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A Study of First Language Background and Second Language Order of Acquisition

Meghan Aitken

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Arts

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ABSTRACT

A Study of First Language Background and Second Language Order of Acquisition

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Master of Arts

One major topic that often appears in textbooks on second language acquisition (SLA) is that of order of acquisition of morphemes. Much research has been done on the issue in the past, and a particular acquisition order has been accepted by many in the field of SLA for second language learners of English. This order of morphemes is deemed invariant and not affected by the native language of the learner. This thesis examines this claim, using an elicited imitation test to target nine English morphemes. The results show that a learner's native language does indeed have an effect on the order of acquisition of morphemes; however, only a few limited claims can be made regarding this order (for example, Japanese and Korean seem to acquire the auxiliary morpheme earlier than in other languages). Previous research is examined in light of the differences between this and other studies, with a specific focus on methodological issues which could have a significant impact on both results and interpretation of results in studies related to order of acquisition of morphemes.

Keywords: Morphology, Second Language Acquisition, English Language, Native Language, Transfer, Elicited Imitation.

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Chapter 1: Introduction

Research over the past century in the field of second language acquisition has uncovered linguistic patterns that help both in the teaching and learning of a second language. However, one of the areas of linguistics where little is known concerning second language acquisition (SLA) is morphology. Of the little that is known, however, studies on the morphological order of acquisition for second language learners of English have been plentiful. One of the most oft-cited and well-known of these studies is Krashen et al.'s research on the order of acquisition of morphemes. In their research they propose a "natural order" of morphemes that second language learners of English follow when acquiring the language (Krashen, 1977).

In the subsequent 35 years, several researchers have dedicated their efforts to discovering if there is a universal order of acquisition of English morphemes and if so, what that order is. Brown (1973) discovered a general order for learners of English as their native language (L1), which motivated SLA researchers to see if they could find a similar order for second language (L2) learners of English. Several papers were published on the matter, and although not all the research agreed, Krashen's 1977 paper became famous for its proposed "natural order," which many researchers and ESL curriculum writers have made use of ever since.

This order was of interest to many second language acquisition researchers because its validity would impact theories of language learning. For example, the behaviorist theory is based on the concept of transfer: the idea that what someone has learned before (their L1), they can apply to a new learning situation (an L2). They develop habits, in this case of language learning, which they apply to their learning of a *second* language (Saville-Troike, 2006). However, if this is correct, we wouldn't expect to see differences between the L1 learners' order of acquisition of morphemes and the L2 learners' order of acquisition of morphemes. Dulay and Burt challenge

the idea of behaviorism and supports creative construction, or “the child’s gradual construction of his own linguistic rules” (Dulay & Burt, 1973, p. 246) over habit forming as a prevailing influence in child SLA. They are the first to propose an order of acquisition of morphemes for second language learners that is different than the order found for first language learners.

Another reason for interest in research on order of acquisition of morphemes is the implications it may have on teaching English as a second language. Krashen and his colleagues (Krashen et al., 1976) found a similar order of acquisition of morphemes for L2 learners of English as that of Dulay and Burt’s (1974). In Krashen et al.’s work, they propose that a natural order of acquisition of morphemes would support the idea that explicit instruction of English structure may not play a significant role in the acquisition process, since the morphemes are acquired in a naturally occurring order. This would impact the way that English structure is taught to second language learners. They suggest that exposure to the language alone may be sufficient to allow a learner to acquire the morphemes in the proposed order, (in particular for children) and that teaching the rules cannot influence the order. They also propose that the natural order gives evidence that adults process language similar to the way that children do when learning a second language (Bailey, Madden, & Krashen, 1974).

One of the weaknesses of these previous studies is that not many look at the influence that a learner’s native language has on this order. While there are some that support the idea of L1 transfer influencing a learner’s order of acquisition, most research tends to favor the idea of no influence (Bailey, Madden, & Krashen, 1974; Dulay & Burt, 1974; Fathman, 1975; Freeman, 1975). A more recent study (Luk & Shirai, 2009) suggests that L1 is affecting the order of acquisition of learners of English; however, this study only looks at three morphemes and four

native languages. Another recent study (Weitze, Mcghee, Graham, Dewey, & Eggett, 2011) looks at a few more L1s, but is lacking sufficient data for certain morphemes.

In order to better determine if L1 is having an influence on the order of acquisition of morphemes in second language learners of English, data would need to be collected that would include all morphemes of interest as well as a large enough sample of speakers of a variety of native languages. In this research, a test was created that includes all nine of the morphemes listed in Krashen et al.'s work (1977), and that test was administered to a variety of L1 speakers in the hopes of gathering enough data to allow for more definitive conclusions.

Research Questions:

1. Will an elicited imitation test targeting the nine morphemes listed in Krashen's "natural order" show a significant influence of native languages on mean morpheme scores of participants?
2. If native language has a significant influence, how will the order of acquisition of morphemes be affected?

Chapter 2: Review of Literature

In the late 1960s and early 1970s, researchers in language acquisition spent a considerable amount of time looking at morphological acquisition of English learners. One of the more influential books from that time is Roger Brown's *A First Language: The Early Stages* (Brown, 1973). In his book, Brown shares the results of a longitudinal observational study of three young children learning English as their native language. Speech samples were recorded from these children and Brown analyzed them for *obligatory contexts* of morphemes, or situations where the context required use of a specific morpheme. He used as an indicator of acquisition of a morpheme a score of 90 percent accuracy or higher for that morpheme in at least three consecutive speech samples. These three children show similar patterns in the order in which they acquire 14 morphemes of English. From this study, Brown proposes that there is a natural order of acquisition of morphemes in children learning English as their first language (L1).

Since Brown's study, many researchers have used the concept of obligatory contexts to determine order of acquisition of morphemes. In fact, soon after Brown, de Villiers and de Villiers (1973) reported the results of a study of speech samples from 21 children learning English as their first language. They examined the speech samples for obligatory contexts and scored the participants for use or non-use of the morpheme. Then they calculated each participant's percentage score for the morphemes from which they calculated a mean percentage score for each morpheme. They then ranked the morphemes in order from least difficult to most difficult (highest mean to lowest mean percentage score). Their results were highly correlated with Brown's order and support his findings. This prompted others to ask whether such a pattern exists in second-language acquisition of English as well.

Heidi Dulay and Marina Burt are some of the first to report their findings on morpheme order in second language acquisition. In their study, they looked at 151 children whose L1 was Spanish who varied in level of proficiency as well as amount of exposure to English (Dulay & Burt, 1973). Using the *Bilingual Syntax Measure* (BSM), they looked at eight of Brown's 14 morphemes (also referred to as functors). In this method, the subjects are shown 7 different color cartoons and asked 33 different questions. As Dulay and Burt explain it, "The administration of the BSM is like chatting with a child about some pretty pictures . . . there are no correct answers in a conversation of this kind . . . for example, in answer to the question 'Which one is he?' one child might say 'He's the fat guy'; another might say, 'the big man' . . ." (Dulay & Burt, 1974, p. 40). Responses to these questions were then examined for instances a participant used (or did not use) a morpheme in an obligatory context. Dulay and Burt also used this method in their 1974 study where they looked at 11 morphemes (including the 8 from their previous study) with 60 Spanish-speaking and 55 Chinese-speaking children.

In both of their studies, Dulay and Burt not only found that child second language (L2) learners of English acquire morphemes in a specific order, but that that order differs from the order of acquisition of Brown's and the de Villiers' L1 learners of English. Their scoring method was similar to that of de Villiers and de Villiers, and morphemes were ranked in decreasing order according to their mean percentage scores. Although their second study included 11 morphemes, their findings supported the morpheme order from their 1973 study of 8 morphemes. Dulay and Burt's findings are also supported by numerous studies that followed (see discussion below). A comparison of the morpheme orders for first language and second language acquisition as discussed by Brown (1973) and Dulay and Burt (1973) can be found in Table 1.

Table 1

L1 and L2 Orders of Morphemes

Brown's Order (L1)	Duly and Burt's Order (L2)
1. Progressive <i>-ing</i>	1. Progressive <i>-ing</i>
2. Plural <i>-s</i>	2. Plural <i>-s</i>
3. Irregular past	3. Copula
4. Possessive <i>-s</i>	4. Auxiliary
5. Copula	5. Articles
6. Articles	6. Irregular past
7. Regular past <i>-ed</i>	7. Regular past <i>-ed</i>
8. Third person singular <i>-s</i>	8. Third person singular <i>-s</i>
9. Auxiliary	9. Possessive <i>-s</i>

Bailey, Madden and Krashen (1974) extend the work of Dulay and Burt by focusing on adult learners of English. They looked at 73 subjects, ranging from ages 17 to 55, 33 of whom were Spanish speakers and 40 of whom represented a class of non-Spanish speakers (all 11 other L1s represented by the group). They also used the BSM and found a high degree of agreement between child and adult L2 learners of English with regards to morpheme order. They also found the correlation between de Villiers and de Villiers' order for L1 children and the adults in their study to be not significant.

Fathman (1975) administered a different type of test, the Second Language Oral Production English (SLOPE) test. In this test, the subject takes 20 subtests targeting a certain structure that consist of 3 items per subtest. Each of these is represented by pictures and the students are prompted by the test administrator to give an answer that would require the desired morpheme. The subjects were 120 children, ages 6 to 14, all generally with the same background and experience with English and who were native speakers of either Korean or Spanish. Her results showed similar patterns in the morpheme order compared to the previous studies,

however because her testing and scoring methods were different and because she tested 20 different structures, she felt it impossible to compare her research to previous work.

This research was followed up by Krashen, Sferlazza, Feldman, and Fathman (1976) who wanted to see if all 20 structures from the SLOPE test would be the same for adults as children. They administered the SLOPE test to 66 adult learners of English who had varied English exposure and learning environments. They found that the adult order of the 20 morphemes was not significantly different from the child order found by Fathman (1975). Krashen and a few other colleagues (Krashen et al., 1977) also show results of research using free speech samples from 22 intermediate level students which support the morpheme order found in the previous studies. This was done in attempt to show that the morpheme order was not dependent on only using the BSM or imitation studies. Their study only analyzed seven morphemes, however, as two of the morphemes were not seen in enough obligatory occasions to allow for analysis.

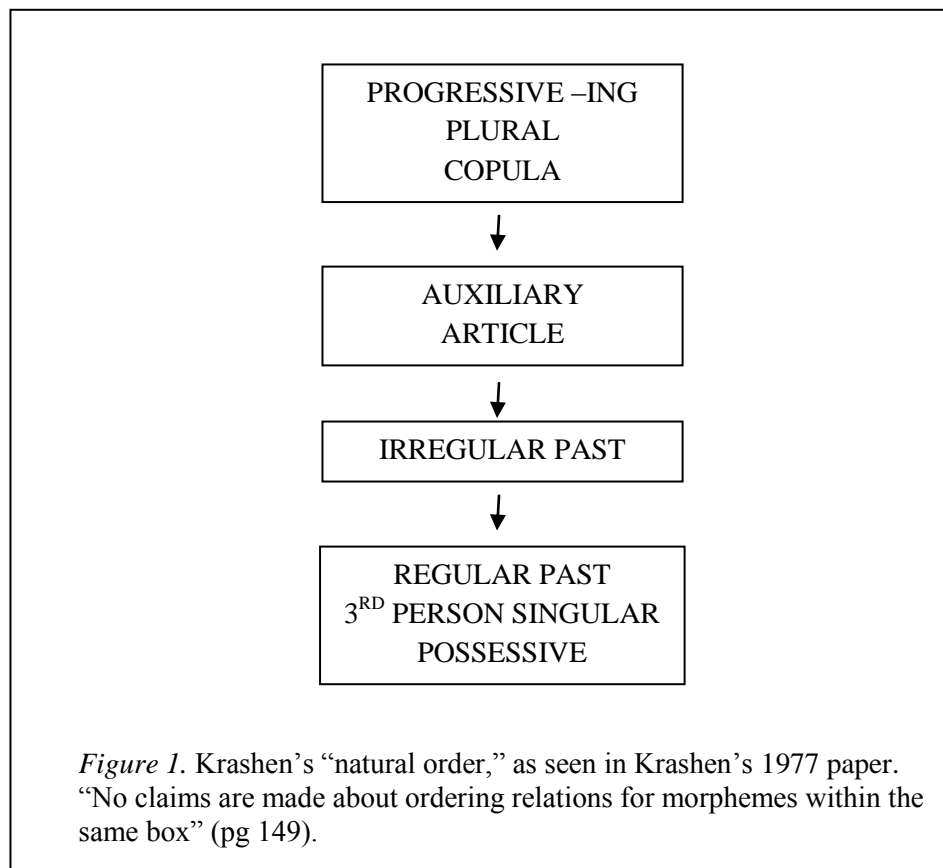
Some researchers did not agree with the morpheme order found in the aforementioned studies. Rosansky (1976) disputed the proposed order of acquisition, calling into question the methodology and statistical analyses of several of the previous studies related to morpheme order. In the study, she looked at both cross-sectional and longitudinal data of the six subjects (two children, two adolescents, and two adults). Among other things, she found that while the cross-sectional studies correlated significantly with previous SLA studies, they also correlated significantly with de Villiers and de Villiers L1 study. She explained this odd contradiction by challenging the statistical analyses of previous studies, and even pointed out their failure to consider the large amounts of variance within the means from their data. Krashen (1977) later refutes this by stating that Rosansky's research did not have ten instances of each morpheme, a requirement he considers necessary to find reliable results.

Hakuta (1976) finds different results in his case study of a child learning English. This was a longitudinal study involving a 5 year old Japanese girl who was observed for a period of 60 weeks. The subject produced some 17 different morphemes that were analyzable, and when compared to previous studies that used the BSM, the 9 morphemes in common differ for Hakuta's Japanese learner than the previous research. Krashen (1977) refutes these claims, however, challenging Hakuta's methodology, although he gives little explanation.

Diane Larsen-Freeman's work (1975) goes on to investigate whether different tasks will reflect similar morpheme orders as those found using the BSM. Twenty-four adult ESL learners from an intensive English program that were at the same level in the program were used as subjects. They represented four different L1s (Arabic, Japanese, Persian, and Spanish). Ten of Dulay and Burt's (1974) eleven morphemes were evaluated using five different tasks: reading, writing, listening, imitating, and speaking. The BSM was used as the speaking task to allow for comparability to the previous research. Larsen-Freeman's results show some variability in the morpheme order between tasks, but at the same time some consistency in the rank of certain morphemes in all five tasks. The speaking and imitating tasks, however, were highly correlated with the previous studies. The other tasks' (reading, writing, and listening) results were challenged by Krashen (1977) on the basis of interference of the Monitor, or conscious grammar. He claimed the variability is the result of the extra processing time allowed in certain types of tasks.

The most influential of the studies to follow Dulay and Burt, however, would have to be the research done by Stephen Krashen presented in "Some Issues Relating to the Monitor Model" (Krashen, 1977). In this research, all the previous studies were examined and the claims against an invariable morpheme order were addressed. They found that all of the studies with at

least ten obligatory occasions of each morpheme and that involved unmonitored tasks had consistent results that had little variation. Here they presented an order of acquisition which they tag as the “natural” order of morpheme acquisition for L2 learners of English (Krashen, 1977). This order is often presented in second language acquisition books, such as *Introducing Second Language Acquisition* (Saville-Troike, 2006) and *Culturally and Linguistically Diverse Exceptional Students* (Grassi & Bulmahn Barker, 2010). See Figure 1 for Krashen’s “natural order.”



After the late 1970s, while researchers began to investigate morpheme order in other languages there was a hiatus in research on L2 learners of English and morphological order of acquisition. A resurgence of interest in this topic seemed to begin sometime during the 1990s,

but most of this research focuses on the whys of the order, or the reason one morpheme may be more difficult to acquire than another (see O'Dowd, 1991; Goldschneider & DeKeyser, 2005; Ellis, 2006). Research on the actual order in which morphemes are acquired in English learners died down. Most recently, however, Luk and Sharai (2009) and Weitze et al. (2011) look into the order of acquisition of morphemes and whether or not L1 influences that order for individual students.

An interesting point to note about all of this research (past and more recent) is that the majority of work done either claims no influence of L1 on order of acquisition or doesn't address the issue at all. Dulay and Burt (1973) claim that most errors in L2 learners of English are development errors (those similar to a child learning English as their first language) with interference of their L1 being responsible for just three percent of the errors. A subsequent paper of theirs (Dulay & Burt, 1974) comparing Spanish and Chinese learners of English claims there is no L1 influence. Bailey et al. (1974) found no influence in their study of 33 Spanish speakers and 40 speakers of other L1s. However, many of the L1s were not well represented and they had to group 11 different L1s into a group they called "non-Spanish."

Fathman (1975) compares Spanish- and Korean-speaking children learning English in her study using the SLOPE test and concludes that L1 is not having a significant influence. She does mention, however, that L1 could be causing some variability and that she would need to investigate the types of errors made, not just that a structure was missed, in order to make solid conclusions. Larsen-Freeman (1975) studied 24 adults of 4 different L1s (Arabic, Japanese, Persian, and Spanish) and notes that while there is some variability between languages, it does not turn out to be statistically significant.

Krashen et al. (1976) see little to no influence of the L1 on the order of the morphemes in their work, but once again the majority of the languages are represented by only one or two subjects and must be grouped into language categories. Krashen et al. in a different paper do mention that it is possible that L1 has a small influence in adult learners but not children, and later say that L1 influence in language production is not interference, but a sign of low levels of acquisition. Quoting Newmark (1966), they state, “L1 influence is not proactive inhibition, but is simply the result of the performer being ‘called on to perform before he has learned the new behavior.’” (Krashen, 1977, p. 155). The performer would insert their L1 in a context where they do not know the L2, not necessarily where they have not acquired a certain feature of the L2. These claims are solely based on theory stated in previous research and not on Krashen et al.’s own work.

Some research supports the idea of L1 transfer affecting the order of morphemes. Hakuta (1976) argues that the different order he found in his case study of a Japanese child is indeed the result of L1 interference. Gass and Selinker (2001) assert that there is evidence of some influence of L1 on the order of the morphemes. More recently, Ellis (2006) lists studies where the L1 of the subjects does affect the order of the morphemes (those L1s being Japanese and Korean). He states:

Thus (1) there are identifiable differences in rank order of acquisition of morphemes between monolingual English-speaking children and second-language learners of English from particular L1 backgrounds, and (2) there is L1 influence on the course of L2 acquisition, with clear differences in rank order of acquisition of English morphemes between Spanish-speaking and Chinese-speaking children on the one hand (Dulay and Burt 1974) and Korean and Japanese speakers on the

other (Shin and Milroy 1999). The fact that Japanese and Korean are morphosyntactically very similar confirms these language specific influences on L2 acquisition: L2 acquisition is clearly affected by the transfer of learners' knowledge of their first language. (pg 187)

Goldschneider and DeKeyser, in their meta-analysis of past research on morphological order of acquisition related to English SLA, do not specifically look at L1. However, they do comment on the possibility of L1 being an influential factor in the order of morphemes. Their study shows that a combination of five factors accounts for a large portion of the variance between morphemes. Those five factors are perceptual salience, semantic complexity, morphophonological regularity, syntactic category, and frequency. They add, "The amount of variance accounted for, while high, still leaves room for other contributing factors, such as L1 transfer, which is not included in this study" (Goldschneider & DeKeyser, 2005, p. 59)

Luk and Shirai (2009) give evidence of this influence as well. Their study reviews several papers on morpheme acquisition for L2 learners of English whose native languages were Spanish, Japanese, Chinese, and Korean. They analyze the 9 morphemes listed in Krashen's natural order and found that Japanese, Chinese, and Korean differed from the "natural order" with respect to the plural *-s*, the possessive *-s*, and articles. They relate this to whether or not that morpheme exists in the subject's L1, proposing that L1 transfer has more of an influence than most previous research has suggested and that many second language acquisition textbooks portray.

Around the same time, Weitze et al. (2011) presented results from their research at the 2009 Second Language Research Forum. They looked at whether their method of testing (elicited imitation - EI) reflected similar patterns of acquisition as previous studies and whether L1 has an influence on the order of acquisition of morphemes. They presented the results of EI tests administered to speakers of 5 different L1s that ranged across 5 different proficiency levels. Their results showed that EI tests do reflect similar patterns of acquisition and showed similar results for Spanish, Japanese, and Korean learners as Luk and Shirai. They also saw similar results for Portuguese as Spanish.

Weitze et al.'s research, however, did not have any instances of the possessive *-s* morpheme and had conflicting results for Chinese. Luk and Shirai's results show that Chinese seems to be similar to Japanese and Korean, whereas Weitze et al.'s results show that Chinese seems to be similar to Spanish and Portuguese. They support the claim of others who feel that L1 does have an influence on the order of acquisition of morphemes for L2 learners of English and propose that further research be done to support the claim.

Weitze et al.'s results also suggest that "data collected using the [elicited imitation] procedure does indeed reflect the influence of the same interlanguage mechanisms which govern the spontaneous use of language in unplanned speech production as claimed by Ellis (2005, 2006), Erlam (2006), and Bley-Vroman and Chaudron (1994)" (Weitze et al., 2011, p. 159). This allows for elicited imitation (EI) to be used as a valid testing tool when analyzing morphological order of acquisition. Elicited imitation is similar to the imitation task given in Larsen-Freeman's paper (1975) where a subject hears a sentence containing the targeted features and is asked to repeat it. Larsen-Freeman's imitation task was also found to correlate well with Krashen's "natural order."

An EI test works as follows: a subject will hear an utterance, form a representation of that utterance using long term memory and store that representation in short term memory. Based on the representation he has created, the subject will reconstruct the sentence and repeat it out loud. Elicited imitation has been found to be a good measure of implicit knowledge (Erlam, 2006). The idea is that a student cannot successfully repeat an utterance if he cannot understand it (Bley-Vroman and Chaudron 1994). His knowledge of the language will aid in processing the sentences and constructing the representation that he will use to process a sentence and produce a response (i.e., reconstruct the sentence). Thus, EI is an effective tool for examining morphological order of acquisition. For more information on elicited imitation see Gallimore and Tharp (1981), Bley-Vroman and Chaudron (1994), Vinther (2002), and Erlam (2006).

Since EI has been shown to be a valid tool and has been shown to reflect similar patterns to those seen in other morpheme order studies, this study will use an elicited imitation test to further investigate the role of L1 on the order of acquisition of morphemes.

Chapter 3: Research Design

In an effort to further the research done on L1 influence on the order of acquisition of morphemes, an elicited imitation test was created by the Pedagogical Software Speech Technology (PSST) group at Brigham Young University, myself included, specifically targeting the nine morphemes from Krashen's "natural order" and administered to subjects representing seven L1s. The possessive *-s* morpheme was included to make up for where Weitze et al.'s (2011) paper lacked sufficient data for all nine morphemes and more L1s were analyzed in efforts to support Weitze et al.'s and Luk and Shirai's (2009) conclusions on L1 influence and morphological order of acquisition.

Participants

The test was administered at the English Language Center in Provo, Utah at the beginning of their fall semester (August 5 2010). There were 168 students who took the elicited imitation test, representing 13 different L1s. Of these students, six were eliminated since they were the only students representing their L1 (Malagasy, Mongolian, Nepalese, Ukrainian, Urdu, and Vietnamese) and thus would not provide sufficient data. A total of seven L1s are represented in the analysis that follows (Chinese, French, Japanese, Korean, Portuguese, Russian, and Spanish). The students represented a full range of proficiency levels, measured on a scale of one to eight, which was determined by a placement exam given by the English Language Center. See Table 2 for a representation of the demographic information for the participants.

Materials

We chose nine morphemes based on Krashen's "natural order": auxiliary (AUX), possessive *-s* (POSS), third person singular *-s* (3PS), plural *-s* (PLU), present progressive *-ing* (ING), irregular past (IRPS), articles (ART), the copula 'be' (COP), and past tense *-ed* (ED).

Table 2

Demographics of participants

L1		Level	
Spanish	72	1	8
Korean	35	2	25
Japanese	17	3	43
Portuguese	16	4	32
Chinese	12	5	20
French	5	6	20
Russian	5	7	12
		8	3
Malagasy	1		
Mongolian	1	Ages	
Nepalese	1	17 to 63	
Ukrainian	1		
Urdu	1	Gender	
Vietnamese	1	100 female	68 male

Note. Number of participants for each L1, level, and gender as well as range of ages represented.

The original intention was to have a total of six sentences per morpheme, with each morpheme having a sentence of each predetermined length: 5 to 7 syllables, 8 to 9 syllables, 10 to 12 syllables, 13 to 15 syllables, 16 to 18 syllables, and 19 to 21 syllables. This was done to ensure that each morpheme would be represented by each syllable length. These lengths were decided based upon the fact that most elicited imitation literature lists using sentences ranging from 5 to 19 syllables (Weitze et al. 2011).

By assuring that each morpheme is contained in a sentence of each syllable length, we can control for the potential of memorization, or rote repetition. The capacity of working memory is 7 +/- 2 units, and these units can be defined as syllables, phrases, or anything in between. Second language learners who are further along in the acquisition process can chunk information together and store these larger units in their working memory, while those who have

just begun learning the language would have much smaller chunks. In relation to elicited imitation testing, Weitze et al. explain:

As the length of EI utterances become greater, it becomes necessary to chunk information into successively larger units to create a mental representation to be retained in working memory until it is repeated. The associations of unit sequences formed in long term memory established during acquisition are believed to facilitate this chunking process (Ellis, 2005). As language learners become increasingly proficient their long term memory contains more of these constructions (Weitze et al., p. 154).

The constructions contained in long term memory would aid a learner in repeating a sentence, and since a more proficient learner would have more constructions in their long term memory, they can be more successful in repeating longer sentences. Thus, there is no magic number of syllables that any learner would not be able to repeat by memory. By having a fairly large range of syllable lengths and by ensuring that each morpheme is included in sentences of various lengths, the possibility of rote memorization can be controlled for. Also, each morpheme was placed near the middle of the sentence, based on Gallimore and Tharp's (1981) claim that the easiest part of the sentence to imitate is the beginning, then the end, with the middle being the hardest.

We created each sentence with a specific morpheme in mind, although the occurrence of other morphemes within a sentence targeted for a specific morpheme was allowed. The sentences were created not to ensure the occasion of only one morpheme per sentence, but to ensure the test would represent all nine morphemes at least once in each syllable-length group. This hopefully would better reflect natural speech, where one doesn't often find many sentences that have only one isolated morpheme. Two examples illustrate the guidelines used in sentence

creation: *Is that dad's car outside?*, a sentence targeting the possessive -s morpheme, six syllables in length; and *His political career is over after tonight*, a sentence targeting the copula, 14 syllables in length. These sentences represent two different syllable lengths and show the targeted morpheme at the middle of the sentence.

In total, there were 35 instances of articles, 26 instances of the plural -s morpheme, 20 instances of the copula 'be,' 17 instances of irregular past tense, 12 instances of auxiliary verbs 'be' and 'have,' 7 instances of possessive -s, 7 instances of progressive -ing, 7 instances of third person singular -s, and 4 instances of -ed. The -ed ending originally was intended to have at least 6 instances, however, after testing it was noticed that some of the intended -ed sentences had actually been created using a past participle instead of the regular past tense and those sentences had to be omitted.

Procedure

In this test, students would sit at a computer using headphones and a microphone. They would be instructed on how to take the test and then given a practice item. When the test began, they would hear a sentence and then repeat it. The sentences were previously recorded by native speakers of English. The students' responses were recorded and then sent to a server. From there, the recordings were uploaded into a grading tool that would break the sentences up into syllables. Each syllable was graded by a human grader and given a binary score, one for correct and zero for incorrect. The syllable scores for each instance of the nine morphemes were used to calculate a morpheme score for each student. These scores were then used to calculate a percentage correct for each of the nine morphemes for each student. For example, a student's score on all of the article (ART) morphemes would be added up and then divided by the total number of instances of that morpheme, each morpheme being worth 1 point. These percent scores were then used in a

mixed model ANOVA blocking on the individual, with each individual having nine scores. The scores were used as the dependent variable, with level, L1, and morpheme being the independent variables. A second analysis using the Ordering-Theoretic Model is done using these scores as well, and will be discussed in more detail below.

Chapter 4: Findings and Discussion

The data were analyzed two ways: using a mixed linear model ANOVA and using the Ordering-Theoretic Method, also known as the “tree method” or the “hierarchical method” (Dulay et al., 1982). The ANOVA was done first, and a full model with all two-way interactions was run. The interactions were run on L1, level, and morpheme to see if any of the combinations were significant. It was expected that there would be no significant interaction between level and morpheme but that there would be a significant interaction between L1 and morpheme. This would demonstrate that level was not significantly affecting the morpheme order, thus eliminating it as a potential confounding variable. The level and morpheme interaction was important to look into since the majority of previous research involved students of similar levels (usually intermediate), and this research has individuals from all levels.

The results of the analysis show main effects for level, L1, and morpheme to be significant (**level:** $df = 7,124$; $F = 15.95$; $p < 0.0001$ **L1:** $df = 6,124$; $F = 3.02$; $p = 0.0086$ **morpheme:** $df = 8,1192$; $F = 27.29$; $p < 0.0001$). The analysis of L1s showed no significant interaction between level and L1, which is to be expected ($df = 25, 124$; $F = 1.33$; $p = 0.1575$). The interaction between level and morpheme was also not significant ($df = 56, 1192$; $F = 1.32$; $p = 0.0593$), therefore it can be assumed that level is not a confounding variable. The interaction between L1 and morpheme, however, was very significant ($df = 48, 1192$; $F = 2.69$; $p < 0.0001$). Thus it appears that L1 does have an effect on the order of acquisition of morphemes. The individual mean percentages for each morpheme by each L1 are displayed in Table 3, with the percentages listed in Krashen’s order (early acquired on the left and late on the right). To better illustrate the variation of the order of morphemes between languages, Table 4, which lists each of the morphemes in order of accuracy level for each language, is included below.

As Table 4 shows, Russian only differs from Krashen’s order in the placement of the possessive –s morpheme (it being further left and therefore less difficult in the order) and Chinese only differs in the placement of the auxiliary verbs (also further left in the order). The auxiliary and third person singular morphemes are both further left for French speakers, while the plural is further right.

Table 3

Mean percent scores by language for each morpheme.

L1	Morpheme								
	ING	PLU	COP	AUX	ART	IRPS	ED	3PS	POSS
Chinese	0.654	0.592	0.585	0.649	0.547	0.542	0.457	0.480	0.496
French	0.888	0.721	0.796	0.876	0.742	0.665	0.470	0.723	0.599
Japanese	0.660	0.561	0.559	0.684	0.514	0.569	0.409	0.573	0.521
Korean	0.713	0.526	0.545	0.680	0.512	0.563	0.379	0.605	0.499
Portuguese	0.695	0.669	0.649	0.619	0.640	0.576	0.404	0.481	0.527
Russian	0.851	0.723	0.724	0.641	0.578	0.576	0.523	0.539	0.622
Spanish	0.762	0.654	0.670	0.660	0.638	0.508	0.365	0.502	0.468

Note. Morphemes are listed in order following Krashen’s “natural order.”

Table 4

Morpheme order by language

L1	Morpheme Order								
	ING	PLU	COP	AUX	ART	IRPS	ED	3PS	POSS
Chinese	ing	aux	plu	cop	art	Irps	poss	3ps	ed
French	ing	aux	cop	art	3ps	Plu	irps	poss	ed
Japanese	aux	Ing	3ps	irps	plu	Cop	poss	art	ed
Korean	ing	Aux	3ps	irps	cop	Plu	art	poss	ed
Portuguese	ing	Plu	cop	art	aux	Irps	poss	3ps	ed
Russian	ing	Cop	plu	aux	poss	Art	irps	3ps	ed
Spanish	ing	Cop	aux	plu	art	Irps	3ps	poss	ed

Note. Each language is ordered from highest mean percent to lowest, going left to right. Grayed out boxes are morphemes that are in a different place than Krashen’s “natural order,” the large bold text representing a move forward and the plain text representing a move backward. Krashen’s order is listed above for reference.

Table 5

Morpheme order by language with associated mean percentage scores

L1	Morpheme Order								
	ING	PLU	COP	AUX	ART	IRPS	ED	3PS	POSS
Chinese	ing 0.654	aux 0.649	plu 0.592	cop 0.585	art 0.547	irps 0.542	poss 0.496	3ps 0.480	ed 0.457
French	ing 0.888	aux 0.876	cop 0.796	art 0.742	3ps 0.723	plu 0.721	Irps 0.665	poss 0.599	ed 0.470
Japanese	aux 0.684	ing 0.660	3ps 0.573	irps 0.569	plu 0.561	cop 0.559	poss 0.521	art 0.514	ed 0.409
Korean	ing 0.713	aux 0.680	3ps 0.605	irps 0.563	cop 0.545	plu 0.526	Art 0.512	poss 0.449	ed 0.379
Portuguese	ing 0.695	plu 0.669	cop 0.649	art 0.640	aux 0.619	irps 0.576	poss 0.527	3ps 0.481	ed 0.404
Russian	ing 0.851	cop 0.724	plu 0.723	aux 0.641	poss 0.622	art 0.578	Irps 0.576	3ps 0.539	ed 0.523
Spanish	ing 0.762	cop 0.670	aux 0.660	plu 0.654	art 0.638	irps 0.508	3ps 0.502	poss 0.468	ed 0.365

Note. Each language is ordered from highest mean percent to lowest, going left to right. Grayed out boxes are morphemes that are in a different place than Krashen's "natural order," the large bold text representing a move forward and the plain text representing a move backward. Krashen's order is listed above for reference.

In every language there are means that are very close to each other (within .01 or 1 percentage point). This poses a problem. If the conclusions were made based on the tables above (namely Table 5), they would be based off unsound statistical practices: ignoring the variance between the means. They would be invalid for one of the very reasons Rosansky (1976) claims that previous research was invalid. In order to truly determine the order of mean percentages,

post-hoc pair-wise t-tests were done to see if the means were significantly different than each other. The best subsets results for Spanish are shown in Table 6.

Table 6

Best subsets table for Spanish

<i>ING</i>	<i>PLU</i>	<i>COP</i>	<i>AUX</i>	<i>ART</i>	<i>IRPS</i>	<i>ED</i>	<i>3PS</i>	<i>POSS</i>
<hr/>								
<u>Morpheme</u>			<u>Subsets</u>					
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>			
ING		0.762						
COP			0.670					
AUX			0.660					
PLU			0.654					
ART			0.638					
IRPST				0.508				
3PS				0.502				
POSS				0.468				
ED						0.365		

Note. The standard error for the mean percentage scores of the Spanish data is 0.02467. Krashen's order is included above the table as a reference. The gray morphemes are those previously thought to have been in a different order.

As can be seen in Table 6, there are groupings of morphemes that are not significantly different than each other. Referring back to the Spanish data, the auxiliary morpheme seemed to be too similar to the plural and the copula to really determine if it was out of order (see Table 4). After looking at which differences between means of morphemes for Spanish were significantly different, the position of the auxiliary morpheme related to the plural and copula cannot be determined. There is no significant difference between the three morphemes (as well as the article morpheme).

While Spanish has no overlapping subsets, it still is difficult to make any conclusions about the order of the morphemes. The other six languages are even more difficult to evaluate since the majority of their subsets overlap. Chinese is similar to Spanish in that the only potential difference in the order proposed earlier was the movement to the left of the auxiliary morpheme. Table 7 shows the best subsets for Chinese, grouping morphemes that are not significantly different from each other. The placement of the auxiliary morpheme in the order for Chinese learners cannot be decided from this data since the auxiliary morpheme is not significantly different from the surrounding five morphemes. All that can be said of Chinese is that the *-ing* and auxiliary morphemes come before the possessive, third person singular, and past tense (*-ed*), and that the plural and copula come before the past tense (*-ed*) in the order.

Table 7

Best subsets table for Chinese

<i>ING</i>	<i>PLU</i>	<i>COP</i>	<i>AUX</i>	<i>ART</i>	<i>IRPS</i>	<i>ED</i>	<i>3PS</i>	<i>POSS</i>
<hr/>								
<u>Morpheme</u>				<u>Subsets</u>				
	<u>A</u>	<u>B</u>	<u>C</u>					
ING	0.654							
AUX	0.649							
PLU	0.592	0.592						
COP	0.585	0.585						
ART	0.547	0.547	0.547					
IRPST	0.542	0.542	0.542					
POSS		0.496	0.496					
3PS		0.480	0.480					
ED			0.457					

Note. The standard error for the Chinese data was 0.05413. Krashen's order is included above the table as a reference. The gray morphemes are those previously thought to have been in a different order.

Portuguese was thought to have no difference in order; however, the data proves to be inconclusive due to the numerous overlapping subsets (see Table 8). What can be said of Portuguese, however, is that the *-ing* morpheme comes before the last four morphemes (IRPST, POSS, 3PS, and ED), the plural and copula before the last three (POSS, 3PS, and ED), the article and auxiliary before the last two (3PS and ED), and the irregular past and the possessive before the past tense (*-ed*).

Table 8

Best subsets table for Portuguese

<i>ING</i>	<i>PLU</i>	<i>COP</i>	<i>AUX</i>	<i>ART</i>	<i>IRPS</i>	<i>ED</i>	<i>3PS</i>	<i>POSS</i>
------------	------------	------------	------------	------------	-------------	-----------	------------	-------------

Morpheme	Subsets				
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>
ING	0.695				
PLU	0.669	0.669			
COP	0.649	0.649			
ART	0.640	0.640	0.640		
AUX	0.619	0.619	0.619		
IRPST		0.576	0.576	0.576	
POSS			0.527	0.527	
3PS				0.481	
ED					0.404

Note. The standard error for the Portuguese data is 0.04953.

Krashen's order is included above the table as a reference. The gray morphemes are those previously thought to have been in a different order.

The Russian data originally showed that only the possessive morpheme was different than in Krashen's order. The large subsets and their overlap, however, make it impossible to determine this (see Table 9). We can conclude, however, that the *-ing* morpheme does indeed

come before the last six morphemes (AUX, POSS, ART, IRPS, 3PS, and ED), and that the copula and plural morphemes come before the last two (3PS and ED).

Table 9

Best subsets table for Russian

<i>ING</i>	<i>PLU</i>	<i>COP</i>	<i>AUX</i>	<i>ART</i>	<i>IRPS</i>	<i>ED</i>	<i>3PS</i>	<i>POSS</i>
------------	------------	------------	------------	------------	-------------	-----------	------------	-------------

Morpheme	Subsets		
	A	B	C
ING	0.851		
COP	0.724	0.724	
PLU	0.723	0.723	
AUX		0.641	0.641
POSS		0.622	0.622
ART		0.578	0.578
IRPST		0.576	0.576
3PS			0.539
ED			0.523

Note. The standard error for the Russian data is 0.0759. Krashen's order is included above the table as a reference. The gray morphemes are those previously thought to have been in a different order.

The French data was originally thought to differ in order with respect to the auxiliary, third person singular, and plural morphemes. However, the only thing that can be said of these three morphemes is that the auxiliary comes before the irregular past, possessive, and *-ed* morphemes, and that the third person singular and plural morphemes come before the *-ed* morpheme (see Table 10).

Table 10

Best subsets for French data

<i>ING</i>	<i>PLU</i>	<i>COP</i>	<i>AUX</i>	<i>ART</i>	<i>IRPS</i>	<i>ED</i>	<i>3PS</i>	<i>POSS</i>
<hr/>								
<u>Morpheme</u>		<u>Subsets</u>						
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>			
	ING	0.888						
	AUX	0.876						
	COP	0.796	0.796					
	ART	0.742	0.742	0.742				
	3PS	0.723	0.723	0.723				
	PLU	0.721	0.721	0.721				
	IRPST		0.665	0.665				
	POSS			0.599	0.599			
	ED				0.470			

Note. The standard error for the French data is 0.08338.
 Krashen's order is included above the table as a reference.
 The gray morphemes are those previously thought to have
 been in a different order.

Table 11

Best subsets table for Japanese

<i>ING</i>	<i>PLU</i>	<i>COP</i>	<i>AUX</i>	<i>ART</i>	<i>IRPS</i>	<i>ED</i>	<i>3PS</i>	<i>POSS</i>
<hr/>								
<u>Morpheme</u>		<u>Subsets</u>						
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>			
	AUX	0.684						
	ING	0.660	0.660					
	3PS		0.573	0.573				
	IRPS		0.569	0.569				
	PLU		0.561	0.561				
	COP		0.559	0.559				
	POSS			0.521				
	ART			0.514	0.514			
	ED				0.409			

Note. The standard error for the Japanese data is 0.04707.
 Krashen's order is included above the table as a reference.
 The gray morphemes are those previously thought to have
 been in a different order.

The Japanese data shows that while the auxiliary and the *-ing* morphemes are not significantly different from each other; the auxiliary morpheme does come before every other morpheme. This is a significant difference from the Krashen order. However, the previous notion that the third person singular, irregular past, and plural morphemes fall in a different place than in Krashen's order is not able to be determined (see Table 11).

Similar to the Japanese data, the Korean data still shows that the auxiliary morpheme has indeed moved earlier in the order. It also seems that the third person singular (3PS) morpheme has moved higher up in the order for Korean as well. However, while the beginning of the order for Korean is made up of small subsets, the rest of the order (excluding the *-ed* morpheme) consists of two very large groups which overlap. This makes it difficult to say whether the third person singular, as well as the irregular past and the plural morphemes have a different place in the order (see Table 12).

Table 12

Best subsets table for Korean

<i>ING</i>	<i>PLU</i>	<i>COP</i>	<i>AUX</i>	<i>ART</i>	<i>IRPS</i>	<i>ED</i>	<i>3PS</i>	<i>POSS</i>
<hr/>								
<u>Morpheme</u>			<u>Subsets</u>					
		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>		
	ING	0.713						
	AUX	0.680	0.680					
	3PS		0.605	0.605				
	IRPS			0.563	0.563			
	COP			0.545	0.545			
	PLU			0.526	0.526			
	ART				0.512			
	POSS				0.499			
	ED						0.4379	

Note. The standard error for the Korean data is 0.03825. Krashen's order is included above the table as a reference. The gray morphemes are those previously thought to have been in a different order.

Based on the ANOVA results, then, it can be said that there is a significant interaction between native language of the learner and morpheme, suggesting that there is an overall tendency for native speakers of different languages to acquire morphemes in different orders. However, it is difficult to determine precisely how order of acquisition varies by language at this time. One thing that we can say is that the Japanese and Korean data show the auxiliary morpheme further left, or acquired earlier by L2 learners of English. This is consistent with previous research that shows that Japanese and Korean have similar orders, and Ellis notes that this similarity can be attributed to the fact that they are morphosyntactically similar languages (Ellis 2006, Weitze et al. 2011, Luk & Shirai 2009). Unfortunately, not much can be said of other languages as to a specific order of acquisition of morphemes. The non-significance of the differences between means for each language makes it impossible to tell whether the morphemes are in a different order or in the same order based on the mixed linear model and the post-hoc analyses reported here.

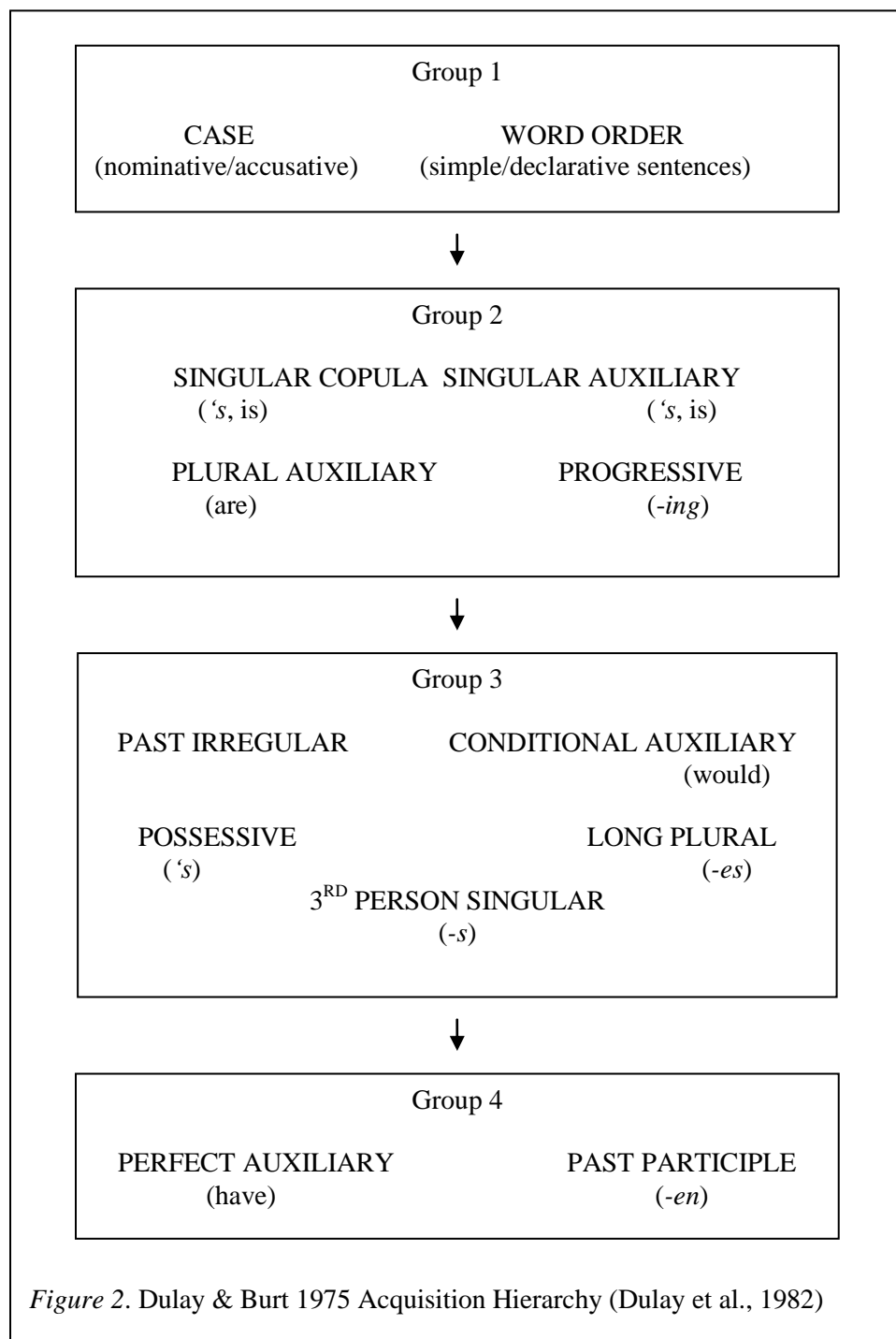
The roadblock that was faced in this analysis (lack of significant differences in means) is worth discussion. This is an issue Rosansky (1976) points out in her research, claiming that variance is an issue that previous researchers ignored in their analysis. She even goes so far as to calculate variance for some of the previous studies (Bailey et al.'s and the de Villiers' work). She found that many of the means had very large variance, which if considered would affect their rank orders. Rosansky's discussion calls into question the methodology of previous research specifically based on the statistical methods used. For example, the research done with the Bilingual Syntax Measure (BSM) did not take into account whether the differences between their group means were significant or not. They simply ordered the means from highest to lowest and then assigned them a rank based on these means (Dulay & Burt, 1973; Dulay & Burt, 1974;

Bailey, Madden, & Krashen, 1974; Freeman, 1975; Krashen, 1977). This was also done by de Villiers and de Villiers (1973) in their research with L1 acquisition, as well as Krashen (1976) and Fathman (1975) with the SLOPE test for L2 learners.

Most researchers used a Spearman rank correlation when comparing their order to other orders, however, their order was determined without considering whether the differences in means between the morphemes was significant or not. While it is still notable that these previous studies show high rank correlations with each other, it is impossible to make sound conclusions based on data that was ranked using numbers that were potentially not significantly different from each other.

Further investigation of this issue showed that later on Dulay and Burt introduced a new rank with groups (called an acquisition hierarchy) using the Ordering-Theoretic Method (Bart & Krus 1973; see Dulay et al., 1982 for step-by-step explanation). This method allowed them to group morphemes instead of simply having a linear, item-by-item order and did not depend on mean scores. They claim that this method is a way of overcoming the issue of close rank order scores (Dulay et al., 1982). Their grouped rank order is shown in Figure 2.

In order to see if this new method would help overcome the issue of close (and not significantly different) mean scores, we analyzed the data as a whole group and within each language group to see if it would give more definitive orders. We followed Dulay and Burt's explanation of the Ordering-Theoretic Method, provided in *Language Two* (Dulay et al., 1982), and the results were used to create tables displaying the acquisition hierarchies observed. The Ordering-Theoretic Method appears to be a response to criticisms such as Rosansky's (1976), and better accounts for individual variation and has some similarities to implicational scaling (Scholfield, 1991). Figure 3 shows the acquisition hierarchies determined by the Ordering-



Theoretic Method for the data from our elicited imitation test. In this analysis the *-ed* morpheme was excluded due to having insufficient instances to perform the analysis.

As Figure 3 shows, the morphological order of acquisition for all of the languages together is similar in some ways to Krashen's. While the *-ing* and the third person singular morphemes are in the first and last groups, respectively, the other morphemes are all included in one single group in the middle. This seems to be the case with most of the languages and is similar to the problem that we see in the best subsets from the previous analysis. Most of the languages have larger groups of morphemes than what Krashen found. One interesting trend among all the languages is that the *-ing* morpheme is first in the hierarchy for each and every language and is always found in its own group. The only exception to this is Spanish, where we see an overlap with the plural morpheme appearing in the first two groups.

While this analysis does not allow us to tell how the orders differ between languages, there is one exception. The French language group is the only group that appears to definitely have a different order than that proposed by Krashen based on the Ordering-Theoretic Method. The order begins with *-ing* and ends with third person singular; however, the copula and auxiliary are much further right while the possessive is much further left. This would lead us to believe that the possessive is earlier acquired while the copula and auxiliaries are later acquired for French speakers learning English. Also of note is that this analysis does not show that the auxiliary is earlier acquired for Japanese and Korean speakers, as the previous analysis did show. Since the Ordering-Theoretic Method is grouping large bands together in the middle, it is possible that a more fine-grained analysis might separate these and other morphemes out. At any rate, the use of the Ordering-Theoretic Method with our data at least places the auxiliary in a location more similar to Krashen's order.

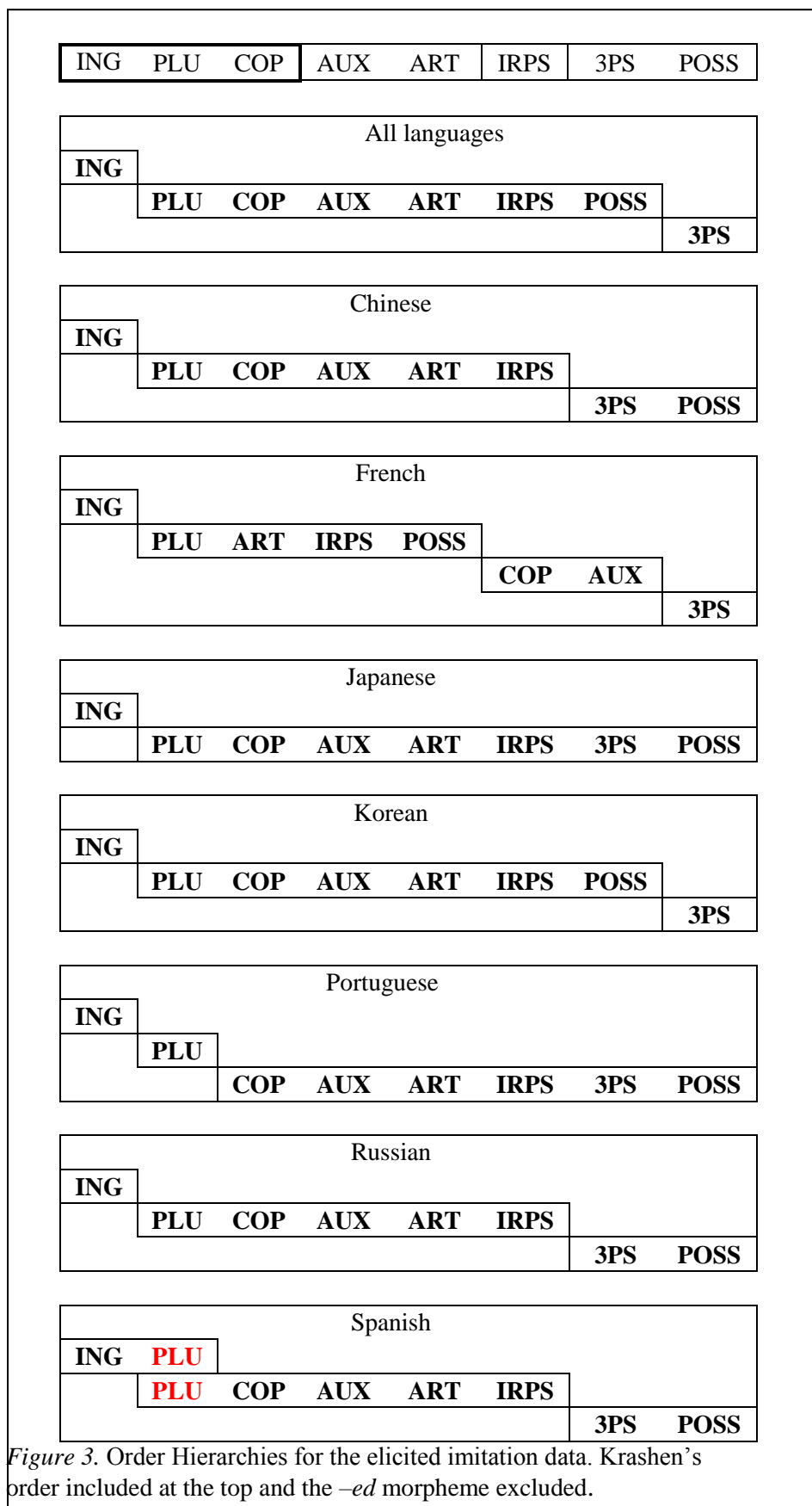


Figure 3. Order Hierarchies for the elicited imitation data. Krashen's order included at the top and the *-ed* morpheme excluded.

Since using the ANOVA and the Ordering-Theoretic Method both resulted in large subsets or groupings for our data, it is hard to say whether each language's order of acquisition of morphemes differs from Krashen's order as well as how the languages' orders differ. It would be beneficial to replicate Krashen's method of analysis and see if we can determine smaller subsets similar to his; however, Krashen is unclear in his explanation of his methodology (Krashen, 1977). It is possible that he followed the same method of analysis as Dulay and Burt (using Ordering-Theoretic Method), however, his explanation of how he ranked the morphemes is vague and he did not explain specifically how he analyzed the data. Despite our efforts to find orders of acquisition of morphemes for individual language groups, it appears that our methodologies are unable to produce adequate results to allow for specific orderings of morphemes. It also appears that previous research has potential methodological issues which could significantly affect their results as well as others' interpretations of those results.

Chapter 5: Conclusion

Findings

The research questions presented at the beginning of this thesis were as follows:

1. Will an elicited imitation test targeting the nine morphemes listed in Krashen's "natural order" show a significant influence of native languages on mean morpheme scores of participants?
2. If native language has a significant influence, how will the morpheme order be affected?

In addressing the first question, this research shows that the elicited imitation test administered does show a significant influence of native language on mean morpheme scores. In other words, a subject's native language, or L1, does have an effect on the order of morphemes as tested in this elicited imitation test: there is a significant interaction between L1 and morpheme. Although previous research on morphological order of acquisition oftentimes claimed no affect of L1 on the order, we have found otherwise. Our findings support the results of both Luk and Shirai's and Weitze et al.'s findings. These results lead us to believe that it is possible that L1 transfer is playing a much more significant role in second language acquisition than was previously thought and that SLA students process input through the filter of their native language (Luk and Shirai, 2009).

The second question, how is the order affected for each L1, is harder to answer. Based on the mixed linear model ANOVA and post-hoc analyses, the only conclusion that can be drawn is that it appears Korean and Japanese learners produce the auxiliary accurately earlier than expected. This is interesting because Luk and Shirai's (2009) results show that the auxiliary in both Japanese and Korean learner data does not appear to move places in the "natural order." Also, the Ordering-Theoretic Method does not show a similar pattern for Japanese and Korean,

while it does show changes in the order of acquisition for French. These inconsistencies are hard to explain, and further research would need to be done to better determine how the order of acquisition of morphemes changes for each individual language.

Krashen and others have regularly asserted that there is no difference in order of acquisition across languages. The data in this study suggested there are differences. There are two possible explanations for the contradictory conclusions. First, in this study there were not always ten or more instances of each morpheme as Krashen suggested. Second, the instrument used to collect data (elicited imitation) was different from Krashen's and Krashen's methodology wasn't explained well enough to replicate. The latter leads one to ask whether an elicited imitation test is lacking in its ability to show acquisition and whether previous methodologies used are capable of demonstrating an order of acquisition of morphemes as well. While leaders in the field of SLA (e.g., Ellis, 2008, and Erlam, 2006) have used elicited imitation to measure "implicit knowledge" of language, they have not, to my knowledge, used these tools to measure order of acquisition. Only Weitze and her colleagues (2011) have done so, whereas tools like the BSM and SLOPE tests have been used multiple times to measure order of acquisition.

Limitations

In this thesis, the ANOVA results did not suggest a very definitive order of acquisition of morphemes. While this is very disappointing, it is important to consider. Contrary to most of the previous studies, this analysis took variance into consideration rather than just ranking means by accuracy level. Failure to consider variance is a problem that Rosansky addressed in her paper that could greatly influence and call into question research on morpheme acquisition order in the field of second language acquisition. After noticing large variance in her own data, Rosansky looked at previous studies and found that "many of the means exhibit large variance, with

standard deviations occasionally approaching the value of the mean itself” (Rosansky, 1976, p. 418).

After trying a different method (The Ordering-Theoretic Method, an approach apparently taken by leaders in acquisition order research in response to the need to take individual variation into account), we were still unable to get very definitive results, or at least results similar to those of Krashen and other previous work. It is possible that the problem may be related to the fact that some of the morphemes lacked at least ten instances in the test. Another possibility is that the elicited imitation test is not measuring the same thing that previous tests (such as the BSM and SLOPE tests) measure, and thus will not give similar results. It is possible that elicited imitation is not able to distinguish specific language skills such as correctly using specific morphemes and therefore cannot give a clear picture as to whether a morpheme is acquired or not. It is difficult to say, however, since Dulay and Burt’s use of the Ordering-Theoretic Model focuses on different morphemes and Krashen’s work does not explain well enough his methodology in determining his hierarchy, or “natural order.”

Some other limitations related to the elicited imitation test may be contributing factors as well. Types of errors were not examined in the data collected which could have a significant effect on the results. For example, sentences were not controlled for lexical frequency. This could be a confounding variable that may have an impact on the results. If certain low frequency words were used that included some of the targeted morphemes, it could be possible that the student had not acquired the vocabulary item, instead of the morpheme embedded in the word. It is also possible that zero scores were the result of omission of whole sentences, or students not attempting to repeat an item, which they may have been able to successfully repeat. Because of

the nature of the test, it would be beneficial to look at individual variation in the data to see what types of errors were being made.

Another setback in answering these questions is that the regular past tense (*-ed*) morpheme was always found at the end of the order, and in a few languages was found to be significantly lower than all other morphemes. This could be due to the fact that there were only four instances of the *-ed* morpheme, due to errors in creating the sentences of the test that were overlooked. Although we have insufficient data for the past tense (*-ed*) morpheme, it is notable that even with only 8 morphemes we see potential variation in morpheme order for each language.

Suggestions for Future Work

In the future, it would be very beneficial to see how the regular past tense morpheme is affected by the L1 of the subject, as well as to look for significant differences between each of the nine morphemes for each L1. In order to ensure the presence of the *-ed* morpheme, sentences would need to be created that would allow a subject to demonstrate their ability to produce this morpheme (in addition to the sentences with the other eight morphemes) so that all the morphemes of the “natural order” could be compared.

Also, subjects of various L1s would need to take the test, with each L1 being represented by enough subjects to allow for analysis of their test results. This test could be administered at more than one English learning facility, increasing the number of students taking the test as well as the number of students representing each L1. As is common in many English learning programs in the United States, there is a higher quantity of Spanish-speaking and Korean-speaking students at the English Language Center and it is often hard to find a big enough representation of many other native languages to analyze. In spite of this obstacle, it is important

to find participants of various L1s to further investigate the influence of L1 on the order of acquisition of morphemes.

It also may be beneficial to create at least ten test items for each morpheme instead of six. This would meet Krashen's requirement of having ten obligatory occurrences of each morpheme and make the studies more comparable. While the test used in this thesis meets Krashen's requirement of being an unmonitored task, it does not meet the previously mentioned requirement that all the morphemes occur at least ten times. Also, the morphemes are not all equally represented, which is something that could be improved upon in the future.

The most important improvement that can be made to this work would be to resolve the issue of large groupings of morphemes. If research can be done that resulted in significant differences between each of the nine morphemes for each language represented, or at least smaller subsets, the influence of L1 could be better examined. It would also be beneficial to know exactly how Krashen analyzed his data so that a comparable analysis could be done. This would help to know whether elicited imitation is able to demonstrate acquisition of morphemes as well as help in future analyses on the order of acquisition of morphemes and the influence of native language.

Both analysis of mean percentage scores and the Ordering-Theoretic Method do not appear to be effective in determining the order of acquisition of morphemes for different languages using our test scores. Since previous research using mean scores appears to ignore variance, Dulay and Burt are potentially the only example of using the Ordering-Theoretic Method, and Krashen does not clearly explain his methodology, and further research would need to be done to determine the validity of the results and the subsequent interpretations of the results from previous work.

It is possible that a cross-sectional study may be the weakest link. It appears that the studies that analyze test results (and are not longitudinal studies) rank their morphemes without considering if there is a significant difference between them and there appears to be but one study that reports utilizing the Ordering-Theoretic Method. However, Brown (1973) and Hakuta (1976) are able to avoid this problem by doing longitudinal case studies where they tracked acquisition over a period of time. A longitudinal study of L2 order of acquisition of morphemes similar to that of Brown's L1 study and Hakuta's L2 study of a Japanese child would be ideal and would be especially beneficial if various native languages were represented.

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