicz, & Green, 2010). In its focus on production, however, the Revised Hierarchical model also neglects the role other aspects of the second language may play.

Jiang (2000) addressed that deficit and developed a model of second language lexical development specific to classroom learners. In his model, the development of phonological, morphological, semantic, and syntactic knowledge are each represented, rather than treating second language vocabulary entries holistically. In addition to representing each type of knowledge separately, Jiang also utilizes the structural concepts of the lemma and lexeme. Traditionally, the lemma stores semantic and syntactic information, while the lexeme stores morphological and phonological information.

Jiang postulated that the development of second language vocabulary items occurs in three stages. Those stages are the formal stage, the first language lemma mediation stage, and the second language integration stage. In the formal stage, the second language word representation consists primarily of how to say and spell the word with a weak connection to the first language lemma. In the first language lemma mediation stage, the second language lexical entry has integrated the first language lemma, leading to visible gains in automaticity such that second language learners with lexical entries at this stage are able to access the meaning of these words faster than those entries that are still in the formal stage. Finally, in the second language integration stage, the lemma now contains second language semantics, syntax, and morphology and is no longer mediated through the first language.

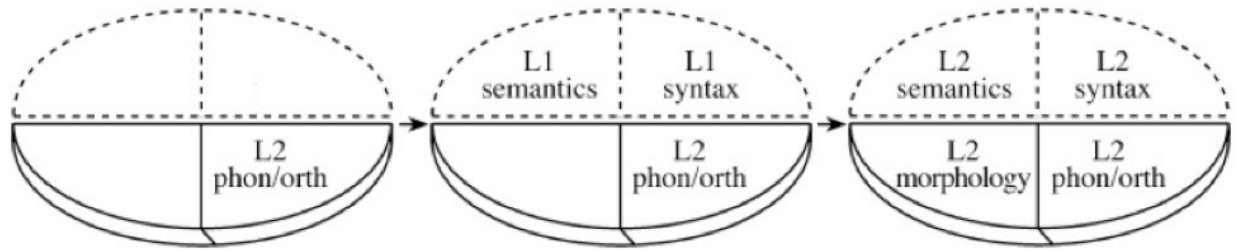


Figure 2. Jiang's model of lexical development in the second language. Pictured from left to right are representations of the second language lexical entry at the formal stage, first language lemma mediation stage, and second language integration stage. This figure was reprinted from Jiang (2000).

Much of Jiang's subsequent research on second language vocabulary acquisition has focused on the first language lemma mediation and second language integration stages. Jiang found that second language learners indicated higher semantic relatedness for English (second language) word pairs that shared translations in the first language than those that did not share translations. For example, the words *problem* and *question* share a translation in Chinese and the pair was consequently rated as more similar than pairs such as *interrupt* and *interfere* that do not share translations. The responses of native English speakers, in contrast, did not exhibit such a bias. His results are consistent with the idea that second language lexical entries do in fact utilize first language semantic content, as described by the first language lemma mediation stage of his model. These results, however, focus on development that is most relevant for highly proficient second language learners (Jiang 2002, Jiang 2007).

Early Lexical Development in Adult Second Language Learners: Next Steps

Consequently, the structure of early second language learners' lexical entries remains relatively unexplored. One starting point to assess that status is to examine the performance of adult early second language learners, in order to gather data that can then be connected to a model. That is the goal of this research. This type of study is important because it provides information for future studies that will assist in evaluating potential mechanisms to explain lexical development among early adult second language learners.

This research will address the question of how second language learners first acquire vocabulary by examining the interaction between the development of lexical knowledge and morphological knowledge in adult beginning second language learners. In order to do so, I tested adult beginning second language Spanish learners enrolled in introductory Spanish classes at three universities. Each participant responded to a background questionnaire, two measures of morphological knowledge, and a measure of lexical knowledge.

Previous second language acquisition research has found evidence that early (third-semester) learners attend to grammatical cues, the skill tested by the morphological measure. Zyzik (2009) found that learners tended to overemphasize some cues, such as the *-a/-o* distinction for identifying feminine and masculine nouns, while under-utilizing other cues. For example, when choosing between *cariño* (affection) and *cariñosa* (affectionate, loving) at the end of the sentence *Una familia feliz consiste en mucho amor*

y cariño/cariñosa (A happy family is made up of much love and affection) participants reported choosing *cariñosa* over *cariño* because *cariñosa* matched *familia*. The correct answer, however, was *cariño*. Similarly, Sunderman and Kroll (2006) found that learners who were presented with word pairs and asked if they were translation equivalents were quicker to respond with a mismatch answer when grammatical class did not match. Given these results the format of the morphological recognition measure, which requires learners to differentiate between words differing only in their grammatical form, should not be outside their ability.

The lexical knowledge measure used priming stimuli to assess the participants' lexical knowledge. The participants were presented with two types of stimuli: direct translation, where participants were presented with English (first language) words, and picture primes. Participants were asked to respond to these primes with the first word that came to mind in Spanish.

In keeping with previous research, having the participants respond in Spanish allows us to assess the extent of their lexical knowledge through evaluation of their error responses (Zyzik, 2009). Error analysis of this type has a long history in psycholinguistics. Fromkin (1971), for example, analyzed speech errors to create a widely influential model of speech production. In fact, the wide usage of error analysis techniques within second language acquisition research led Ellis to devote an entire chapter of his book, *The Study of Second Language Acquisition*, to error analysis (Ellis, 2008). Previous error analyses of language elicited by the type of free-response

technique used in this study have created developmental timelines where early learners of a language generally give phonologically related responses (table-maple), and more advanced learners generally give syntagmatic (responses that are of a different grammatical class but can often co-occur with the stimulus word, e.g. table-white) and paradigmatic (responses of the same grammatical class that are interchangeable within an utterance, e.g. table-chair) responses (Namei, 2004).

Based on the predictions of Jiang's (2000) model and the findings of Namei (2004) I predict an interaction between morphological knowledge and error type such that early second language learners with greater knowledge of derivational morphology (knowledge of word-class markers, rather than inflectional markers that provide information about tense or number) will give more syntagmatic/paradigmatic (both response types combined in this experiment under the category of conceptual errors) responses, while learners with a lesser knowledge of derivational morphology will have more form-based errors. The overall error rate between the two groups should be similar given that the participants are all first semester learners. A lack of differences in error type between the two groups, however, would suggest that knowledge of derivational morphology is not related to vocabulary acquisition in adult beginning second language learners.

Method

Participants

The 31 participants in this study were college students enrolled in introductory Spanish courses at Bucknell University, Susquehanna University, and Bloomsburg University. All participants were 18 years of age or older. Eleven participants were males and 20 were females – their mean age was 21 years, ranging from 18 to 53, with a median of 20 years. The participants were recruited through classroom visits and offered five dollars or class credit for participating. Three participants reported a language other than English as their native language. These participants are not included in the final analyses. Additionally, three separate participants' data were excluded because they performed below chance on the morphological measure (to be described below), and one participant's data was excluded due to experimenter error. In sum, 31 participants took part in the study but the data from only 24 was included in the analysis.

A questionnaire was used to gather information on participants' age, language or hearing disability status, native language, exposure to other languages, and use of language learning strategies. The data on possible disabilities and native language were recorded primarily as an exclusionary measure in order to better control the variance of the sample. As mentioned previously, the data from the three participants who reported a language other than English as their native language was discarded. None of the participants reported hearing or language disabilities.

Language exposure data was collected to gather information concerning the learning environment of the participants; previous research has shown that the language acquisition environment affects the rate of acquisition (Freed, Segalowitz, & Dewey, 2004). Twelve participants reported exposure to a language other than English in either their home or community. Specifically, two participants reported exposure to a language other than English only at home, eight participants reported exposure to a language other than English only in their community, and two participants reported exposure to a language other than English both at home and in their community. Data concerning the age when participants had first begun studying a foreign language and the age when they had first begun studying Spanish were acquired to prevent the inclusion of participants who were not adult beginning learners of Spanish. The mean age at which the participants had begun learning Spanish was 15.79, while the mean age at which participants had begun learning any foreign language was 12.92.

The method that participants reported using to learn vocabulary was another area of interest because the participants were recruited from three separate classes. When the participants were asked if they tried to associate new words with concepts or with direct translations into their native language, 75% reported using the direct translation method, whereas the other 25% reported that they typically tried to associate new words with concepts.

Materials

The participants completed a background questionnaire, two morphological measures, and priming stimuli. Each testing item was printed in black ink on white paper. The only exception was the use of color photographs as picture primes in the lexical knowledge measure.

Background Questionnaire: The background questionnaire gathered participant information concerning age, native language, hearing disabilities, informal second language exposure, instructional methods, previous study of a second language, and time at which their study of Spanish began. The background questionnaire is provided in Appendix B.

Morphological knowledge measures: The morphological recognition measure was a forced-choice translation task that assessed the subjects' knowledge of the morphological rules in their second language. The stimuli were adapted from Zyzik & Azevedo (2009). Figure 3 shows an example prompt from the morphological recognition measure. The morphological familiarity measure assessed participants' familiarity with the items from the morphological recognition measure. Participants rated each Spanish word as Very Familiar, Somewhat Familiar, or Not At All Familiar. This rating allowed me to determine whether the participants' morphological recognition scores were a true reflection of their knowledge of morphology or were influenced by the unfamiliarity with the stimulus words.

This section will measure your ability to translate between English and Spanish. Please circle the correct answer and close the binder when you have finished.

Happiness: Feliz o Felicidad

Figure 3. This figure contains the instructions for the morphological recognition measure and an example test item. Note. The correct answer is felicidad, as any Spanish word ending in –dad is a feminine noun.

Lexical knowledge measure: The priming stimuli were designed to assess the participants' lexical knowledge. The primes were of two types: direct translation primes and picture primes. Direct translation primes were designed to correspond to the formal stage of Jiang's (2000) theory and consist of English words, to which the subject is asked to give a response in Spanish. The second prime type, the picture prime, was designed to correspond to the first language lemma mediation stage. The stimulus words were selected from the introductory Spanish textbook *Hola, ¿que tal?* by Alonso, Alonso, and Zaslow (2010) and are listed in Appendix A. There were 30 stimulus words in total. In any particular trial 15 stimulus words were presented as picture primes and 15 were presented as direct translation primes. The order of the prime types was counterbalanced across participants, and the order within prime type was randomized within constraints (differing grammatical classes of stimuli were blocked together) before each test trial.

Direct Translation Prime

Picture Prime

Dog → Perro



→ Perro

Figure 4. An example from the lexical knowledge measure of the two presentations of the stimulus word “Dog,” designed to elicit the Spanish response *perro*.

Procedure

A native speaker of English with highly proficient speaking and reading skills in Spanish conducted the testing. Participants were tested both in small groups and individually. The materials were administered in a three-ring binder, and students first filled out the background questionnaire. Next, participants were instructed to look at the first stimulus of the lexical knowledge measure. Their instructions were as follows: *The following pages will ask you to associate pictures and various English words with words you know in Spanish. Please look at the picture or read the text on each page. Then, on the experimenter’s cue, turn the page and write the first word in Spanish that comes to mind. Your response should not exceed one word. Please wait for the next cue before moving to the following item.* After 10 seconds they turned to the response page where they had up to 30 seconds to give a single-word response in the second language. This process was repeated until the stimulus materials were finished. At this point, students were given the morphological recognition task. Following the morphological recognition

task, the participants completed the familiarity task. Upon completion of the morphological familiarity task, the students were debriefed and thanked for their time.

Coding

Participants' responses to the priming stimuli were coded by the principal experimenter and a native speaker of Spanish. The inter-coder reliability rating was .717 as measured by Cohen's kappa, indicating substantial agreement (Landis & Koch, 1977). Responses were coded for correctness and error type and placed into six categories: no error, form-based error, conceptual error, alternative response, no response and first language response. Form-based errors were, in essence, spelling errors; they bore a close resemblance to the target response but displayed an incomplete knowledge of Spanish phonotactic constraints (**sila* instead of *silla* as a response to chair). Phonotactic constraints refer to restrictions on possible combinations of sounds in a language. English, for example, does not allow certain consonant combinations such as *-Ng* at the start of a word. Conceptual errors were errors in that the target word was not produced, but exposed the participants' inter-lexical connections (for example, responding *sentarse*/to sit to the stimulus word chair). Synonyms, such as *chica* instead of *niña*, made up the alternative response category and were included in the final analyses as correct responses. First language responses included both English responses (chair) and English words with attached Spanish morphemes (el chairo).

Results

Participants' morphological knowledge was assessed through two tasks, one a measure of the participants' ability to recognize relevant morphological information (the morphological recognition measure) and the second a measure of the participants' familiarity with the Spanish words used on the morphological recognition measure (the morphological familiarity measure). On the morphological familiarity measure participants rated the Spanish words used on the morphological recognition measure as Very Familiar, Somewhat Familiar, or Not at All Familiar. The mean percentage of words rated as Very Familiar or Somewhat Familiar by the participants was 66.56%, *SD* 32.1%. The mean percentage of Not at All Familiar ratings was 30.89%, *SD* 18.1%. There was a mean No Response rate of 2.56%, *SD* 9.25% (The large standard deviation is due to one participant who only rated 50% of the words). Participants' mean correct performance on the morphological recognition measure was 73.08% , *SD* 13.8% with a range of 53.85% to 100%.

Overall, participants' performance on the morphological recognition measure was positively correlated with their performance on the lexical knowledge test ($r=.493$, $p=.014$). The lexical knowledge required them to generate a Spanish word when primed with an English word or a picture on the lexical knowledge test. Subjects who demonstrated high recognition performance of Spanish morphological structure also generated a higher percentage of correct target responses on the lexical knowledge

measure compared to subjects who demonstrated moderate recognition of Spanish morphological structure.

Two groups were formed based on the morphological recognition measure. Participants who scored above 75% correct were placed in the Strong morphological performance group, and participants who scored between 50% and 75% correct were placed in the Moderate morphological performance group. Participants who scored below the chance level of 50% on the morphological recognition measure were excluded from further analysis. The results for the two groups on the lexical knowledge measure are summarized in Table 1 with the data averaged over the different types of primes in the lexical knowledge task (direct translation and picture). The mean percentage of correct responses was 65.14%, *SD* 15.26%. The mean no response rate was 2.50%, *SD* 3.84%. The total error rate was 32.36%, *SD* 22.32%, although this varied with the level of morphological performance. The participants in the Strong morphological performance group had an overall error rate of 24.17%, *SD* 17.26%, while those in the Moderate morphological performance group had an overall error rate of 40.56%, *SD* 25.01%. The evaluation of the error responses divided by type is summarized in Table 2. Overall, participants made more conceptual errors (*M* 18.47%, *SD* 11.71%) than form-based errors (*M* 10.89% *SD* 7.02%) with first language responses comprising the smallest error category (*M* 3.06%, *SD* 3.59%). Table 3 further analyzes the previous results by presenting the prime type by error type data. Only form-based and conceptual errors are included because they comprise the majority of the error responses and are the error types included in the original hypotheses.

In addition to the subjects analysis, an item analysis was carried out on the results of the lexical knowledge measure. High performance words were defined as words for which 75% or more of the participants responded with correct target responses to both the direct translation and picture presentations of the word. Low performance words were words for which less than 75% of participants responded with correct target responses to both primes. For high performance words, 46.51% of the participants who made errors made form-based errors, and 41.86% of the participants who made errors made conceptually based errors. For low performance words, 30.09% of the participants who made errors made form-based errors, while 51.39% of the participants who made errors made conceptually based errors. This pattern of responses is consistent with the pattern gathered from the subject analysis that shows higher percentages of conceptual errors among low-performing participants.

Table 1

Mean Percentage Scores for Performance on the Lexical Knowledge Measure (Standard Deviations in Parentheses)

Morphological	Correct	Errors	No Response
Performance			
Strong	72.5 (13.11)	24.17 (17.26)	3.33 (4.49)
Moderate	57.78 (14.02)	40.56 (25.01)	1.67 (3.02)
Total	65.14 (15.26)	32.36 (22.32)	2.50 (3.84)

Table 2

Mean Percent Response Rates for each Error Type on the Lexical Knowledge Measure (Standard Deviations in Parentheses)

Morphological Performance	Form-Based	Conceptual	L1 Response
Strong	8.89 (5.19)	13.06 (9.48)	2.22 (2.59)
Moderate	12.78 (8.51)	23.89 (12.05)	3.89 (4.46)
Total	10.89 (7.02)	18.47 (11.71)	3.06 (3.59)

Table 3

Mean Percent Error Type Response Rate Corresponding to Different Prime Types (Standard Deviations in Parentheses)

Prime Type	Error Type	
	Form-Based	Conceptual
Direct Translation	12.5 (10.08)	16.39 (15.23)
Picture	9.17 (7.04)	21.11 (13.57)

A 2x2x2 mixed factor ANOVA examined the relationships between morphological knowledge (strong, moderate), error type (form-based, conceptual), and prime type (direct translation, picture). Error type and prime type were within-subjects factors, while morphological performance was treated as a between-subjects factor. There was a main effect of error type $F(1,22)=7.744, p=.011$. Additionally, there was a marginal interaction between error type and prime type $F(1,22)=3.976, p=.059$, such that more conceptual errors occurred after picture primes than direct translation primes.

There was also a significant interaction between prime type and morphological performance $F(1,22)=4.55, p=.044$. Participants in the Strong morphological performance group tended to make more errors in response to picture primes than to direct translation primes, although they made fewer errors overall $t(23)=-2.656, p=.014$. Additionally, there was a significant positive correlation between percent correct on the morphological measure and percent correct on the priming stimuli ($r=.493, p=.014$).

Discussion

This study investigated a possible relationship between morphological knowledge and lexical knowledge in adult beginning second language learners. The finding that participants who demonstrated high recognition performance of Spanish morphological structure also generated a higher percentage of correct target responses on the lexical knowledge measure compared to participants who demonstrated moderate recognition of Spanish morphological structure is consistent with the conclusion that there is a relationship between morphological knowledge and lexical knowledge in adult beginning second language learners. Additionally, the results show that participants tended to make more conceptual errors than form-based errors. Participants in the Strong morphological performance group (who performed above 75% correct on the morphological recognition task) made fewer errors overall, although this result was moderated by prime type. Participants in the Strong morphological performance group made approximately the same number of conceptual errors in response to picture primes as participants in the Moderate morphological performance group.

The hypotheses based on the Revised Hierarchical Model and Jiang's model of lexical development, however, predicted a different pattern of results. I had predicted an equal overall error rate regardless of performance on the morphological recognition task based on the status of the participants as first semester learners of Spanish. The differences I had predicted were in error type. I predicted that participants in the Strong morphological performance group would make more conceptual errors than form-based errors. This prediction was based on both Jiang's (2000) model of second language lexical development and Kroll and Stewart's (1994) Revised Hierarchical Model, as these models predict that more proficient learners have stronger direct links to the conceptual store than less proficient learners. Complementarily, Namei (2004) and Wolter (2001) report that less proficient learners give more responses that are related only in form to their prime, while more proficient learners give responses that are semantically or grammatically related. Given the previous research I predicted that participants in the Moderate morphological performance group (who scored between 50% and 75%) would make more form-based errors than conceptual errors. The data show, however, that both the Moderate morphological performance group and the Strong morphological performance group made more conceptually based than form-based errors. Specifically, the Strong morphological performance group made a nearly equal number of conceptual errors in response to picture primes as the moderate group. This result is consistent with the Revised Hierarchical Model's prediction that second language learners have difficulty accessing second language words directly from concepts.

Two possible limitations of the study may explain the deviation of the results from the hypotheses. First, the morphological recognition measure may have been overly difficult and thus a poor measure of the participants' morphological knowledge. The measure was adopted from a task meant for third semester learners (Zyzik & Azevedo 2009). While the experimenter did select the most frequent items to be on the morphological recognition measure, subjects rated a higher percentage of words on the morphological measure as Not at all Familiar than what was anticipated. It is possible that the vocabulary on the morphological recognition measure was less familiar overall to the subjects in the current study. One method of analysis that would address this limitation would be to divide participants into groups based on their relative familiarity with the items on the morphological recognition measure, rather than their performance on the morphological recognition task. Familiarity ratings, however, would indicate subjects' overall knowledge of the Spanish vocabulary presented but would be an ambiguous measure of their explicit knowledge of the morphological information targeted in the recognition task.

The other limitation in the experimental design may offer an explanation for the large percentage of conceptual errors: participants were given up to 30s to respond to each prime. During that time, participants could have used semantically based compensation strategies. That is, when presented with words for which the participants did not know the direct Spanish translation they searched their lexical networks for semantically or conceptually similar words in English for which they did know the translation. This opportunity for activation of related meanings could explain the high

rate of conceptual responses among participants in both the Strong morphological performance and Moderate morphological performance groups.

The possibility that the participants might have depended on semantic information is consistent with models of second language acquisition presented by Ullman (2004) and Clahsen and Felser (2006). Both of these models predict that adult second language learners rely primarily on lexical knowledge during processing of second language stimuli. Ullman (2004) bases his prediction on the relative accessibility of the declarative and procedural memory systems. The declarative/procedural hypothesis suggests that the declarative memory track underlies the lexicon, while the procedural memory track underlies syntax. For adults learning a second language, the former is more accessible than the latter, resulting in the use of lexically and semantically based compensation strategies.

Clahsen and Felser (2006) also conclude that second language learners rely primarily on semantic information, although their hypothesis is that the syntactic structures of second language learners are shallow and not fully formed, in contrast with Ullman's neurocognitive explanation. They found that adult second language learners have differing Event Related Potentials (ERPs) to over-regularizations and inappropriately applied irregular endings than adult native speakers or child second language learners. Additionally, Clahsen and Felser noted that when presented with relative clause based ambiguities, adult second language learners rely on semantic and pragmatic information to resolve the ambiguity, rather than syntactic information. To

summarize, prior evidence supports the hypothesis that the second language learners tested in this study may have taken advantage of the time given to them to respond to use semantically-based compensation strategies when confronted with an unavailable target response.

Although the current results are consistent with a semantic compensation strategy to explain the percentage of conceptual responses, that does not explain why the participants would have deviated from the previously observed pattern in the free response literature to give fewer form-based responses (Namei, 2004). One possible explanation is that the participants, as first-semester students, would not have had large phonological neighborhoods for the words in their lexicon, thus making a semantically based response the easier alternative. Another possible explanation is that although the instructions were to write down the first thing the participant thought of in Spanish, it is possible that the participants, who were all members of selective four year universities, may have rejected form-based responses as insufficient or embarrassing and used the remaining time to engage in the semantic compensation strategy. There were several instances of cross-outs in the data that support this hypothesis.

Conclusions and Future Directions

The purpose of this research was to investigate a possible relationship between morphological knowledge and lexical development in adult second language learners. The evidence I found is consistent with a relationship between morphological knowledge and lexical development, although limitations in the experimental design constrain its

ability to describe that relationship. Consequently, the nature of the relationship between morphological and lexical knowledge remains to be clarified by future research.

Given the positive correlation between morphological knowledge and lexical development in this experiment, the logical next step would be to investigate the hypothesis that morphological knowledge not only is related to lexical development, but also facilitates it. An alternative hypothesis would be that morphological knowledge is related to lexical knowledge, but does not facilitate it. This hypothesis would suggest that morphological knowledge and lexical knowledge could both be explained by an over-arching variable, such as second language proficiency. One way to test these hypotheses would be to design a training study where the experimenter would work in tandem with second language instructors to either emphasize attainment of morphological knowledge or traditional vocabulary knowledge. Students would be tested at the beginning of the semester to establish a base level of their morphological knowledge, lexical development, and overall proficiency. Then, at the end of the semester, the participants would be tested again. Were morphological knowledge to facilitate lexical development, then the students who received specialized training in morphology would be expected to outperform their peers in the traditional classroom setting on all measures. The morphological knowledge scores would act as a check to insure that the training had been effective, while a comparison of the lexical development results between the training and traditional groups would describe the relationship between morphological knowledge and lexical development.

Additionally, to circumvent some of the limitations that affected this study, participants could complete the morphological and lexical knowledge measures in a computer controlled, speeded reaction time format. Instructing participants to respond as quickly as possible would limit their ability to engage in compensatory strategies and provide a different picture of their connections between the second language and the first language (direct translation prime responses) and the second language and the conceptual store (picture prime responses). Beyond limiting participants' ability to engage in compensatory strategies, the advantage to reaction time tasks is that they provide information on learners' ability to process language receptively (Ellis, 2008). A researcher using this technique can examine the data and select samples within time ranges to analyze. In fact, a possible manipulation that could take advantage of this feature would be to have two conditions, one speeded and one with the 30s time limit described in this study. This would give the experimenter the chance to compare the two groups and see if the extra time does result in participants giving more conceptual responses as observed here.

A similar modification of the methodology could include a speeded recognition task, rather than a recall task. A recognition task would be able to include a larger number of items which would give a better view of the participants' overall vocabulary knowledge, although it would not provide as much information about the status of individual lexical entries as the free-response lexical knowledge measure utilized in this study. Were one to use such a speeded recognition task, their hypothesis would suggest

that morphological knowledge facilitates general vocabulary acquisition, rather than the development of individual lexical entries.

I would also suggest that future researchers give the morphological recognition measure before the lexical knowledge measure. In this study, the percentage of English responses could be due to the reduced salience of the second language, Spanish. The lexical knowledge measure was given first and it presented subjects with English words and pictures. The participants did not encounter Spanish vocabulary until the morphological recognition measure that was presented second. Previous second language acquisition research has found that context can have a large effect on the relative activation of the two languages (Hermans, Ormel, Besselaar, & Van Hell, 2010). Considering that the morphological recognition measure presents the participants with Spanish words to choose from, if given first, it might make the second language more salient and consequently limit the use of semantic compensation strategies and the number of English responses given by the participants. In a future study that presented the morphological recognition measure first, I would predict fewer first language responses and an increased percentage of target responses.

Another possible modification would be to evaluate the sparse phonological network hypothesis described earlier in the Discussion. Similar research that has been conducted with monolinguals is consistent with the hypothesis that the structure of the lexical network can influence speech production (Chan & Vitevitch, 2010). One could evaluate the sparse phonological network hypothesis described above by including a

measure of participants' knowledge of common phonological neighbors for the target words in the lexical knowledge task.

While it is tempting to gather as much information as possible at a time when dealing with a small population, increasing the length of the experiment may make it even more difficult to recruit participants. Additionally, although the longitudinal study described above would be the ideal next step, it would likely be difficult to persuade instructors to change their methodology and curricula. Consequently, there are two other options a future researcher could take. One option, which would sacrifice some of the ecological validity, would be to do a similar study but with a shorter training period, possibly only a half hour. Utilizing such a design would mean the results would be less generalize-able, and it is possible that such a short training period would not have significant effects on the participants. The alternative would be to sacrifice causality but retain ecological validity by repeating this study with the modifications, such as using a reaction time format, suggested above. The results of such an experiment could be used to evaluate potential mechanisms to explain lexical development among early adult second language learners. Avenues for future research could include an investigation of the role of lexical networks—where each word represents a node made up of a variety of features, and shared features (sound, spelling, meaning, et cetera) create connections between the nodes—in the development of individual lexical entries (Wolter, 2001).

In addition to identifying areas of future study within second language acquisition research, this investigation is also important because it examines adult beginning second

language learners' acquisition in the common context of a formal classroom. Many classroom strategies explicitly encourage translation from the first language to the second language. This strategy creates an opportunity for learners to build connections between second language lexical entries, first language lexical entries, and their conceptual store. Specifically, as mentioned previously in the discussion of the Revised Hierarchical Model, translation from the first language to the second language is mediated by the conceptual store. , offering an opportunity for direct connections from the conceptual store to second language lexical entries to be strengthened. Similarly, activities where learners tell stories based on pictures provide a more direct opportunity to strengthen learners' connections between their conceptual store and individual second language lexical entries. Previous research, along with the current study, suggests that further consideration of how morphological training might be applied to the classroom is needed. More broadly, studies of this type, that combine psycholinguistic methods in common contexts of second language acquisition have the potential to influence second language teaching methodologies in addition to addressing theoretical questions about second language lexical development.

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Appendix A

Girl-Niña



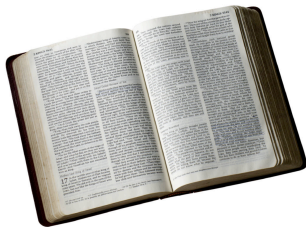
Dog-Perro



Pencil-Lápiz



Book-Libro



Pen-Bolígrafo



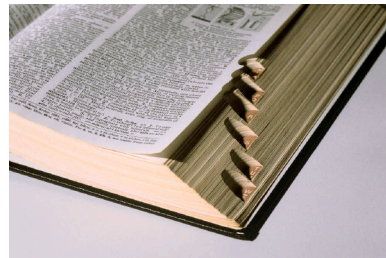
Door-Puerta



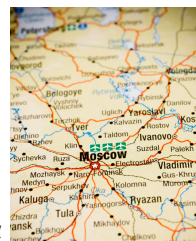
Bathroom-Baño



Dictionary-Diccionario



Map-Mapa



Backpack-*Mochila*Chair-*Silla*Window-*Ventana*Desk (student's)-*Pupitre*Winter-*Invierno*Calculator-*Calculadora*To eat-*Comer*To talk-*Hablar*To dance-*Bailar*To study-*Estudiar*



To sing-*Cantar*



To wash-*Lavar*



To listen-*Escuchar*



To read-*Leer*



To run-*Correr*



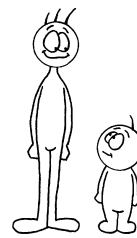
To write-*Escribir*



To give-*Dar*



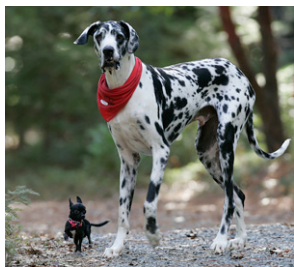
Short-*Bajo/a*



Happy-*Alegre*



Big-*Grande*



Blue-Azul



Appendix B

This questionnaire is designed to assess your language history. Please answer honestly and close the binder when you have finished.

Background Questionnaire

1. How old are you?
2. Do you have any hearing problems or learning disabilities?
3. What is your native language?
4. Do you or members of your family speak a language other than your native language at home?
5. Do you often encounter a language other than your native language in your community (either hometown or on campus)?
6. At what age did you first begin to learn Spanish?
7. Have you ever taken a foreign language before? If so, please write it below.
8. If you have previously studied a foreign language, at what age did you begin to study it?
9. When learning new vocabulary, do you learn the direct translation into your native language or do you try to associate the new word with a concept?