CHALLENGES IN THE SECOND LANGUAGE ACQUISITION OF DERIVATIONAL MORPHOLOGY: FROM THEORY TO PRACTICE

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ABSTRACT: The three studies in this dissertation bring together quantitative and qualitative methods in order to understand L2 learning of derivational morphology. By using measures of derivational knowledge developed from L1 research, Study 1 provides a foundation for in-class research by assessing what L2 learners know and do not know about derivational morphology in comparison to adult native English speakers and how factors such as L1 background and L2 proficiency shape L2 knowledge of derivational morphology. Results show that L2 learners have poor knowledge of derivational morphology regardless of L1 background or L2 proficiency.

Study 2 follows from these results and investigates the effects of input-processing versus pushed output instruction on the development of productive and receptive morphological abilities. The results of this study support the hypothesis that instruction is beneficial for L2 derivational learning; however, results do not support the hypothesis that pushed output instruction leads to better immediate and long-term learning than the input-processing condition. In fact, results suggest that equivalent learning occurs between the two conditions across all measures of derivational knowledge.

Finally, Study 3 was a qualitative investigation of learners' attitudes, actions, and motivations towards the learning of derivational morphology over the course of Study 2. Using activity theory, this study describes how students' initial actions, which were not aligned with the goal of morphological learning, were transformed over the course of the study as students came

to realize the importance of derivational morphology for their success in English. The results of this study are also important because they offer an alternative explanation for why the hypotheses in Study 2 regarding the effectiveness of output were not supported. Specifically, many participants in this study became aware of derivational morphology for the first time as a result of this study; therefore, a "novelty effect" (cf. Tulving & Kroll, 1995) may have overridden any potential benefit of the output treatment over the input treatment.

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PREFACE

This dissertation bears my name alone and is the product of three years of Ph.D. studies; however, many people have played integral roles in the completion of the work presented herein and I would like to take time to thank them for their support. Above all, I would like to thank my dissertation advisor, Professor Alan Juffs, for his unwavering support and encouragement as I worked through the Ph.D. program and completed this dissertation. Despite his busy schedule as a professor in the linguistics department and as the Director of the University of Pittsburgh's English Language Institute (and many other commitments), Alan always found time to meet with me individually, to review my work, and to answer my questions. His thoughtful comments have deepened my understanding of the connections between theoretical linguistics and applied classroom research and have been a guiding force in my development as a scholar. I greatly appreciate his help and encouragement.

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in general will go a long way towards improving the materials that I used in my research for further classroom use.

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1.0 INTRODUCTION

The acquisition of second language morphology is of central concern to contemporary theories of second language (L2) acquisition. The domain of morphology is critical to these theories because learners have very special problems acquiring morphology. In particular, two recurrent questions in L2 research have been (1) What are the problems that underlie L2 morphology acquisition? and (2) How do these mechanisms compare and contrast with mechanisms used in the acquisition of L1 morphosyntax? To date, clear answers to these questions have not been forthcoming, and researchers have used evidence from L2 production data and psycholinguistic experiments to support a number of positions regarding how L2 learners access UG (Beck, 1998; Clahsen & Muysken, 1986; Clahsen et al., 2010; Eubank, 1994, 1996; Franceschina, 2001; Goad, White, & Steele, 2003; Gor, 2010; Hawkins & Chan, 1997; Haznedar & Schwartz, 1997; Lardiere, 1998a,b; Montrul, Foote, and Perpiñán, 2008; Prévost & White, 2000; Schwartz & Sprouse, 1996; Spinner & Juffs, 2008; Vainikka & Young-Scholten, 1994; White, 2003; White et al., 2004) and whether L2 processing is explained via dual-mechanism (Bowden, Gelfand, Sanz, & Ullman, 2010; Clahsen, Felser, Neubauer, Sato, & Silva, 2010; Clahsen & Neubauer, 2008; Silva & Clahsen, 2008), single-mechanism (N. Ellis, 2005; McClelland & Patterson, 2002) or "hybrid" (Gor & Cook, 2010) accounts of morphological processing.

These studies have been crucial to the development of theories regarding how second language learners acquire morphosyntax in an L2; nonetheless, the emphasis on *theoretical* models of L2 grammatical processing can go only so far in terms of *practical* classroom applications. That is, current trends in theoretical SLA research on grammatical processing are often disassociated from the practice of language teaching to the extent that language teaching professionals have little to gain from theoretical linguistics and may be left wondering how contemporary research findings might actually be applied to real classroom settings. As illustrated in Figure 1, when teachers are engaged in the practice of language teaching, issues related to whether or not L2 learners use single or dual-mechanisms during morphological processing give way to more immediate concerns such as (1) Should I bother to teach morphology and, if so, (2) How should I teach morphology? These are important questions for *applied* theories of L2 acquisition and there is a dire need for research that bridges theory and practice when it comes to morphological processing.

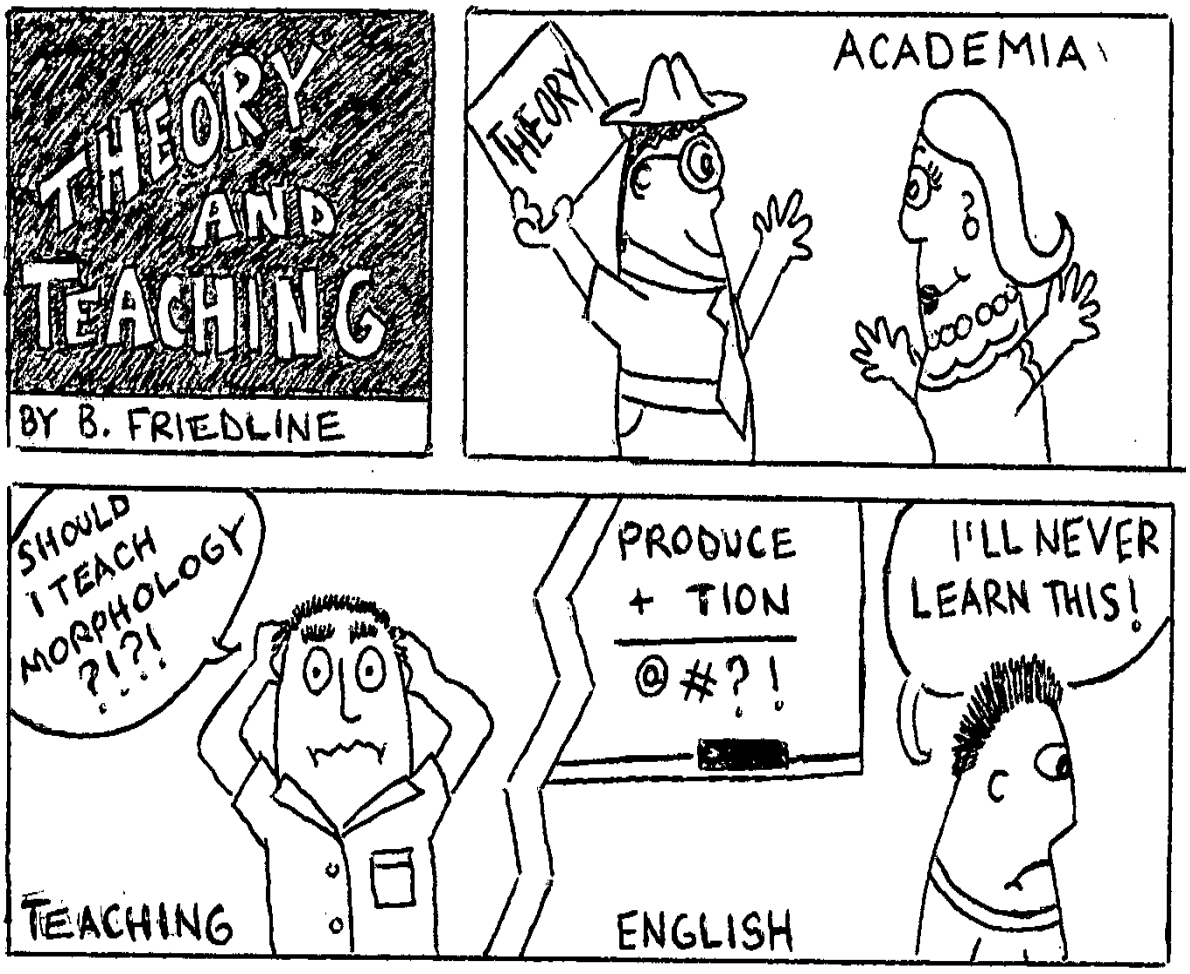

Figure 1. Research and Practice Cartoon

This is not to say that no previous research has bridged the gap between theory and practice in the domain of morphological processing. For instance, VanPatten's input-processing theory does much to link findings on morphological processing from theoretical psycholinguistics to practical classroom applications (VanPatten, 1990, 1996, 2002; VanPatten & Cadierno, 1993). DeKeyser's (1995, 1997) work on explicit and implicit grammar learning also goes to great lengths to connect research and practice in the domain of morphological learning. Within the larger picture of morphological learning, however, these studies are limited in that they tend to focus almost exclusively on the L2 acquisition of inflectional morphology

and other syntactic phenomena despite the fact that derivational morphology may also be a very real problem for L2 learners (Friedline & Juffs, 2010; Lardiere, 2006; Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002).

In the context of this research background, the three studies in this dissertation serve to further our understanding of L2 morphological knowledge in connection with classroom morphological teaching. The first study directly investigates what L2 learners know about derived words by using a series of tasks that have been adapted from research on L1 derivation (e.g., Carlisle & Fleming, 2003; Tyler & Nagy, 1989). The second study follows from the results of the first study and includes instructional interventions based on input-processing theory (Cadierno, 1995; VanPatten, 1996, 2002; VanPatten and Cadierno, 1993), and pushed output theory (Swain, 1985, 1998, 1999; Swain & Lapkin, 1995, 2000, 2003). This quasi-experimental study aims to discover how instruction influences the acquisition of derivational morphology and whether one type of instruction might be more effective than another type. Finally, the third study draws from Activity Theory (Lantolf & Thorne, 2006; Leont'ev, 1981; Thorne, 2005) and attempts to understand how students' goals, backgrounds, and motivations interact with the intended goals and motivations of the researcher as well as the tasks themselves during a mediated teaching experiment.

The studies reported in this dissertation target adult English as a Second Language (ESL) learners who are studying at intensive English programs in the United States or other English-speaking countries. The proficiency of these learners ranges from intermediate (MTELP: 45-79; TOEFL iBT: 54-93) to high (MTELP: 80-100; TOEFL iBT: 94-120). These ESL learners come from a variety of different L1 backgrounds, but most share the common goal of wanting to attend institutions of higher education in English speaking countries. All learners in this study have

studied English for a number of years in their home countries prior to enrolling in their current intensive English program. These learners were selected because previous research has revealed that morphological knowledge and production are often areas of weakness for ESL learners even at very advanced stages of language development.

This dissertation is organized as follows. First, chapter 2 presents background information on the nature of inflection and derivation and defines what it means to have *derivational knowledge.* Chapter 3 reviews work on L1 and L2 morphological learning from linguistics and psycholinguistics. Chapter 4 provides an overview of research on grammar instruction. Chapter 5 describes activity theory and its relevance for studying L2 morphological learning. Chapter 6 describes the motivation for the current studies and the importance of connecting theory and practice in the domain of morphological learning. Chapter 7 (Study 1), chapter 8 (Study 2), and chapter 9 (Study 3) discuss the individual studies that were conducted as part of this dissertation. Chapter 10 provides recommendations for teaching derivational morphology within an ESL context, as well as directions for future research.

2.0 DERIVATIONAL MORPHOLOGY

2.1 DERIVATION VS. INFLECTION

In English, derived words are typically formed by adding an affix to the beginning (prefix) or the end (suffix) of a base. For instance, if the derivational affix *-able* is added to the base *desire* (verb, meaning: to want), the derived word *desirable* (adjective, meaning: wanted) is formed. The word *desirable* can be further modified by adding the prefix *-un* to derive *undesirable* (adjective, meaning: not wanted). The reader should note that change in grammatical category (e.g., verb → adjective) and change in meaning (e.g., wanted to not wanted) are often used as "tests" for whether or not a morpheme is inflectional or derivational. In the example provided above, both the prefix *-un* and the suffix *-able* change the meaning of the base word. Additionally, the suffix *-able* changes the grammatical class of the base from a verb to an adjective. In contrast, inflectional morphemes typically change neither the meaning nor the grammatical category of the base word. For instance, the plural morpheme *-s* does not change the grammatical category of the base *boy* (noun, meaning: a male child) during affixation, nor does it affect the grammatical category of the noun. The noun *boys* retains the meaning 'male child,' but now becomes plural 'male children.'

The view that inflection and derivation are mutually exclusive grammatical categories is an oversimplification of the complexity involved in distinguishing inflections from derivations.

In more formal terms, Stump (2001) distinguishes inflections from derivations by using the following five criteria:

(1) change in lexical meaning or part of speech

(2) syntactic determination

(3) productivity

(4) semantic regularity

(5) closure

The first criterion (change in lexical meaning or part of speech) pertains to the observation that the addition of a derivational affix typically changes the meaning or the part of speech of a stem, whereas the addition of an inflectional affix to a stem does not. If we take the base word *dark* (adjective) and add the derivational affix *-ness* to derive *darkness* (noun), the derived word is no longer an adjective. In addition, the meaning of the derived word, although still related to the core meaning of the base *dark* 'without light', changes slightly to 'the state of being without light.'

Regarding the second criterion of syntactic determination, Stump (2001) explains that, "a lexeme's syntactic context may require that it be realized by a particular word in its paradigm, but never requires that the lexeme itself belong to a particular class of derivatives" (p. 15). In other words, there are certain lexemes whose properties (at spell-out) are determined by the syntactic frame in which the lexeme occurs. For instance, when the lexeme *drive* is inserted into the syntactic frame in (1), it takes on subject-verb agreement properties (i.e., 3rd person singular -*s*) and is realized as *drives.* The second portion of Stump's (2001) quote refers to the fact that the syntactic frame does not mandate that a particular class of derivates is used to fill the syntactic slot. In (2), for instance, a speaker can choose to use the nominalization *darkness* or the noun

woman and is in no way obligated to use derivational morphology. The criterion of syntactic determination is used to separate inflectional morphology from derivational morphology in that inflectional morphology is typically associated with syntax while derivational morphology is not (see Anderson, 1992).

(1) The man *drives* the car to work every day.

(2) The man loves the *darkness/woman.*

The third criterion claims that inflection is generally more productive than derivation. For instance the inflectional morpheme *-s* is very productive and can be added to almost any singular count noun to form the plural of the noun as in *boats*, *cigarettes*, and *boxes.* In contrast, Linguists classify derivational rules as idiosyncratic (Halle, 1973) or semi-productive (Jackendoff, 2002) since they do not apply equally to all words from the same grammatical category. For instance, Stump (2001) notes that the morpheme *-en* can be added to the adjectives *hard* and *deaf* to form *harden* and *deafen*, but not to the adjectives *cold* and *brave* to form **colden* and **braven.* There is nothing inherently wrong, per say, with the words **colden* and **braven* from the standpoint of phonology or semantics in that native speakers could undoubtedly pronounce **colden* and come up with a meaning such as 'to make cold' despite the fact that they would never generate **colden* during spontaneous speech production. In other words, although derivational rules (e.g., add *-en)* could potentially apply to all members of a word class (e.g., adjectives), there are constraints on word formation processes that limit whether or not a derived word actually occurs within the language (Halle, 1973; Jackendoff, 2002).

The fourth criterion relates to differences in semantic regularity between inflections and derivations. The inflectional plural morpheme *-s* always has the same interpretation whether it appears in the word *boats*, *cigarettes,* or *boxes*. In all of these cases, the plural *-s* means more

than one boat, cigarette, or box. Conversely, derivational morphemes are not always semantically regular. Stump (2001) describes how the derivational affix *-ize* has a variable meaning based on the stem to which it attaches; *winterize* means 'prepare (something) for winter, *hospitalize* means 'put (someone) in the hospital', and *vaporize* means '(cause to) become vapor (p. 17).'

Finally, the fifth criterion (i.e., closure) pertains to the observation that inflection tends to close words to further derivation, but derivation does not (Stump, 2001, p. 18). For example, the affix *-ness* can be added after the affix *-ful* in the word *truthfulness;* however, the affix *-ful* cannot be added to the plural *truths* to form **truthsful.*

Beyond these five criteria, empirical studies also suggest that inflections and derivations are processed differently within the computational system. Evidence from studies on patients with severe brain damage, for instance, reveals that morphological impairment among aphasics is largely restricted to inflectional rather than derivational morphological processing (Badecker & Caramazza, 1989; Miceli & Caramazza, 1988). The rate of acquisition for inflection and derivation is also cited as evidence for processing differences. For example, Green et al. (2003) found that knowledge of inflection was generally well developed within 3rd and 4th grade writing, but derivation was much better developed among the 4th grade group (see also Carlisle & Fleming, 2003).

However, not all researchers agree with the assessment that inflection and derivation are qualitatively different (See Beard, 2001 for discussion). From the standpoint of theoretical linguistics, Distributed Morphology (DM) views inflections and derivations as the result of the same formal syntactic operations (cf. Embick & Noyer, 2001, 2009; Halle & Marantz, 1994; Harley & Noyer, 1999; Marantz, 1997, 2002; Noyer, 2010). In addition to theoretical accounts such as DM, data from cross linguistic studies as well as empirical psycholinguistic experiments

supports this position. Halle (1973) reports that the productivity criteria (i.e., inflections are productive) is violated in approximately 100 Russian verbs that have defective inflectional paradigms (see Halle, 1973). Stump (2001) also shows that inflectional processes in one language may be derivational in other language (see Stump, 2001: 19 for an example from Breton). Finally, in terms of experimental work on the processing of inflectional and derivational morphology, Raveh and Reuckl (2000) report results from a series of priming studies that show that inflected and derived words both serve as effective primes when factors such as orthographic similarity were controlled. They assert that these similarities evince a similar mode of processing across inflection and derivation.[1]

2.2 CHARACTERISTICS OF DERIVATIONAL AFFIXES

2.2.1 Neutral vs. Non-neutral affixes

Morphologists refer to two subtypes of derivational morphemes in English based on their phonological behavior when affixed to base words: neutral and non-neutral affixes. Neutral affixes are characterized by the fact that they do not change the phonological shape of the base to which they attach. The derivational affix *–ness* is just one example of a neutral affix; when this affix combines with a base word *dark* as in example (3), it does not influence the segmental or suprasegmental characteristics of the base. Conversely, non-neutral affixes are those that trigger

[1] Importantly, these results show only that inflections and derivations may be processed in the same way, and may not reflect qualitative differences between inflections and derivations.

phonological processes or changes. For instance, in example (4), *-tion* is a non-neutral affix in that it significantly alters the phonological form of the base word to which it attaches. In example (4) the alveolar stop consonant /d/ is transformed into a post-alveolar fricative /ʒ/ with the addition of the *–tion* suffix. In a similar manner, non-neutral affixes can also affect stress when they are combined with a base word. In example (5), the addition of the affix *–ity* changes the primary stress from the first syllable in *popular* to the third syllable in *popularity* as well as results in a modification to the syllabic consonant /ɚ/. This distinction between neutral and non-neutral affixes is introduced here because previous studies on the first language acquisition of English suggest that non-neutral suffixes may present more difficulties than neutral suffixes when children are acquiring English as a first language (Carlisle, Stone, and Katz, 2001; Tyler & Nagy, 1989). Hence, this distinction may be relevant for the study of how second language learners acquire derivational morphology.

Example (3):	ˈdɑɹk [dark]	+	nɛs [ness]	=	ˈdɑɹknɛs [darkness]
Example (4):	ɪˈɹoʊd [erode]	+	ʃɪn [tion/sion]	=	ɪˈɹoʊʒɪn [erosion]
Example (5):	ˈpɑpjʊlɚ [popular]	+	ɪɾi [ity]	=	pɑpjʊˈlæɪɾi [popularity]

2.2.2 Constraints on affix productivity

A second characteristic of derivational morphemes is that constraints on word formation may limit the productivity of an affix (Chomsky, 1995; Jackendoff, 2002; Gonnerman, Seidenberg, & Andersen, 2007). Going back to the first example *desirable*, the affix *-able* appears to be very productive in that it can be added to many base verbs to derive novel adjectives such as

acceptable, fixable, and *comfortable.* Nonetheless, this simplistic analysis becomes problematic with words such as *arrive, sit,* and *sleep* in that ungrammaticality results from the affixation of -*able* to the verbal base as in examples (6-8) shown below.

(6) arrive (verb) + able → *arrivable

(7) sit (verb) + able → *sitable

(8) sleep (verb) + able → * sleepable

Despite the fact that -*able* is a very productive morphological process in English, -*able* does not *typically* attach to intransitive verbs to derive adjectives. It is important to point out here that these constraints are 'leaky' in the sense that one could easily come up with contexts in which intransitive verbs appear to take the suffix -*able* as in the example provided below:

(9) He laughed.

(10) *He laughed the man.

(11) The situation was laughable.

In Example (11), *laugh* is intransitive, yet its meaning in the context of this sentence is perfectly grammatical, which is contrary to what we would predict. However, the derived word *laughable* is somewhat different from the previous derived words such as *desirable* and *comfortable* in that it lacks the core meaning of words derived with the affix -*able.* Words with the suffix -*able* tend to mean something to the effect of "capable of or having the quality of". Thus, the meaning of *comfortable* in the phrase *the comfortable chair* is to "have the quality of comfort." In contrast, *laughable* in example (11) above means "ridiculous," not "having the quality of laugh." Hence, there is a clear meaning difference between words generated via a productive regular rule (e.g.,

comfortable) versus words such as *laughable* that have a very specific meaning.[2] Hulstijn (2005) reminds us that

> Natural languages are characterized by the absence of one-to-one relationships between form and meaning, from the morpheme level all the way up to the text level. Both the lexicon and the grammar of natural language contain, on the one hand, too many irregular form-meaning phenomena to allow a comprehensive characterization by means of rules operating on categories and, on the other hand, too many regular form-meaning phenomena to represent them simply as a large unstructured set of items (p. 134).

Both the regular and the irregular processes have their place in SLA research; yet, L2 learners stand to gain the most from instruction that centers on regular derivational processes since the alternative is memorizing each word as an individual lexical item.

2.3 DEFINING MORPHOLOGICAL KNOWLEDGE

The term *morphological knowledge* implies that a speaker knows something about the form, meaning, and usage of a set of inflectional (e.g., case, tense, and agreement) and/or derivational (e.g., *-ness* is a nominalizing suffix in English) affixes in a given language. For instance, a speaker may represent the derivational suffix *–ness* in the following format within the lexicon:

(12) Lexical entry for *–ness*

[2] The differences between the processes here could be classified into productive morphology which encompasses the majority of words that take the suffix *-able* and idioms which overlap in form only but have very specific contexts of meaning and usage (Jackendoff, 2002).

Form: (phonological) /nɛs/ (orthographic) [ness]

Meaning: the state of X

Usage: (constraints) attaches to adjectival bases to form nouns; can be attached after the derivational suffixes *–ful* and *–less*; cannot be attached after the derivational suffix *–able.*

If we take (12) to be a representation of a speaker's knowledge of the derivational affix *-ness,* then knowledge of *–ness* includes knowledge of the orthographic and phonological form, knowledge of the meaning "the state of X," and knowledge of constraints on affix attachment. This basic model serves to illustrate a basic model of what a speaker may 'know' about the derivational suffix *–ness*; however, it fails to consider how the form, meaning, and use of a lexical item come to be represented within the computational system (i.e., the process of acquisition), nor does it consider factors such as the degree (receptive vs. productive or implicit vs. explicit) to which the knowledge is established within such a system. This section explores specifically how *derivational knowledge* has been defined within the context of research on first and second language acquisition and expands upon the basic representation of a lexical entry as presented in Example (12).

2.3.1 Derivational knowledge in L1 research

In their work on the first language acquisition of derivational morphology, Tyler and Nagy (1989) propose three different aspects of knowledge of derived words: relational, syntactic, and distributional. First, they define relational knowledge as "recognizing that words have complex internal structure and that two or more words may share a common morpheme (p. 649)."

Referring back to (12), the fact that *–ness* can be part of many different words such as *darkness* and *emptiness* would be a component of relational knowledge. In both cases, *-ness* surfaces as a nominalizing affix with the meaning "the state of X." Similarly, the ability to recognize that that multiple derived words (e.g., produce, product, production) may share the same base word (e.g., produce) even though they contain different derivational affixes would be a component of relational derivational knowledge. Second, they define syntactic knowledge as, "knowing that derivational suffixes mark words for syntactic category (p. 649)." For instance, *darkness* and emptiness are nouns (derived from adjectives) because they contain the derivational suffix *-ness*. Finally, distributional knowledge encompasses the constraints on the concatenation of stems and affixes. For example, the affix *–ness* attaches to adjectives to derive nouns such as *darkness* or *emptiness*, but cannot be attached directly to verbs: **produceness* or nouns: **talkness.* Although Tyler and Nagy (1989) only discuss distributional knowledge in relation to derived words with one derivational affix, constraint knowledge could also extend to knowledge of constraints on affix ordering (Hay, 2002). That is, language learners must know that the suffix *-ful* must apply before the suffix *-ness* in a word such as *truthfulness* as opposed to **truthnessful* which violates constraints on affix ordering. Tyler and Nagy's framework for defining derivational knowledge has been used largely within the context of first language acquisition research; however, these definitions could also function for describing second language knowledge of derived words with the addition of several important components from research on the second language acquisition of the lexicon.

2.3.2 Derivational knowledge as a component of L2 vocabulary

To date, most second language researchers incorporate morphological knowledge into a framework of vocabulary knowledge. Richards (1976), for instance, lists eight assumptions about second language vocabulary knowledge among which the fourth and fifth assumptions relate directly to morphological knowledge.

> (1) The vocabulary knowledge of native speakers continues to expand in adult life.
> (2) Knowing a word means knowing the degree of probability of encountering that word in speech or print. For many words we also know the sort of words most likely to be found associated with the word.
> (3) Knowing a word implies knowing the limitations on the use of the word according to variations of function and situation.
> (4) Knowing a word means knowing the syntactic behavior associated with the word.
> (5) Knowing a word entails knowledge of the underlying form of a word and the derivations that can be made from it.
> (6) Knowing a word entails knowledge of the network of associations between that word and other words in the language.
> (7) Knowing a word means knowing the semantic value of a word.
> (8) Knowing a word meaning knowing many of the different meanings associated with the word. (Richards, 1976, p. 83).

In this case, "knowing a word" entails that a learner has acquired the underlying form of the word along with the appropriate inflections and derivations that are inherited based on how the word is used within a syntactic frame. Building on this early work, other second language researchers have focus on the degree to which learners have acquired the form, meaning, and usage of vocabulary items (Laufer, 1998; Nation, 2001; Schmitt & Meara, 1997; Wolter, 2001) or the process by which the form, meaning, and usage come to be represented in the L2 lexicon (Jiang, 2000, 2002).

Nation's (1990; 2001) framework of vocabulary knowledge includes both receptive and productive components.[3] Receptive components for the word *underdeveloped* include:

(1) being able to recognize the word when it is heard
(2) being familiar with its written form so that it is recognized when it is met in reading.
(3) recognizing that it is made up of the parts *under-*, *-develop-* and *–ed* and being able to relate these parts to its meaning.
(4) knowing that *underdeveloped* signals a particular meaning
(5) knowing what the word means in the particular context in which it has just occurred
(6) knowing the concept behind the word which will allow understanding in a variety of contexts.
(7) knowing that there are related words like *overdeveloped*, *backward,* and *challenged*
(8) being able to recognize that *underdeveloped* has been used correctly in the sentence in which it occurs.
(9) being able to recognize that words such as *territories* and *areas* are typical collocations (Nation, 2001, p. 26-28).

Productive components for the word *underdeveloped* include:

(1) being able to say it with correct pronunciation including stress
(2) being able to write it with correct spelling
(3) being able to construct it using the right word parts in their appropriate forms
(4) being able to produce the word to express the meaning 'underdeveloped'
(5) being able to produce the word in different contexts to express the range of meanings of *underdeveloped*
(6) being able to produce synonyms and opposites for *underdeveloped*
(7) being able to use the word correctly in an original sentence
(8) being able to produce words that commonly occur with it.
(9) being able to decide to use or not use the word to suit the degree of formality of the situation (At present developing is more acceptable than *underdeveloped* which carries a slightly negative meaning.) (Nation, 2001, p. 28)

[3] The terms active and passive have been used in the literature to refer to productive and receptive vocabulary knowledge (c.f. Corson, 1995, as cited in Nation, 2001; Laufer, 1998). These authors emphasize that vocabulary knowledge exists on a continuum from passive to active knowledge, with active knowledge incorporating passive knowledge.

Receptive morphological knowledge entails that a learner can recognize that a word is divisible into parts and that those parts contribute to the overall meaning of the word. Conversely, productive morphological knowledge entails that a learner can construct a morphologically complex word and use it appropriately within a given context. Studies using the productive-receptive distinction have found differences between receptive and productive knowledge of morphology. Schmitt and Meara (1997) measured intermediate Japanese EFL learners' receptive and productive knowledge of verbal morphology and word associations longitudinally over one academic year. Overall, the results for verbal morphology indicated that receptive knowledge was generally better developed than productive knowledge; however, performance on receptive and productive tasks related to verbal suffixes indicated a lack of mastery of inflectional and derivational suffixes even after a year of English instruction.

Together, work by Nation (1990, 2001) and Schmitt and Meara (1997) serves to illustrate the complexity of acquiring *morphological knowledge* while acquiring second language vocabulary. These studies make it very clear that such *knowledge* is not simply the memorization of a lexical item as sketched in (12), but, instead, a complex process that involves the degree to which the knowledge is instantiated in the developing system. Some authors view the degree of vocabulary knowledge as a continuum from passive (i.e. receptive) knowledge to active (i.e. productive) knowledge (e.g., Laufer, 1998), while others claim that the idea of a continuum is problematic from a cognitive standpoint. Read (2000), for instance, explains that the idea of a receptive-productive continuum confuses the notions of recognition versus recall and comprehension versus use (p. 249).

2.3.3 How is L2 derivational knowledge acquired?

Besides investigations into the degree to which vocabulary knowledge (including morphology) is established within the lexicon, psycholinguistic studies have sought to determine how such knowledge comes to be represented within the L2 developing system. Jiang (2000; 2002) proposes three stages for the acquisition of L2 lexical representations for instructed second language learners.

Stage (1) Formal stage

Stage (2) Lemma mediation stage

Stage (3) L2 integration stage

During the formal stage, the initial L2 lexical entry for a vocabulary item consists only of the orthographic and phonological components of word knowledge and excludes morphological, syntactic, and semantic specifications (see Figure 2: Levelt's model of a lexical entry.) Since L2 learners already have access to conceptual meanings as well as syntactic and morphological content through the L1 lexicon, L2 learners associate the newly acquired L2 forms with vocabulary items that share similar L1 translations. If a learner wants to use the L2 form at this stage, it is necessary to first activate the L1 form in order to access the conceptual meaning. With continued exposure and activation of the association between L1 and L2 forms, the L1 lemma transfers into the L2 lemma space during what Jiang (2000) terms the lemma mediation stage. This means that the L2 lexical space is occupied by the L2 orthography and syntax along with the syntactic and semantic specifications from the L1. At this stage, morphological information tends not to transfer from L1 to L2 due to the language-specific nature of morphology. Finally,

during the L2 integration stage, the learner acquires the semantic, syntactic, and morphological specifications from the L2 and the L2 lexical entry becomes very similar to the L1 entry.

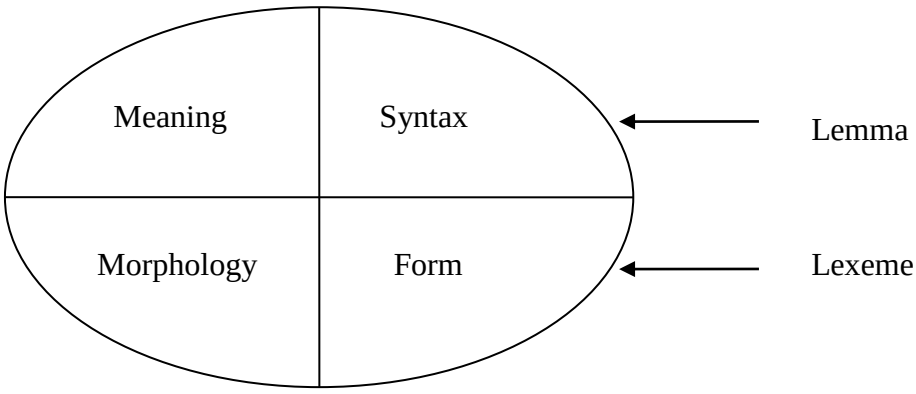

Figure 2. Levelt's (1989) model of a lexical entry

Jiang (2000) notes that L2 learners may fossilize at the lemma mediation stage because they have developed a sufficient degree of automaticity in vocabulary processing for everyday communicative purposes. Fossilization at this stage does not mean that learners do not have access to morphological knowledge; they can still learn to use morphology appropriately through the application of explicit morphological knowledge. However, whether or not a learner can apply explicit morphological knowledge is contingent upon the availability of processing resources during online processing. When sufficient processing resources are available, morphology may be accurately supplied, but when such processing resources are not available due to communicative pressures, morphology may be omitted. This process is fundamentally different from the L1 lexical retrieval process in that morphological information is a *conscious* process that is applied *outside* of the lexicon. For natives, morphological knowledge is fully integrated into the lexical entry and accessed during lexical retrieval.

This model is also important for understanding how L2 learners develop morphological knowledge because it connects L2 processing strategies directly with pedagogical practices in L2 acquisition. According to Jiang (2000), the reason that learners acquire words using the three-stage process described above is primarily due to the manner in which the words are presented within a classroom context. More specifically, during the early stages of language learning vocabulary words are learned by associating an L2 form with an L1 translation. Moreover, the L2 form is typically a 'default' form of a vocabulary word, meaning that it appears as a base form without its inflected variants. It is this practice of associating L1 forms with L2 forms and meanings that leads to the eventual 'lemma mediation' where the L2 lemma space comes to incorporate the L1 lemma. A second consequence of learning vocabulary items as 'defaults' without morphological affixes is that L2 learners tend not to incorporate morphological rules into a lexical entry for a particular word. These rules are, perhaps, acquired later as declarative knowledge when the L2 learner receives explicit grammar instruction, but are never proceduralized in the same way as in the native system.

2.3.4 Additional considerations

2.3.4.1 Complexity

It is a fact of language acquisition that not all linguistic structures are created equal when it comes to learning them. Morphosyntactic deficits notwithstanding, L2 learners acquire some structures such as progressive *–ing* with relative ease, whereas other structures such as subject-verb agreement *–s* prove to be highly resistant to language acquisition (Bailey, Madden, & Krashen, 1974; Brown, 1973; Johnson & Newport, 1989). Some researchers describe the

difficulty in the L2 acquisition of subject-verb agreement in terms of the inherent complexity underlying the grammatical construction. R. Ellis (2006) suggests that factors such as frequency, saliency, functional value, regularity, and processability play a large role in whether or not grammatical structures can be acquired as implicit knowledge during L2 acquisition. Hence, *-ing* which is frequent, salient, regular, functionally valuable, and processable in language input is much easier to acquire than subject-verb agreement *–s* which, although frequent and regular, lacks perceptual salience and functional value, and, therefore, may not be processable during L2 acquisition. These criteria are also likely to play a role in the acquisition of derivational morphology as evinced by L1 studies on the acquisition of neutral and non-neutral affixes (e.g., Carlisle et al., 2001; Tyler & Nagy, 1989).

Importantly, poor L2 performance on structures such as subject-verb agreement does not mean that L2 learners know nothing about abstract agreement in the L2, and most learners know the "rule" underlying this process despite the difficulties they have in using the rule during spontaneous language production. Such a disconnect between knowledge of a "rule" and correct rule usage during language production has led SLA researchers to propose two distinct types of linguistic knowledge: explicit and implicit knowledge (Hulstijn, 2005). Explicit knowledge relates to the knowledge of grammatical rules or structures that one is consciously aware of and has the capacity to verbalize. Conversely, implicit knowledge pertains to subconscious grammatical knowledge that one can use automatically without recourse to rules or formal metalinguistic processes. This is similar to Krashen's 'learning' versus 'acquisition' distinction (Krashen, 1985; Krashen & Scarcella, 1978).

Most of the research cited in this dissertation (e.g., Clahsen et al., 2010) pertains to how learners acquire (or fail to acquire) implicit morphological knowledge; however, it is important

to point out that the acquisition of explicit morphological knowledge may also play an important role in L2 acquisition (see DeKeyser, 1997, 1998). Explicit knowledge contrasts with implicit knowledge in that factors that inhibit the acquisition of implicit knowledge need not apply to the acquisition of explicit grammatical rules. For instance, R. Ellis (2006) proposes that the complexity of acquiring explicit knowledge of grammatical rules depends on "the concepts involved and the labels (metalanguage) needed to express them (p. 437)." In short, if the concepts are functionally simple and can be described using transparent, regular rules and non-technical language, then one would predict that the grammatical concept would be easy to acquire as explicit knowledge. In contrast, if a structure is multi-functional, non-transparent, and cannot be described by a general (non-technical) rule, then such a structure would not be a good candidate for explicit knowledge. Research suggests that learning difficulty of grammatical structures varies as a function of which type of knowledge is involved (R. Ellis, 2006). Grammatical structures that have simple, transparent rules are good candidates for explicit knowledge, whereas multi-functional structures that do not have transparent rules are best learned as implicit knowledge (c.f. DeKeyser's (1995) distinction between categorical and prototypical rules).

2.3.4.2 L1 Influence

In L2 acquisition research, considerable debate surrounds whether or not a learner's native language influences their morphosyntactic abilities in a second language. Some studies suggest that a learner's native language has little influence on L2 morphological abilities. This was the case in early SLA research such as the morpheme order studies (Bailey, Madden, and Krashen, 1974) and is still a theme in current psycholinguistic studies. For instance, Silva and

Clahsen (2008) show that L1 influence had no effect on L2 learner's sensitivity to morphological information in masked-priming. In contrast to these findings, the majority of contemporary SLA empirical studies argue for some degree of L1 influence. Juffs (1998) investigated the influence of L1 verb-argument structure on L2 sentence processing among very advanced ESL learners and found that Romance learners were generally more accurate than learners with East Asian (Chinese, Japanese, and Korean) L1 backgrounds on grammaticality judgments involving causative-inchoative alternations. This difference is attributed to L1 influence in that East Asian languages typically require morphosyntactic marking of causativity, whereas Romance languages do not. Koda (2000) shows that L1 print processing experience affects L2 morphological awareness among L1 Chinese and L1 Korean learners of L2 English. In this study, L1 Chinese speakers were better than L1 Korean speakers at integrating morphological and contextual information during sentence processing because of their experience with integrating word-internal and contextual information in Chinese. White (2003) compares morphological learning between Patty (the subject in Lardiere's studies) and an L1 Turkish learner of English (pseudonym: SD) in order to test the hypothesis that the presence of complex verbal morphology in L1 Turkish facilitate production of L2 verbal morphology. The results of this study revealed that SD performed more accurately on verbal morphology than Patty and supported an L1 influence account. Also in line with this account, Basnight-Brown, Chen, Hua, Kostić, and Feldman (2007) show that L1 influence facilitates morphological acquisition among speakers of European languages. For instance, L1 Serbian learners of L2 English demonstrated morphological sensitivity in cross-modal lexical decision to nested stems (e.g., drawn – DRAW), whereas L1 Chinese speakers did not show any facilitation (Basnight-Brown et al., 2007). They claim that Europeans may not be as limited as Chinese speakers by age of acquisition since they

are familiar with an alphabetic script and they have experience with a highly inflected language (see Jia, 2006; Jia et al., 2002).

2.3.5 Summary

At first blush, the definition of *derivational knowledge* includes little more than knowing form, meaning, and usage of a lexical item. However, this basic definition does not hold up when examined in light of contemporary research on the acquisition of derivation by both child and adult learners. Research findings from L1 research (Tyler & Nagy, 1989), L2 vocabulary research (Nation, 2001), and psycholinguistics (Jiang, 2000, 2002) support a more dynamic view of derivational knowledge which incorporates the degree to which the form, meaning, and use of a lexical item are instantiated within the conceptual system at one particular point of language development. In other words, knowledge of derivational morphology is not an "all or nothing" phenomenon in which a learner either knows the form, meaning, and usage of a derivational morpheme or does not. This research shows that adult and child language learners may acquire a lexical entry such as (Example 12) one piece at a time in the acquisition of first and second language vocabulary (Jiang, 2000, 2002; Tyler & Nagy, 1989; see also Clark, 2001) and that first language influence is likely to play a role in L2 morphological acquisition (Basnight-Brown et al., 2007). Similarly, this research also reveals that the degree to which derivational knowledge is represented within the conceptual system may vary along a receptive-productive *and* an explicit-implicit continuum. That is, an L2 learner may know about a morphological rule (explicit knowledge), but have no capacity to perceive (receptive knowledge) or utilize the rule in spontaneous language production (productive knowledge). Likewise, an L2 learner may have

subconscious knowledge of a rule (implicit knowledge) which may lead to a range of receptive and productive morphological abilities, but have no ability to verbalize or explain such knowledge in metalinguistic terms (explicit knowledge).

2.3.6 Derivational knowledge: Predictions for L2 acquisition

Derivational knowledge is comprised of a complex and multi-faceted set of linguistic features, language skills, and learner characteristics. As such, any definition of *derivational knowledge* needs to account not only for the degree of the underlying representational knowledge of derivational morphology along the receptive/productive and explicit/implicit continuum, but also for factors such as L1 background and the structural complexity of the linguistic structures being learned. The following general research hypotheses are proposed for the L2 learning of derived words in light of this definition of derivational knowledge:

(1) L2 learners acquire L2 derivational gradually and may plateau before reaching native-like levels of L2 competence (Jiang, 2000, 2002).

(2) Learner characteristics such as L1 background affect how L2 learners acquire derivational knowledge.

(3) The complexity of the structure (linguistic rules vs. metalinguistic concepts) influences how easy a structure is to acquire in terms of explicit/implicit knowledge.

(4) Receptive derivational knowledge is more fully developed than productive knowledge among L2 learners.

3.0 CHALLENGES TO L2 MORPHOLOGICAL LEARNING

Children and adults differ in their abilities to acquire lexical and grammatical morphemes in a target language. Given sufficient exposure, a child's grammar will converge on adult native-speaker norms for morphological production and the two grammars (i.e., child and adult) will become virtually indistinguishable. In contrast to the convergence between adult and child native speaker grammatical behavior, the grammars of adult L2 learners typically diverge from native-speaker norms in the production of morphology even after many years of language exposure (Bley-Vroman, 2009; Hawkins, 2009; Lardiere, 1998a,b, 2006; Long, 1997, 2003, Prévost & White, 2000; White, 2003). In light of these differences between children and adults, the aim of this chapter is to explore how children and adult language learners differ in terms of the ultimate attainment of native-like morphology from the standpoint of SLA research.

3.1 STUDIES ON THE L1 ACQUISITION OF MORPHOLOGY

Child acquisition of inflections and derivations has drawn considerable attention from researchers in the areas of linguistics and psychology over the past four decades. This research has centered on the order in which children acquire grammatical morphemes in their native language (Brown, 1973) or in a second language (Dulay & Burt, 1973, 1974) as well as on how

children develop morphological awareness in their native language (Anglin, 1993; Carlisle, 2000; Carlisle & Fleming, 2003; Carlisle, Stone, & Katz, 2003; Tyler & Nagy, 1989). In terms of the acquisition of English morphology, this research has revealed that children typically begin to acquire inflectional morphology during the earliest stages of word use at 12 to 20 months of age (Clark, 2001). Then, at approximately two years of age, children begin to produce zero-derived forms (nouns used as verbs). Finally, the ability to produce novel derived forms with derivational affixes may occur as early as two to two-and-a-half years of age, but in some cases this ability does not develop until the age of three or four (Clark, 2001). This early use of derivational affixes does not imply that a child has fully acquired native-like production and comprehension of derived forms. That is, knowledge of the various aspects of derivational knowledge (i.e., morphological awareness) continues to develop well into the late elementary and high school years. This section begins with a review of the morpheme-order studies and then proceeds to describe research on the L1 acquisition of derivation.

3.1.1 Inflection

Early research on the acquisition of morphology focused primarily on inflections. Brown (1973), for instance, collected speech samples from children in their natural environments and then coded the speech samples for whether children provided (or failed to provide) morphologically appropriate forms in obligatory contexts. If children used the morpheme correctly in 90 percent of obligatory contexts, then the morpheme was considered to be fully acquired. Brown noticed a clear developmental sequence for fourteen English grammatical morphemes, which is represented below:

(1) Present progressive
(2) in, on (prepositions) [2 morphemes here.]
(3) Plural
(4) Past irregular
(5) Possessive
(6) Uncontractible copula
(7) Articles
(8) Past irregular
(9) Third person regular
(10) Third person irregular
(11) Uncontractable auxiliary
(12) Contractible copula
(13) Contractible auxiliary

Brown's study provided evidence for a natural order of acquisition for children acquiring English as an L1. This finding prompted other researchers to ask the same question about natural sequences for child L2 acquisition. In a series of studies using the Bilingual Syntax Measure (BSM), Dulay and Burt (1973, 1974) explored if there was a common sequence in the acquisition of L2 morphology and if a learner's native language influenced the order of acquisition of these morphemes. In their first study they used a sample of 151 Spanish-speaking children (divided into three groups) who were learning English as an L2 in order to explore if there was a common order in the acquisition of certain grammatical forms. The results of this study indicated that all three groups acquired the grammatical morphemes in a similar order. In their later study, Dulay and Burt (1974) investigated whether L1 effects would influence the second language acquisition of grammatical morphemes by comparing scores on the BSM from a group of L1 Chinese learners (55 total) with scores from a group of L1 Spanish learners (60 total). Both groups of learners were children. They found that both the L1 Chinese and the L1 Spanish acquired the 11 functors in English in virtually the same order regardless of typological similarities and differences between the native and the target languages. Based on this finding,

they claimed that there was a universal order for the L2 acquisition of certain grammatical structures in English regardless of first language background.

3.1.2 Derivation

In contrast to these early studies on the acquisition of inflectional morphology which propose a "natural order" for the acquisition of inflectional morphology, studies on the L1 acquisition of derivational morphology focus on how children gradually develop awareness of derivation as they progress through elementary and middle school (Carlisle & Fleming, 2003; Tyler & Nagy, 1989) and how such awareness may contribute to other language related abilities such as vocabulary size (Anglin, 1993) and reading ability (Carlisle, Stone, & Katz, 2001).[4] Tyler and Nagy (1989) investigated the development of relational, syntactic, and distributional knowledge of neutral and non-neutral derived words among fourth, sixth, and eighth grade students. They found that relational knowledge (i.e., the relationship between stems and affixed words) for neutral and non-neutral derived words was gained as early as fourth grade and remained relatively stable over developmental time. Conversely, syntactic knowledge (i.e., derivational affixes mark a word for syntactic category) and distributional knowledge (i.e., knowledge of constraints on affix attachment) became more adult-like as a function of students' age and grade level. That is, older students knew more about the syntactic and distributional constraints on derived word formation than younger students. The neutral/non-neutral distinction was relevant

[4] The fact that a natural order for derived morphemes has not been proposed is likely due to the long span of time that occurs between when derivational affixes are initially produced (i.e., two-and-a-half to four years of age) and a more end-state mastery of derivation that may not be fully developed until later in adult life.

only for the acquisition of distributional knowledge in that younger students tended to overgeneralize the application of neutral affixes to ill-formed words, but not non-neutral affixes to ill-formed words. [Note: They go on to argue that the students' behavior on neutral affixes may be evidence for rule-based processes.]

Carlisle and Fleming (2003) investigated the development of first and third graders morphological processing using Schreuder and Baayen's (1995) model of morphological processing. Under this model, representations of bound morphemes (such as *-er* in *writer* and *worker*) develop when children detect patterns in form and meaning between words. After these patterns are noticed in the input, they gradually acquire semantic and syntactic content and become available for access in word recognition and use. In short, this model predicts that children can only analyze novel morphologically complex words (decomposition + meaning) if they can access the relevant stems and bound morphemes. The results of Carlisle and Fleming's (2003) study largely supported this model of morphological processing in that third graders were significantly better than first graders when it came to decomposing unfamiliar words and providing a definition for such words. Also of interest was the finding that first graders' responses on the decomposition task indicated an overall insensitivity to meaning relations in word decomposition; first graders often erred by decomposing words such as *dollar* into *doll* or *happy* into *happ.* Together, the results from Tyler and Nagy (1989) and studies such as Carlisle and Fleming (2003) evince that morphological awareness unfolds gradually as children develop representations of bound morphemes and the syntactic, semantic, and distributional constraints associated with such morphemes.

Other studies have focused on the relationship between morphological knowledge and vocabulary and reading knowledge. Anglin (1993) studied the relationship between

morphological knowledge and vocabulary growth among children in first, third, and fifth grade (ages 6, 8, and 10 years old) using an oral interview method. He found that, "the proportion of vocabulary knowledge accounted for by derived words increased substantially [from first to fifth grade], representing on the average about 16% of recognition vocabulary in grade 1 and almost 40% of such knowledge by grade 5" (Anglin, 1993, p. 122). These results suggest that increased morphological awareness during the elementary years leads to significant growth in vocabulary size. From another standpoint, the finding that knowledge of derivational morphology increases substantially as children pass through elementary school is also important since it demonstrates the gradual nature of the development of L1 derivational morphology. Carlisle and colleagues (Carlisle, 2000; Carlisle & Fleming, 2003; Carlisle, Stone, & Katz, 2001) have looked at the relationship between morphological awareness and reading ability in a series of publications. These studies have consistently shown that the awareness of derivational morphemes is significantly related to reading ability. Carlisle et al. (2001), for instance, compared children with poor reading abilities, children with average reading abilities, and adult readers on a series of tasks designed to assess the speed and accuracy in the recognition and production of two sets of words – words with phonological shift and those without phonological shift. The results of the naming task (i.e., the learner was asked to pronounce the word) revealed that poor and average readers performed slower and less accurately than adults on shift words; however, poor readers speed and accuracy on shift words was lower still than that of average readers. Carlisle et al. (2001) suggest that the poor readers' performance on shift words may be due to the fact that they have not yet come to recognize the systematic relations between allomorphs in a base word and its related derived form that involves phonological shift.

3.2 ADULT L2 ACQUISITION OF MORPHOLOGY

3.2.1 The morpheme order studies

Following Brown's (1973) work on the acquisition of grammatical morphemes in L1 acquisition, early research into the second language acquisition of morphology sought to determine if "natural" developmental sequences could also be part of the adult L2 acquisition process. The studies by Dulay and Burt (1973, 1974) tell us something about child L2 acquisition, but they may not be directly applicable to adult L2 acquisition given what we know from studies on the critical period hypothesis (e.g., Johnson & Newport, 1989). Nonetheless, there is one study that suggests that the order of L2 grammatical morphemes may not differ between child and adult L2 learners. Bailey, Madden, and Krashen (1974) used the BSM to investigate if there was a natural sequence of morpheme learning for adult L2 learners. Furthermore, if such a natural sequence was found for adult SLA, the researchers were also interested in determining similarities and differences between adult and child SLA. Regarding the first criteria, they found that there was a common order of acquisition for grammatical morphemes. This difficulty order was maintained despite differences in native language, formal instruction, and exposure to English. Second, in terms of comparability between child and adult SLA, the results from this study indicated strong similarities between the morpheme acquisition order for children and that of adults. These findings had a direct impact on instructed SLA in that morphemes were presented in ESL classrooms according to the order in which they were naturally acquired.

These early morpheme order studies have come under increased scrutiny in recent years especially in the light of meta-analytic studies. Goldschneider and DeKeyser (2001) used a meta-

analysis approach to investigate if morpheme properties such as perceptual salience, semantic complexity, morphological regularity, syntactic category, and frequency could account for a large portion of the variance in the morpheme order studies. This meta-analysis drew from 12 different studies that used oral production data. They found that the five aforementioned morpheme properties accounted for a larger portion of the variance in previous morpheme order studies, with phonological salience and syntactic category having the highest correlations with percentage correct. In a more recent meta-analysis, Luk and Shirai (2009) investigated the role of L1 influence in previous research that investigated how learners from Japanese, Korean, Chinese, and Spanish language backgrounds acquired English morphemes. They found that the majority of previous studies using learners from these language backgrounds revealed different orders for the acquisition of grammatical morphemes based on the learners' native languages.

Together, these studies extend earlier work on the morpheme order studies by showing that a learner's native language and the perceptual and linguistic characteristics of individual morphemes may affect the order in which morphemes are acquired. Moreover, they show that a strict interpretation of a "natural" order of acquisition for grammatical morphemes may not be a tenable explanation for how second language learners acquire L2 morphology. In fact, many of the most recent research efforts have been devoted to understanding the variability that occurs in the L2 production of morphology instead of the predictability as did the morpheme order studies.

3.2.2 Contemporary perspectives on Adult L2 acquisition of morphology

Contemporary SLA studies indicate that L2 learners have persistent problems with morphology even after many years of language exposure. In line with this conclusion, research by Lardiere

(1998a,b) and Long (1997) shows that naturalistic learners of English exhibit variable production of morphological inflection even after considerable exposure to the second language in an immersion setting. Patty, the subject of Lardiere's (1998a,b) studies, supplied the inflectional affix *–ed* correctly in 34% of obligatory contexts even after 18 years of naturalistic exposure to English. Similarly, Ayako, the subject of Long's (1997) longitudinal study, exhibited comparable performance (under 50%) on marking past-time reference even after 52 years of naturalistic exposure to English. Such difficulties in the acquisition of inflectional morphology and other syntactic phenomena have been well documented in SLA literature (e.g., Beck, 1998; Clahsen & Muysken, 1986; Clahsen et al., 2010; Eubank, 1996; Felser & Clahsen, 2009; Francshina, 2001; Gor, 2010; Haznedar & Schwartz, 1997; Jiang, 2004; Lardiere, 1998a,b; Montrul, Foote, and Perpiñán, 2008; Prévost & White, 2000; Schwartz & Sprouse, 1996; Slabakova, 2000; Spinner & Juffs, 2008; Vainikka & Young-Scholten, 1994; White, 2003; White et al., 2003, 2004). However, in contrast to the breadth of studies on L2 inflection, few studies have investigated how L2 learners acquire derivation despite the fact that research into this area suggests that derivational morphology may present distinct challenges to L2 learners (Clahsen & Neubauer, 2009; Friedline & Juffs, 2010; Lardiere, 2006: Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002; Silva & Clahsen, 2008).

The emphasis on inflectional morphology is most likely due to theories such as the Split Morphology Hypothesis (Anderson, 1982; Perlmutter, 1988), which propose a "split" between inflection and derivation insofar as inflection provides a window into the rule-based computational system, whereas derivation occurs only within the lexicon. Importantly, this "split" between inflection and derivation in terms of processing versus storage is controversial given the results of current empirical studies in psycholinguistics, which suggest that derivation

may also be computed within the same rule-based system as inflectional morphology (c.f. Alegre & Gordon, 1999; Clahsen & Neubauer, 2009; Hagiwara et al., 1999; Ullman, 2004). In effect, the results of these studies present a strong case for pursing further research into L2 derivation since L2 performance on derivational morphology can also inform theories of L2 acquisition and processing. Since this dissertation emphasizes the L2 learning of derivational morphology, the following sections of the dissertation focus on research from descriptive (3.2.2.1) and laboratory (3.2.2.2) studies of L2 derivation.

3.2.2.1 Descriptive studies on L2 derivation

Descriptive studies on L2 morphology show that intermediate and advanced L2 learners have poor knowledge of derivational suffixes. In a study of L2 knowledge of verbal suffixes (inflectional: *-ed, ing, ment, -s*; derivational: *-ion, -ly, -ence, -ee, -age, -er, ive, -able, -al*, and *-ure*), Schmitt and Meara (1997) found that L2 receptive and productive knowledge of these suffixes was not well developed among intermediate Japanese EFL learners. Although the vocabulary size of the subjects in this study increased over an academic year of English study, their abilities to recognize (receptive) and produce (productive) derivational suffixes was poor at the time of the pretest (T1) and remained poor at the time of the posttest (T2), with only marginal improvements from T1 to T2.[5] Other studies by Schmitt (1998, 1999; Schmitt & Zimmerman, 2002) looked specifically at productive derivational knowledge among more advanced learners.

[5] Notably, the suffix *-ment* was known relatively well productively (T1: 51% vs. T2: 76%) and receptively (T1: 78% vs. T2: 86%) when compared to the other derivational suffixes, productively (T1 range: 1% - 27%; T2 range: 2% - 37%) and receptively (T1 range: 7% - 53%; T2 range: 10% -58%).

Results from these more advanced learners were comparable to results from intermediate learners. More specifically, advanced L2 learners were rarely able to generate all members of a word family for a given target word. Results also showed that noun and verb derivates were generally known better than adjective and adverb derivates (Schmitt, 1998) and that global vocabulary abilities correlated positively with derivational knowledge (Schmitt & Zimmerman, 2002).

Studies of L2 production data further confirm that intermediate and advanced L2 learners have persistent problems acquiring derivation. For instance, a recent study by Friedline and Juffs (2010) revealed that intermediate L2 learners sometimes made errors in the production of derived words such as those in examples (13) and (14).

(13) We have one different [difference].

(14) I like doing something music [musical].

In example (13) the learner uses the adjective form *different* instead of the grammatically correct form *difference*, which is a noun. In example (14) the learner uses the nominal form *music* in a position that requires the adjectival form *musical*. These errors in derivation were not widespread and learners from both Korean (91% correct) and Arabic (68%) L1 backgrounds tended to produce derived words correctly in obligatory contexts; however, derivational morphology was *rarely* used in nonnative production, which may explain the low error rates. Similar derivation errors were observed in Lardiere's (2006) study of Patty's (a very advanced L2 English speaker) use of L2 derivational morphology. Lardiere found that Patty sometimes produced incorrect derivational forms in written and spoken production such as those in (15: a-f; from Lardiere, 2006, p. 72)

(15) a. I tried to *analysis* what kind of a person M. is.

b. It must be a huge *relieve*.

c. when my father went *bankruptcy*

d. She used to live in uh, *French*, too, Paris

e. God try to give us his wisdom and *happy*.

f. and her sister, who is a physical *therapy*

Results from a multiple-choice test indicated that Patty knew the syntactic requirements associated with derivational morphemes to a high degree, although performance on both real-word (80%) and nonce-word (75%) items was lower than that of native speakers who scored 100% and 98%, respectively.

3.2.2.2 Laboratory studies on L2 derivation

Laboratory studies on L2 derivation suggest that L2 learners process derivational morphology differently than native speakers. Silva and Clahsen (2008) used masked-priming to compare native speakers to adult L2 learners on the deadjectival nominalizations *-ness* and *-ity* (derivation) and regular past tense (inflection). Masked-priming studies investigate whether or not a prime word (presented first) facilitates recognition of a target word (presented after the prime word) and are typically composed of three conditions: (1) an identity condition (*dark* --> *dark)*, (2) an unrelated condition (*dark* --> *shoe*), and a (3) test condition (*darkness* --> *dark*). The assumptions behind masked priming are that similar response times to the identity and test conditions (the unrelated condition should be different) evince decomposition, whereas similar response times between the unrelated condition and the test condition (the identity condition should be different) indicate lexical storage. The results from Silva and Clahsen's (2008) study revealed full stem-priming effects (e.g., *walks* primes *walk* | *darkness* primes *dark*) for native

speakers on both inflections and derivations, but only partial priming effects for L2 learners on derivations and no priming effects for L2 learners on inflections. Silva and Clahsen (2008) argue that the limited priming effects on derivations indicate that L2 learners rely less on decomposition than native speakers and do not implicitly know that *–ness* can be affixed to many adjectives to derive nouns such as *darkness, awareness,* and *illness*.

Clahsen and Neubauer (2010) offer further support for this position in their study of L2 processing of the German nominalizing affix *-ung* among L1 Polish speakers. They conducted two different experiments: an unprimed lexical decision task (with high and low frequency derived words) and a masked priming experiment. Results from the unprimed lexical decision task suggested that both L1 and L2 speakers relied on frequency; however, the frequency effect was much larger within the L2 group. [Note: frequency effects are typically interpreted as effects of lexical storage.] In addition, the results from the masked priming task were similar to those reported in Silva and Clahsen's (2008) study. That is, native German speakers' response times to the words in the identity condition were similar to words in the test condition (i.e., full priming), whereas the response times among L2 learners were similar between the test and the unrelated condition (i.e., no priming). Taken together, these results suggest that L2 processing differs from L1 processing in that L2 learners rely on lexical storage over decomposition when processing morphologically complex words, which is consistent with the predictions of the Shallow Structure Hypothesis[6] (SSH: Clahsen et al., 2010; Clahsen & Felser, 2006; Clahsen & Neubauer, 2009; Silva & Clahsen, 2008). Clahsen et al. (2010) explain that:

[6] The SSH is closely related to the Declarative-Procedural (DP) model in cognitive science. According to the DP model, there are two distinct mechanisms involved in grammatical processing: a procedural system for rule-

> The L2 grammar does not provide the kind of information required to process complex syntax in nativelike ways, forcing L2 learners to fall back on "shallow" parsing strategies. These provide a less detailed representation of the structure of a sentence or a morphologically complex word and are largely based on lexical-semantic and other nonsyntactic cues to interpretation (p. 23).

3.2.3 Connectionist approaches to morphology

Connectionists contend that language learning occurs via a domain-general learning mechanism that is sensitive to statistical regularities in language input (May, Werker, & Gerken, 2002; McClelland and Patterson, 2002; Mintz, 2002; Saffran, Aslin, & Newport, 1996; Saffran, Pollak, Seibel, & Shkolnick, 2007; Seidenberg & Gonnerman, 2000; Tomasello, 2003, 2005). Convergence theory (Seidenberg & Gonnerman, 2000) is a specific connectionist theory that explains morphology as an emergent process that arises when phonological, semantic, and orthographic cues converge as a language learner receives input from the target language over

---

based processes (including inflectional and derivational morphology) and a declarative system for the storage of highly frequent forms (Bowden et al., 2010; Pinker & Ullman, 2002; Ullman, 2004). These systems are rooted in the neurological structure of the brain and are utilized to perform linguistic and non-linguistic functions (Ullman, 2004). The procedural system is composed of the basal ganglia, the frontal cortex, the parietal cortex, the superior temporal cortex, the cerebellum, and possibly the superior parietal lobule (Ullman, 2004, p. 246). The declarative system is composed of medial temporal lobe structures: the temporal and temporo-parietal areas, the inferior and ventral temporal regions, and the superior temporal cortex (Ullman, 2004, p. 245). There is some overlap between the two systems, which suggests that the two systems interact during language processing.

time. Seidenberg and Gonnerman (2000) explain that morphology is, "a graded, inter-level representation that develops in the course of acquiring lexical knowledge" (p. 357). More specifically,

> (1) what is learned about one word carries over to partially overlapping words.
>
> (2) in a connectionist network, the same weights are used to encode the mappings for many different words
>
> (3) if the architecture includes a network of hidden units, it will come to represent convergences between different types of information across words.
>
> (4) a 'morphological level of representation' emerges in the course of learning to use language.
>
> (source: Seidenberg and Gonnerman, 2000, p. 357)

Accordingly, the idea of a morpheme which is prevalent in generative theories as a minimal unit of meaning does not exist within connectionist theories. Instead of combining roots and affixes within a lexicon, morphology is the result of the convergence of learned phonological, semantic, and orthographic cues. Studies within this area show that factors which are typically associated with morphological decomposition can be explained by looking at relationships between sound, meaning, and form. Semantic transparency, for instance, has been shown to influence decision latencies in lexical decision administered through masked priming. Feldman, Soltano, Pastizzo, and Francis (2004), for instance, illustrate that decision latencies are faster after semantically transparent words (e.g., CASUALLY --> CASUALNESS) than semantically opaque words (e.g., CASUALTY --> CASUALNESS) and, furthermore, that the family size of the base morpheme contributed to the degree of semantic facilitation. In a more direct test of the connectionist model, Gonnerman, Seidenberg, and Andersen (2007) show that relationships between

orthography, phonology, semantics affect morphological processing in a series of cross-modal lexical decision priming tasks. The results of their experiments are summarized below:

(1) Morphological structure did not produce reliable priming effects unless items also shared some semantic overlap.

(2) Words that shared phonological and semantic relations produced more facilitation then words that shared phonological similarity only.

(3) Morphologically complex words (i.e., words with a suffix or prefix) were more likely to prime other morphologically complex words if they were related in sound and meaning.

All in all, these studies argue against a decomposition account of morphological processing and show that morphology may be a graded phenomenon that depends largely on relationships between orthography, phonology, and semantics.

Theories based on connectionism posit no differences between child and adult language acquisition in terms of the mechanism involved in language acquisition – both children and adults utilize a domain-general learning mechanism to acquire language (N. Ellis, 2006). This does not imply, however, that children and adults are capable of learning language in the same way. One crucial difference between children and adult learners is that adult learners come to the language learning process already equipped with a native language. In some cases, the presence of an L1 can facilitate the acquisition of the L2 through language transfer. For instance, Shirai (1992) lists six conditions which may facilitate language transfer:

(1) interlingual mapping (e.g., L1 and L2 concepts which have an equivalent meanings are more likely to transfer)

(2) markedness (e.g., unmarked structures transfer first)

(3) language distance (perceived/real) (e.g., more transfer between typologically similar languages)

(4) learner characteristics (e.g., age – adults transfer more from L1)

(5) cognitive load (e.g., when cognitive load is high, transfer tends not to occur)

(6) sociolinguistic context (e.g., more L1 transfer occurs when two Chinese native speakers are speaking in English than when one native Chinese-speaker is speaking to a native Arabic speaker.)

In terms of L1 transfer, the presence of an L1 may negatively impact the acquisition of a second language in that it shapes the way that a particular learner perceives second language input. N. Ellis (2006) argues that contingency, cue competition, salience, interference, overshadowing, blocking, or perceptual learning, which are all shaped by the L1, cause second language learners to ineffectively convert input into intake during second language acquisition.

To my knowledge, there are no studies that specifically look at L2 knowledge of derivational morphology from this perspective.

3.2.4 Limitations of contemporary research on derivation

Combined results from descriptive experimental studies, production data, and laboratory experiments suggest that L2 learners have persistent problems acquiring derivational morphology even at very advanced levels of L2 proficiency. Although these studies present strong evidence that derivational morphology is problematic for L2 learners, there are a number of theoretical and methodological issues that limit the generalizability of these findings that must be addressed in future research on this topic.

3.2.4.1 Theoretical issues

One of the main theoretical problems with previous research on the acquisition of derivational morphology is that it does not consider the role of instruction in the acquisition in the acquisition of L2 morphology. Silva and Clahsen (2008), for instance, claim that rule-based mechanisms are impaired in L2 learners regardless of L1 background or experience with English. The learners in all of these studies have received some formal instruction in English, yet the amount of time spent on instruction in derivational morphology is not known. Would instruction help facilitate recognition of test items with *-ness* and *-ity*?

An additional theoretical concern with previous research on the SLA of derivational morphology is that there is a tendency to treat "morphological knowledge" as a static "either you know it or you don't" construct without considering the degree to which such knowledge is situated in within the learners developing linguistic system. In this regard, Silva and Clahsen's (2008)[7] findings from the masked-priming paradigm pertain largely to receptive knowledge (perhaps competence) and may not be a good indicator of the range of productive abilities (competence and performance) that a learner has acquired. On the same note, studies using production data (e.g., Friedline & Juffs, 2010; Lardiere, 2006) are likewise limited in that they *only* consider the productive component of derivational knowledge. The point here is that more thorough operational definitions of the morphological knowledge construct are needed when designing morphological experiments and interpreting findings from such experiments.

[7] Silva and Clahsen (2008) suggest that morphological processing may be possible for L2 derivation (p. 256).

3.2.4.2 Methodological issues

The main methodological objection to studies on descriptive studies on derivation is that they rely in large part on production data. In other words, this research is highly focused on what learners *do* in natural production (Lardiere, 2006) and when presented with experimental stimuli (Schmitt, 1998, 1999; Schmitt & Meara, 1997) instead of what they *can do*. On this account, Lardiere's (2006) study is highly limited in scope in that it focuses on production data from one particular language learner. This issue of gathering data from multiple participants is somewhat addressed in Friedline and Juffs' (2010) study in that they draw from multiple learners from two different L1 backgrounds. The problem with this study is that the multiple learners rarely produce any derived words. Studies by Schmitt and colleagues (Schmitt, 1998, 1999; Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002) are also limited in that they test derivational knowledge of only a few select items[8] and do not address whether or not L2 learners have implicit or explicit knowledge of derivational processes.

The participants chosen for many of the studies in SLA may also be counted as a potential limitation of past research in that there is a tendency to focus on very advanced learners (Silva & Clahsen, 2008) or learners who have reached an end-state of language development (Lardiere, 2006) instead of focusing on the development of morphological knowledge in second language learners who have not yet reached the "end-state" of language development. Granted, these researchers have good theoretical reasons for the selection of such participants in that data from end-state learners is necessary for answering questions related to how the abstract computational system *ultimately* compares and contrasts between L1 and L2 acquisition. Yet,

[8] Schmitt and Zimmerman (2002) use only 16 prompt words.

this need to answer questions related to the ultimate attainment of a second language should not preclude the application of such theories to learners who are still in the process of L2 acquisition.

In connection to the aforementioned limitations, many questions warrant further research in relation to how L2 learners acquire derivational morphology. Among these questions, four questions that appear to be highly pertinent to furthering a research program in this area are:

(1) How does instruction influence the acquisition of L2 derivational knowledge?

(2) What do L2 learners know receptively and productively about L2 derivation?

(3) Do L2 learners have explicit knowledge of L2 derivational rules?

(4) How does language proficiency affect the acquisition of L2 derivational knowledge?

4.0 GRAMMAR INSTRUCTION

4.1 GRAMMAR INSTRUCTION IN SLA

SLA researchers have strived to answer questions related to the overall effectiveness of grammar instruction for the development of second language grammar. The earliest debate centered on whether or not instruction had any effect on a learner's developing interlanguage (Doughty, 1991; R. Ellis, 2002; Krashen, 1985; Long, 1983; Pienemann, 1989; Shirai, 1997; Spada & Lightbown, 1999). Guided by work on the morpheme acquisition studies (Bailey, Madden, & Krashen, 1974; Brown, 1973; Dulay & Burt, 1973, 1974), Krashen (1985) argued that comprehending input was the sole requirement governing second language acquisition and that teaching was largely ineffective for promoting language acquisition. According to Krashen's (1985) Input Hypothesis,

> Humans acquire language in only one way – by understanding messages, or by receiving 'comprehensible input' … We move from *i*, our current level, to *i*+1, the next level along the natural order, by understanding input containing *i*+1 (p. 2).

Krashen's position has been strongly opposed in SLA research in light of numerous empirical findings that suggest that input, although necessary, is not sufficient for language acquisition to occur. Long's (1983, 1996) Interaction Hypothesis is one theory that has arisen as a challenge to the Input Hypothesis. On this view, the interactions in which learners are engaged

serve a critical function in the second language acquisition process in that they provide a medium for input to become comprehensible through interaction. Specifically, interactions between native and non-native speakers may promote noticing (Schmidt, 1990) of grammatical forms when communication breakdowns occur. For instance, a native speaker's request for clarification (Huh?!?) of a non-native speaker's ungrammatical utterance provides a form of implicit negative feedback that may direct the learner to notice problems in their grammar as they attempt to make themselves comprehensible to native speakers. Research in this area has revealed that negotiated items are typically learned better than non-negotiated items (e.g., Long, 1996; Smith, 2004) if learners do in fact engage in negotiation for meaning in the process of completing classroom tasks (see Foster & Ohta, 2005).

Swain (1985) has also challenged the Input Hypothesis through her work on L2 French learners within Canadian immersion programs. In her work in this area, she found that although the English-speaking students received a great deal of input in the target language through immersion, they lagged behind their French-speaking peers in terms of grammatical competence in written and spoken production (see also Lyster, 1994). She attributed this difference to the fact that English-speakers were rarely provided with opportunities to produce "output" in the target language, which was critical for the development of interlanguage skills beyond those needed for comprehension. In a series of publications, researchers in this area have shown that instruction centered on pushed output (or collaborative dialogue) enhances the learning of *some* target items (Swain, 1998, 1999; Swain & Lapkin, 1995, 2003; Toth, 2008). In particular, items that are correctly and incorrectly negotiated through collaborative dialogue tend to be learned better than items that are not successfully negotiated (Swain, 1998). The most recent versions of the pushed output hypothesis draw upon Sociocultural Theory (Lantolf, 2006; Lantolf & Thorne, 2006;

Vygotsky, 1978) and view language as a "tool in cognitive activity" (Swain & Lapkin, 2003, p. 285). Hence, the process of collaborate dialogue serves as a mediator between cognitive activity and linguistic objects. It is only through social interactions (i.e., collaborative dialogue) that learners are pushed to manipulate and internalize linguistic objects as they seek to communicate with others. Interestingly, this research has also revealed that the use of L1 during collaborative interaction (Swain & Lapkin, 2000) and differences in the proficiency level of learners engaged in collaboration (Watanabe & Swain, 2007) are not likely to inhibit the effectiveness of collaborative dialogue.

The view that grammar is learned implicitly during interaction is not shared by all researchers. In fact, there is a body of research that suggests that explicit grammar instruction may be highly beneficial to second language learners. In a key study, Doughty (1991) investigated the effect of two different types of instruction (meaning-oriented vs. rule-oriented) on knowledge of English relativization. The treatment groups both received exposure to marked[9] relative clauses and instruction on object of the preposition (OP) relatives while a control group received exposure to sentences containing relative clauses only. She found that all groups (including the control group) improved on relativization as a result of the treatment, but that the groups that received explicit instruction on OP relatives plus exposure improved significantly

[9] The term 'marked' refers to a hierarchy of structural difficulty in which structures at the high end (e.g., SU) of the hierarchy are less marked and more accessible for production and structures at the low end (O of COMP) of the hierarchy are more marked and less accessible for production (See Zobl, 1983, 1985). In this case, the markedness hierarchy refers to Keenan and Comrie's (1977) Noun Phrase Accessibility Hierarchy: SU > DO > IO > OBL > GEN > O of COMP.

more than groups than the control group. Hence, this study revealed that explicit instruction on relative clauses led to better relative clause learning than exposure alone.[10]

Other research has investigated the degree of explicit grammar instruction needed for optimal second language acquisition to occur. Long and colleagues (Long, 1996; Long & Robinson, 1998) assert that explicit negative feedback that is minimally invasive during communicative activities may have an important role in L2 grammatical development. In what they refer to as *focus on form* grammar instruction, they argue that corrective feedback such as recasts may maximally contribute to L2 interlanguage development in that it draws L2 learners' attention to grammatical forms while they are processing meaning. In other words, corrective feedback is provided at critical points during communication breakdowns when learners' attentional resources are attuned to gaps in knowledge of linguistic forms. Research findings from studies investigating the impact of interactional feedback (e.g., recasts) on L2 development have generally yielded positive results (Loewen & Philp, 2006; Mackey, 2006; Oliver & Mackey, 2003; Sheen, 2004).

At the other end of the spectrum, research by DeKeyser (1997, 1998) argues that explicit grammar instruction (or Focus on FormS) outside of communicative practice plays an important role in second language acquisition. For DeKeyser (1995, 1997, 1998), explicit instruction on grammatical rules is critical for second language acquisition in that it provides access to declarative knowledge, which, through practice, can be converted into procedural and automatized knowledge. This work draws from Skill Acquisition Theory (Anderson, 1987, as cited in DeKeyser, 1997) and assumes a strong interface position (i.e., declarative knowledge can

[10] Doughty's (1991) study is limited due to the small *n*-size in each group.

be converted into procedural knowledge). Importantly, this approach to grammar instruction does not eschew meaning-based communicative practice altogether, but, instead, argues that engagement in communicative drills (e.g., multiple-choice, fill-in-the-blank, and/or sentence combination) prior to meaning-based communicative practice augments a learner's chances to notice grammatical forms and convert input to intake within a language classroom.

As an alternative to the proposals for *focus on form* (Long, 1996) and *focus on formS* within communicative tasks (DeKeyser, 1995, 1997, 1998), Sharwood Smith (Sharwood Smith, 1993) and VanPatten and colleagues (Cadierno, 1995; VanPatten, 1990, 1996, 2002; VanPatten & Cadierno, 1993) take a meaning-based approach to grammar instruction. On this view, explicit teaching of grammatical rules may be counterproductive for language acquisition since it does not take into consideration how learners process input. Sharwood Smith (1993), for instance, suggests that input-enhancement which makes grammatical forms in the input more salient to language learners may facilitate language acquisition by helping learners to notice (and potentially process) particular features of the input. VanPatten formalizes many of the ideas from input-enhancement theory in his approach to grammar instruction, which is more formally known as input-processing instruction (VanPatten, 1996, 2002).

According to VanPatten (1996), the goal of input-processing instruction is: "to alter the processing strategies that learners take to the task of comprehension and to encourage them to make better form-meaning connections than they would if left to their own devices" (p. 60). This type of instruction builds upon research on human language processing from cognitive science and, therefore, recognizes that humans have limited processing capacities which restrict the amount of linguistic features that can be attended to while comprehending language input. That is, learners typically attend to forms with high communicative value (e.g., content words) before

attending to redundant features such as morphology which may not be attended to at all due to the depletion of a learner's attentional resources. According to VanPatten (1996), the acquisition sequence is linear and contains three principal processes. The first of these processes (stage I) is central to input processing theory and it occurs when input becomes intake as the learner notices and processes language from the linguistic environment. Referring to this initial process in second language acquisition, Cadierno (1995) writes, "input processing involves those strategies and mechanisms that promote form-meaning connections during comprehension" (p. 181). At the second stage (stage II), intake becomes available to the developing system which results in restructuring of the developing system. Not all intake reaches this developing system. At the final stage (stage III), the language that the learner has integrated into the developing system is available for productive use (i.e., output).

Figure 3 illustrates how traditional grammar instruction interacts with VanPatten's model of grammar instruction. As shown in Figure 3, traditional grammar instruction typically focuses on getting learners to produce the target structure, which may enhance fluent language production, but cannot directly impact the developing system because the entire process of second language occurs in linear order from stage I to stage III. VanPatten and colleagues (1993, 1996) argue for a different approach to grammar teaching, one that focuses on altering the way that second language learners perceive input in order to directly affect learners' developing language systems. This approach is outlined in Figure 4 below.

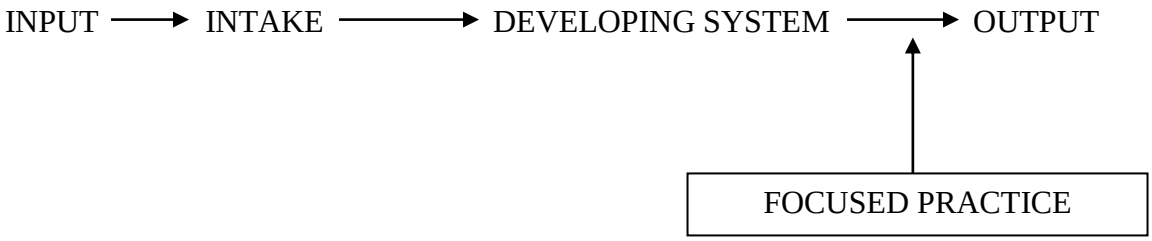

Figure 3. A model of traditional grammar instruction (source: Cadierno, 1995)

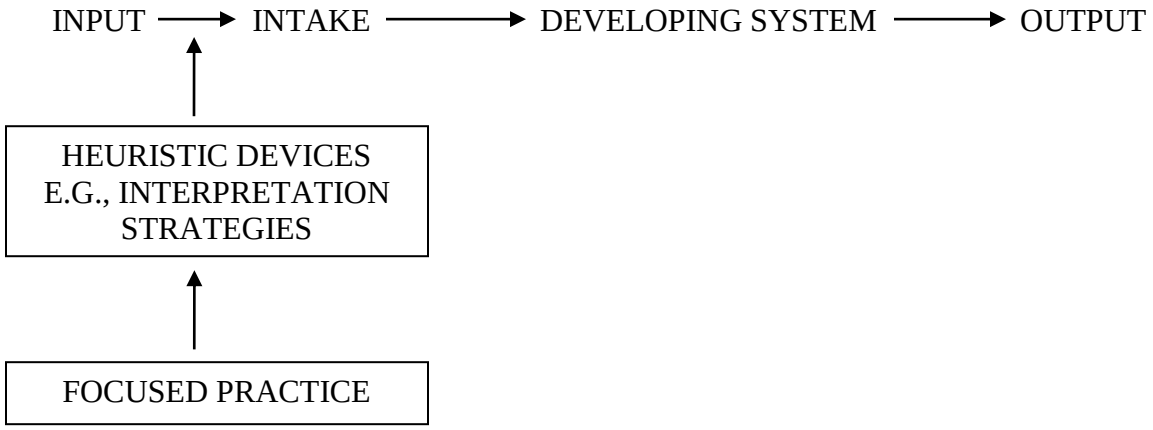

Figure 4. Processing instruction in foreign language teaching (source: Cadierno, 1995)

Thus, processing instruction takes into account how second language learners process input in order to formulate a methodology for more effective language teaching. VanPatten (1996) describes the goal of processing instruction thus:

> The goal of processing instruction is to alter the processing strategies that learners take to the task of comprehension and to encourage them to make better form-meaning connections than they would if left to their own devices. To achieve this, processing instruction has three key components:

(1) explanation of the relationship between a given form and the meaning it can convey.

(2) information about processing strategies, showing learners how natural processing strategies may not work to their benefit

(3) "structured input" activities in which learners are given the opportunity to process form in the input in a "controlled" situation so that better form-meaning connections might happen compared with what might happen in less controlled situations (p. 60).

Research based on this theory has consistently revealed that activities that focus learners' attention on form-meaning connections while processing input does make a difference for second language learning and that learners who receive input-processing instruction may outperform learners who engage in traditional output practice alone (Benati, 2001; Cadierno, 1995; VanPatten, 1990, 1996, 2002; VanPatten & Cadierno, 1993). For instance, VanPatten and Cadierno (1993) conducted a study comparing input-processing instruction to traditional form-focused instruction that investigated how students in a second year university level Spanish class processed input containing non SVO word order in Spanish after receiving either processing instruction or traditional instruction when compared to a control group that received no instruction on non SVO sentences. The results revealed that the difference between the processing instruction group and the traditional instruction group was significant between pretest and posttest performance on interpretation tasks. They argue that the enhanced performance of the processing group on the interpretation task is due to the fact that this group has made appropriate form-meaning connections while processing input. Additionally, they found no significant difference in pretest to posttest performance between the two instructed groups on the

production task. Based on this finding, they claim that processing instruction impacted the learners' developing systems and made forms that had not been directly practiced available for production. Conversely, the group that received traditional instruction and output-practice with non SVO sentences did not learn to interpret non SVO sentences. The researchers interpret this result in light of Krashen's distinction between acquired competence and learned competence, with traditional instruction catering to the latter of these two competencies.

Following VanPatten and Cadierno's (1993) example, a number of other studies have investigated the effects of processing instruction when compared to traditional grammar instruction on a wide range of L2 morphological features. Cadierno (1995), for instance, investigated the influences of processing instruction and traditional instruction on the production and interpretation of Spanish past tense morphology. She noted that in previous research (e.g., Terrell, 1991) it was determined that L2 learners often relied on lexical strategies (i.e., use adverbs of time) instead of using grammatical markers (i.e., past tense verbal morphology) to interpret Spanish past tense. Similarly, Benati (2001) investigated the effects of processing when compared to traditional instruction on the acquisition of the future tense by second semester Italian students. Both studies found that the processing instruction group outperformed the traditional instruction group on interpretation tasks and, furthermore, that there was no difference between instructed groups on production tasks. These results are similar to those found in VanPatten and Cadierno's (1993) original study and they seem to indicate that processing instruction works for teaching the Italian future tense and Spanish past tense.

When taken together, the evidence provided by these studies supports the view that language instruction is an effective method for promoting L2 grammatical competence (see Norris & Ortega, 2000 for full review). However, previous research has not addressed whether or

not instruction is beneficial for the L2 acquisition of English derivational morphology. This is not to say that there is no research on L2 instruction on derivational morphology since several studies have been conducted on the effect of instruction on learning derivational morphology in L2 Spanish (Morin, 2003, 2006). Morin (2003) investigated if explicit strategy instruction on derivational morphology influenced general vocabulary knowledge and/or productive and receptive morphological knowledge among undergraduates (L1 English) in the first and second semester of college Spanish. She hypothesized that awareness of derivational morphemes would lead to enhanced vocabulary knowledge as well as better performance on receptive and productive tasks involving knowledge of derivational morphology. This hypothesis received marginal support through quantitative statistical analysis in that instruction was only beneficial for the more advanced (i.e., second semester) learners on the test of productive morphological knowledge. Error analysis, however, revealed a more positive effect of instruction in that learners from the first and second semester of college Spanish who received instruction on derivational morphology made more attempts to produce novel derived forms. Similarly, Morin (2006) found that explicit strategy instruction on Spanish derivational morphology enhanced receptive and productive derivation abilities among third semester L2 learners of Spanish, but had no effect on their vocabulary size.

Morin's studies suggest that explicit strategy instruction on derivational morphology may be beneficial for second-semester and third-semester L2 learners of Spanish; yet, many questions still remain regarding the effectiveness of instruction on derivation in English and whether different types of instruction (e.g., implicit versus explicit) yield different outcomes. In particular, two research questions that need to be addressed in future research are:

(1) Does instruction matter for the teaching of English derivational morphology?

(2) If so, which type of instruction works the best for promoting derivational knowledge?

4.2 THE CASE FOR PUSHED OUTPUT IN SLA

The adage "practice makes perfect" is commonly recited by language teachers as a rationale for output activities in an ESL classroom, but how accurate is this statement for describing what language learners are actually learning while participating in output practice? The previous section presents research on the output hypothesis and provides empirical support for its effectiveness in SLA; however, it does not go into any great degree of detail to explain why output practice might be an effective means for promoting second language development from a psycholinguistic perspective. Hence, the aim of this section is to describe in detail why language production or "pushed output" might be a more effective means for promoting second language development than an input condition.

4.2.1 The generation effect in cognitive science

The generation effect pertains to the observation that items that are generated are remembered better than items that are read. This effect has received widespread support in cognitive science literature as a robust phenomenon of memory (Burns, 1990; Crutcher & Healy, 1989; DeWinstanley & Bjork, 2004; Hirshman & Bjork, 1988; Slamecka & Graf, 1978). Slamecka and Graf (1978) for instance, investigated whether a self-generated word was remembered better than a word that was externally generated using tests of recognition and recall. In a series of five

experiments, they consistently found that the generation effect applied to both the recognition and the recall of generated items in that items that were generated were remembered better than items that were read. Importantly, later work extended the generation effect beyond the paired associate experimental paradigm to include a generation advantage for other domains such as multiplication tables (Crutcher & Healy, 1989) and words presented in a longer text (DeWinstanley & Bjork, 2004).

Beyond confirmatory research, other studies have sought to uncover the cognitive motivations for the generation advantage. Many studies on the generation effect have considered single-factor explanations. The lexical activation hypothesis (e.g., McElroy & Slamecka, 1982) is one such single-factor theory that has been proposed to explain the advantage of generation. On this view, the generation effect occurs because semantic features are activated during generation and can later be retrieved more easily from memory than read items which do not activate semantic features. Alternatively, proponents of the cognitive effort account claim that the generation advantage results from the increased depth of processing (e.g., Craik & Lockhart, 1972) that occurs during generation (for full review of this work, see Hirshman & Bjork, 1988).

Although the lexical activation hypothesis and the cognitive effort account present conflicting views on the source of the generation effect, Crutcher and Healy (1989) argue in their cognitive operations hypothesis that the two views are not by nature incompatible. As such, they claim that, "it is not essential that the subjects generate or produce the stimulus, but rather it is essential that the subjects engage in the auxiliary cognitive operations linking the stimulus to other information stored in memory" (p. 670). In other words, both the lexical activation hypothesis and the cognitive effort account claim that the generation effect occurs because of "the inducement of auxiliary mental processes or cognitive operations" (p. 670). Crutcher and

Healy (1989) found support for the cognitive operations hypothesis by using a within-subjects GLM repeated measures design with 2 (cognitive operations: other generated vs. self generated) x 2 (stimulus presence: present vs. absent) as independent variables and score on a recall task as the dependent variable. This analysis revealed a main effect for cognitive operations and that items that required the subject to produce something were recalled better than items that involved no generation on the part of the subject; however, the presence or absence of the stimulus during the training task had no effect on recall. These results were compatible with the cognitive operations hypothesis in that the subjects had to perform cognitive operations in order to take advantage of the generation effect. Generation performed by an outside source (e.g., calculator) did not induce the generation effect.

The results from these studies indicate that generating an item facilitates higher levels of retrieval and recall than does reading an item; however, research has revealed that the way in which the to-be-read items are presented influences performance on reading tasks (Burns, 1990). DeWinstanley and Bjork (2004), for instance, show that once learners realize that generation leads to better learning, they may adopt different strategies for the reading-only tasks, which compensate for poor performance on reading conditions and make performance on to-be-read items comparable to performance on to-be-generated items. In other words, learners can be primed to perform equally well on to-be-read and to-be-generated items under the right conditions. Nonetheless, this finding does not weaken the claim for a generation advantage since generation represents a "natural" memory advantage that supersedes strategy usage.

The generation effect has not, to my knowledge, been applied to second language acquisition; yet, it connects rather nicely with the pushed output hypothesis (Swain, 1985, 1998, 1999) in SLA in that both theories view output as an important ingredient in information

retention. The next section elaborates on the psycholinguistic rationale for the pushed output hypothesis in order to situate the "generation advantage" within the domain of second language learning and to make a case for the benefits of output-based instruction over other types of instruction.

4.2.2 Psycholinguistic motivation for pushed output in SLA

The results of some studies comparing input-processing instruction to pushed output instruction indicate that pushed output instruction is more beneficial than input-enhancement instruction in the SLA of English grammar. Izumi (2002), for instance, conducted a controlled experimental study with a pretest-posttest design that compared relative clause learning among five groups that varied in terms of +/- input enhancement (IE) and +/- output (O). In all, there were four experimental groups (+IE+O, +O-IE, -O+IE, and –O-IE) and a control group that received no treatment, but participated only in the pretest and posttest. The input enhancement was provided in the form of an enhanced text. For the pushed output condition, students were asked to reconstruct the original text using notes that they had taken while reading. All of the experimental groups took notes while reading in order to provide the researcher with evidence of noticing. The results of this experiment revealed that the output groups demonstrated a statistically significant improvement in relativization abilities over the input-enhancement groups. Izumi (2002) explains that the benefits of output on relative clause learning are likely to come from the enhanced depth of processing as well as the type of integrative processing that were involved in the text reconstruction. To relate this to the generation effect, we might say that since the output subjects were required to perform cognitive operations through textual

generation, they were able to establish stronger memory representations of relative clause structures than students in the input-enhancement conditions.

Beyond experimental work on the output hypothesis, several researchers have sought to situate the output hypothesis within Levelt's (1989) speech production model (de Bot, 1996; Izumi, 2003; Kormos, 1999). This model is displayed as Figure 5 and is composed of five principle components: the *conceptualizer,* the *formulator,* the *articulator,* the *audition,* and the *speech comprehension system.* Linguistic knowledge is fed into this system from memory representations of *discourse models, situation knowledge,* the *encyclopedia* and from *lemmas* and *forms* which are stored in the *lexicon.* During speech production, a speaker draws upon linguistic knowledge of discourse models, situation knowledge, and the encyclopedia in order to generate a preverbal message within the conceptualizer. Once this preverbal message is generated, it is sent to the formulator whereby it undergoes grammatical and phonological encoding through access to the lemmas and forms which are encoded in a generative lexicon. The output of the formulator is a phonetic plan (or internal speech) which serves as the input to the articulator and the speaker's internal speech comprehension system. At this stage, there are two routes for a phonetic plan. The first route is that the phonetic plan is sent to the speech comprehension system for parsing and then transmitted back to the conceptualizer for internal monitoring. This feedback loop allows speakers to internally monitor their own speech prior to producing any overt speech via the articulator. The second route is for the phonetic plan to be transmitted to the articulator in order to be converted into overt speech. Overt speech functions as the input to the audition which generates a phonetic string to feed the speech comprehension system. The speech comprehension system interprets the phonetic string and generates parsed speech which is fed into the monitor for internal monitoring.

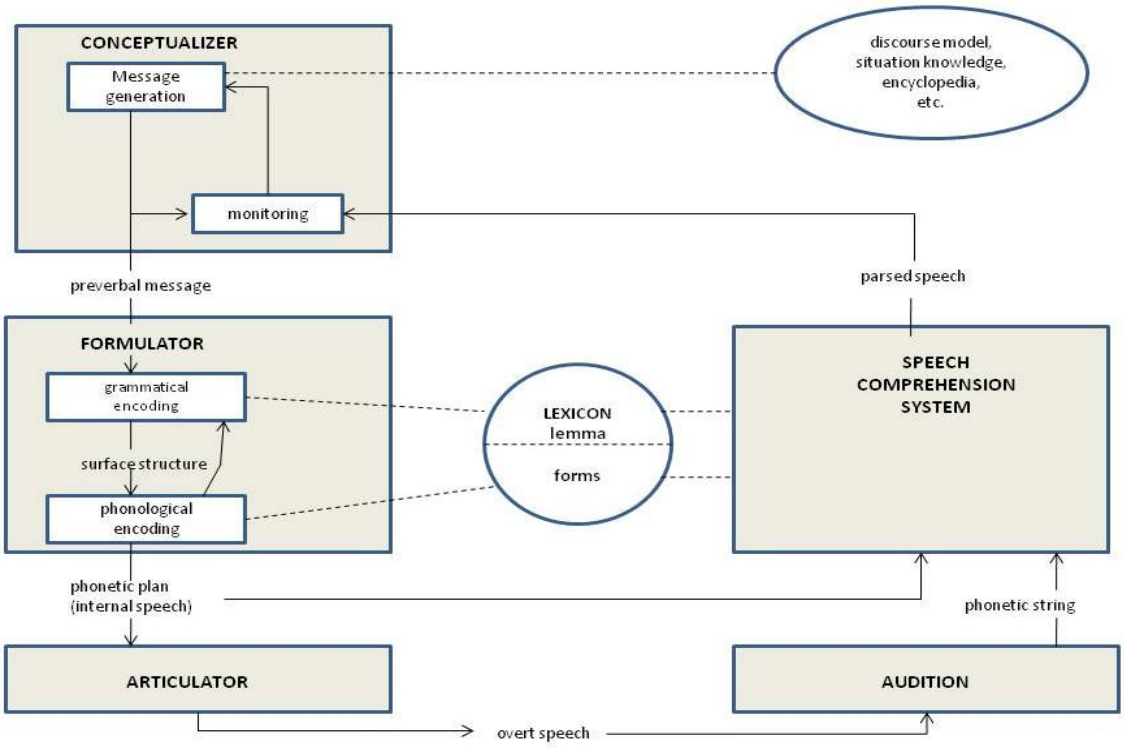

Figure 5. Levelt's speech production model (Levelt, 1989)

Despite its origins as a model for L1 speech, SLA research indicates that Levelt's (1989) model may also be viable for modeling L2 speech production despite differences between L1 and L2 speech processing (de Bot, 1996; Izumi, 2003; Kormos, 1999). The first difference is that the L2 grammatical encoding differs from L1 grammatical encoding in that it is not fully proceduralized. In other words, L2 learners' abilities to perform grammatical encoding will be strongly influenced by the amount of declarative knowledge and the availability of memory resources during grammatical encoding (Kormos, 1999). A second difference concerning L1 and L2 grammatical encoding is that grammatical encoding can be bypassed altogether during speech comprehension (Izumi, 2003; Swain & Lapkin, 1995). The finding that L2 learners process meaning before they process form during speech comprehension has been well established within SLA research (e.g., VanPatten, 1990, 1996).

In connection with L2 learners' limited capacity to perform grammatical encoding when when comprehending a second language, deBot (1996) proposes that the primary function of output is to promote language fluency by converting declarative knowledge into procedural knowledge through grammatical encoding and internal monitoring. Speech that is generated internally and externally is fed back into the conceptualizer for internal monitoring based on a learner's declarative knowledge. If the generated speech is consistent with the learner's internal standards (positive evidence), automatization results because, "the system does not get error messages about the result of this connection; hence the strength of this connection increases" (deBot, 1996, p. 549). On this view, output does not generate new knowledge, but reinforces declarative knowledge that has already been acquired. In related work, Izumi (2003) claims that the function of output in SLA goes beyond promoting language fluency since it prompts learners to utilize strategic learning processes such as hypothesis testing and metalinguistic reflection as learners 'notice gaps' within their own interlanguage systems through internal monitoring mechanisms. Izumi (2003) writes,

> …output triggers chains of psycholinguistic processes that are conducive to language learning. In other words, output processing engages important internal procedures such as grammatical encoding and monitoring, which prompts the learners to interact actively with the external environment to find a solution (e.g., attend selectively to certain aspects of the input) or to explore their internal resources for possible solutions. Output, thus, serves as a useful means to promote the interaction between the learner internal factors (including selective attention and their developing L2 competence) and environmental factors (input, interaction, and pedagogical intervention), or the interaction within the learners themselves for internal metalinguistic reflection (p. 187).

Importantly, output forces learners to perform grammatical encoding operations within their own individual interlanguage systems that may otherwise be bypassed during language comprehension or input processing.

4.2.3 Hypotheses

Despite the divergence in theoretical perspectives, research from both theoretical positions (input processing and pushed output) supports the notion that instructed SLA is beneficial for second language acquisition. Hence, one prediction is that both types of instruction will lead to significantly higher accuracy on derivational morphology from pretest to posttest. However, in terms of which type of instruction will be more beneficial for teaching derivational morphology, pushed output instruction is hypothesized to be more effective than input-processing instruction in the teaching of derived words because it pushes learners to perform deeper processing of derivational morphology than they would during an input-processing treatment.

5.0 SOCIOCULTURAL THEORY AND MORPHOLOGICAL DEVELOPMENT

5.1 SOCIOCULTURAL THEORY

Based on Vygotsky's (1978) work on child learning, Sociocultural theory (or SCT) has emerged in recent SLA research as an alternative to formal theories on language development. Vygotsky's (1978) work was unique for its time in that it incorporated cultural and historical forces into the domain of psycholinguistics during an era that was predominated by the idea that language was governed by an innate grammar module that was activated through exposure to language (e.g., Chomsky, 1965). According to Vygotsky (1978),

> Our concept of development implies a rejection of the frequently held view that cognitive development results from the gradual accumulation of separate changes. We believe that child development is a complex dialectical process characterized by periodicity, unevenness in the development of different functions, metamorphosis or qualitative transformation of one form into another, intertwining of external and internal factors, and adaptive processes which overcome impediments that the child encounters (p. 73).

As this quote implies, cognitive development in SCT involves much more than the gradual accumulation of pieces of knowledge over developmental time or the activation of mental processes via environmental stimuli. On this view, development occurs through a complex interaction between biologically endowed mechanisms (i.e., attention and perception) and

culturally relevant artifacts (i.e., signs and tools). Higher psychological processes emerge as children learn to use cultural artifacts to regulate voluntary mental functions. Hence, cultural artifacts, which serve as mediators in cognitive function, come to play a crucial role in understanding cognitive processes such as language development. Citing Wertsch (1995, p. 56), Lantolf and Thorne (2006) explain that, "the goal of [sociocultural] research is to understand the relationship between human mental functional, on the one hand, and cultural, historical, and institutional setting, on the other (p. 3)."(For a more detailed review of Vygotskian psychology, see Lantolf & Thorne, 2006).

5.2 ACTIVITY THEORY

Even with the right type of instruction and "full access" to nativelike processing mechanisms, second language learners may not succeed in learning in their endeavor to acquire a second language due to factors such as motivation and sociocultural background. In order to more fully understand the role of these factors in a learning context, many researchers have turned to Activity Theory (AT) in order to understand how learners' goals and motivations for learning come to shape and transform the activity of learning a foreign language in a classroom context (Donato & McCormick, 1994; Juffs et al., 2010; Lantolf & Genung, 2002). Activity Theory was developed from Vygotsky's developmental theory by A.N. Leont'ev (1981). Despite the general agreement between these two theories in emphasizing participation in culture as a prerequisite for the development of higher order mental functions, these approaches differ in that Activity

Theory views participation in human activity as the fundamental domain for the analysis of cognitive development. Lantolf and Thorne (2006) explain that

> The unifying element and fundamental unit of analysis [for Activity Theory] is the activity itself. "Activity"… describes a powerful dialectic rooted in contradictions such as thinking and doing, knowing and performing, individual and society, idealism and materialism, use-value and exchange-value, and internalization and externalization. Learning can be seen as a resolution, often ephemeral, to these tensions that produce changes in the conceptual, social, and material conditions of one's everyday life. These changes, in turn, create new contradictions (or opportunities for development) (p. 209).

In other words, learning within the AT framework can only be understood by thoroughly analyzing the tensions and interactions between culture, society, and the individual learner as they occur in a typical learning environment (i.e., a foreign language classroom). Activity theory provides a means for studying these complex tensions and interactions in that culturally defined objects are linked to motives within human activity (Engestrőm, 2001; Leont'ev, 1981). In other words, objects could be defined as end-goals and motives could be defined as reasons (i.e., psychological or institutional) for wanting to attain these end-goals. The subject's role in an activity is to provide the motive and define the actions and operations that will be taken in order to reach the cultural object. Here, an action describes the conscious behavioral component of an activity (i.e., what the subject plans to do to) and an operation defines the unconscious behavior within an activity (i.e., what the subject actually does).

5.2.1 Activity Theory Framework

As depicted in Figure 6, objects are linked to motives through actions and operations within a mediated activity. In this case, an ESL learner may want to attend college in an English-speaking context (motive or goal). In order to attain this goal, she needs to acquire proficiency in English (object), so she enrolls in an ESL program in the U.S. which provides her with instruction in ESL (mediated activity). During the activity, her motives and goal-directed actions and operations may shift in accordance with her beliefs about the value of the activity and in conjunction with external motives (e.g., teacher's motives) that are imposed upon the activity.

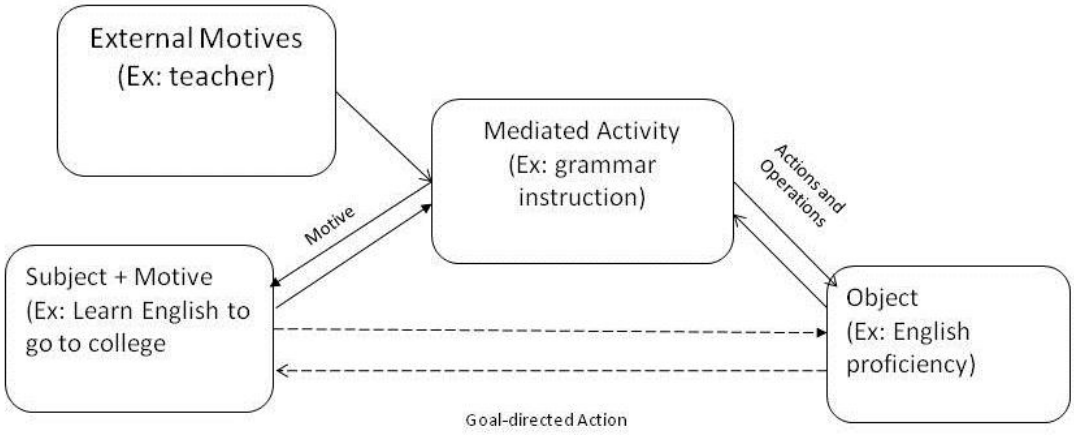

Figure 6. Activity Theory Framework

Over the past two decades, activity theory has been employed in multiple SLA studies in order to understand how learners' goals and motivations for learning come to shape and transform the activity of learning a foreign language in a classroom context (Donato & McCormick, 1994; Juffs et al., 2010; Lantolf & Genung, 2002). Donato and McCormick (1994) investigated the development of strategy use (goal-directed action) within the context of a college French course through a student portfolio project. In the context of this study, the

portfolio project served as a cultural mediation device (activity) for socializing students into effective strategy use for learning French (goal). That is, the portfolios gave students opportunities to reflect on their goals for learning French and, importantly, the actions that they were taking in order to achieve those goals. They found that the portfolio project guided students towards more effective strategies (goal-directed actions) for language learning. Crucially, this study not only suggests that modifications to the classroom culture (activity) can induce positive changes in how students apply goal-directed actions.

In contrast to the positive effect of cultural mediation in Donato and McCormick (1994), Lantolf and Genung (2002) and Juffs et al. (2010) show that the classroom culture can also negatively influence students' goal-directed actions. Lantolf and Genung (2002) investigate one student's (PG) failed attempt to acquire Chinese within a highly uncomfortable teacher-oriented classroom. They note that the learner was highly motivated and experienced language learner and was also a PhD student in linguistics with a specialization in second language acquisition. Hence, PG entered the Chinese classroom with the high expectations of learning to communicate effectively in Chinese by engaging in communicative practices within the classroom. To her dismay, however, she found that the teacher did not engage students in communicative practice, but instead focused on correcting their errors in pronunciation and syntax in a highly teacher-centered fashion. This teacher-oriented practice largely continued throughout the semester despite PG's attempts to speak to the language instructor (and the Chinese department) about instituting changes in teaching methods. This research reveals that teachers and students may have the same goal (object) in mind (e.g., learn Chinese) even though they may have very different beliefs about the actions that are required to achieve these goals. In this case, PG and her instructor hold very different beliefs about how language is acquired and learned (actions).

PF ultimately adopts (very unwillingly) the actions that are valued by the instructor; however, PG's motive of learning Chinese to communicate (higher-order goal) shift to learning enough Chinese to pass the class (lower-order goal).

In a more recent study using Activity Theory, Juffs et al. (2010) report on how students in an ESL reading class interacted with an integrated CALL component (i.e., REAP) that was intended to promote vocabulary learning through extensive reading. This study included quantitative measures to assess vocabulary learning gains as well as qualitative measures (surveys, classroom observations, and focus group interviews) to uncover students' attitudes and beliefs about REAP as well as their motivations for learning English. As in Lantolf and Genung (2002), the results of this study revealed that REAP (cultural mediator) transformed students' motives and actions in ways that were not compatible with their goals, and, moreover, led students to use REAP in ways that were contrary to the teachers' and researchers' intent and not necessarily directed at vocabulary learning through extensive reading. For instance, many Arabic-speaking students were observed speeding through the readings just to get to the vocabulary exercises at the end of each reading. In this case, students' operations while using the tool indicated that they were not concerned with learning vocabulary through extensive reading, which was the high-order goal that the teachers and researchers had established, but, instead, concerned with getting through the reading as fast as possible in order to complete the task (lower-order goal). Although many students reported in qualitative surveys that their goals for learning English were to speak with native speakers and/or to enter an English-speaking university, the actions (complete the task) and operations (go as fast as possible) that they exhibited while using REAP were incompatible with higher-order goals. When asked to compare the traditional reading classroom to the REAP classroom during the focus group interviews,

students reported that vocabulary learning through REAP was boring when compared to the interactive, teacher-directed vocabulary learning that students were used to within their reading classrooms. The researchers report that it is likely that these attitudes and beliefs towards REAP versus the reading classroom shaped their motives when engaged in REAP and led to *negative* transformations in goal-directed actions.

The Juffs et al. paper is also unique in that it unites quantitative and qualitative methods in the study of student vocabulary learning. As they demonstrate in this paper, this type of research was important for showing that although students' performance on quantitative measures reflected no differences among language learners from diverse cultural and linguistic backgrounds, qualitative measures revealed that students from different groups displayed a range of different behaviors based, at least in part, on their cultural and linguistic background. For instance, in contrast to the Arabic-speaking students who tended to speed through multiple readings during a REAP session, Korean-speaking students tended to read articles very slowly in an effort to understand every word. The point here is that by only looking at quantitative data, researchers miss out on the rich qualitative data that can be derived from student interviews and observations. In other words, it is legitimate to focus on quantitative measures in conjunction with qualitative measures in order to develop a more complete picture of a learning activity. In particular, the following general research questions (and subquestions) are crucial to understanding the process of morphosyntactic development from a sociocultural perspective:

(1) What are ESL learners' goals for learning English? (goals)

(2) How do ESL learners study multimorphemic words? (actions)

(3) How does an ESL learner's background influence morphological learning?

5.2.2 Activity Theory and Morphosyntactic Development: Key Predictions

In contrast to the more formal morphological theories presented in this paper, Activity Theory does not make any specific predictions related to whether second language learners will succeed or fail in their endeavor to acquire second language morphology. Instead, the main prediction based on an activity theory framework is that students' learning of derivational morphology within the two conditions will be affected by their sociocultural backgrounds and beliefs about language learning, which are based on their prior experiences learning English in their home country. For instance, one might expect that students who know the importance of derivational morphology for learning English would exhibit different behaviors (e.g., integrating derivational morphology into vocabulary strategies) than those who do not believe that derivational morphology is important for success in English.

6.0 THEORETICAL FRAMEWORK

6.1 CONNECTING RESEARCH AND PRACTICE IN SLA

The issue of L2 morphological learning is a familiar topic to applied and theoretical linguists alike, and studies from these approaches have yielded many important insights into L2 morphological learning. However, one cannot help but note the disassociation between theoretical linguistics and applied research in terms of research findings related to derivational morphology. Theoretical accounts, with their emphasis on uncovering the mechanisms underlying L1 and L2 acquisition, often paint a bleak picture of the L2 learning of derivation in that L2 learners will always be impaired in morphological learning/production due to either impairments to underlying mechanisms (Bowden et al., 2010; Clahsen et al., 2010) or mapping problems between the syntax and morphology (Lardiere, 1998a,b; Prévost & White, 2000). Although a portion of this research addresses L2 derivational learning, it has no real application to L2 instructional contexts (other than L2 learners may need to memorize derived words as whole-units). Alternatively, applied accounts of L2 morphology acquisition present the view that grammar (including morphology) is learnable through classroom instruction (Norris & Ortega, 2000) and may be affected by learner characteristics and contextual variables (Lantolf & Thorne, 2006). The problem with these accounts, however, is that they address how L2 learners acquire inflectional morphology (VanPatten, 1996) and other syntactic phenomena (Doughty, 1991;

Izumi, 2002) and rarely address L2 learning of derivational morphology (see Morin, 2003, 2006 for exceptions). Hence, there is a clear need for research that connects theoretical findings on derivation with applied classroom instructional practices.

In connection with this need in SLA research, the ultimate purpose of this dissertation is to investigate the effects of instruction on the acquisition of L2 derivational morphology. The first study presents exploratory research that was designed to investigate how native speakers and L2 learners compare on a series of tasks that assess derivational morphology. This study does not, per say, address the larger issue of whether or not instruction helps in the L2 acquisition of derivation; however, it provides a strong foundation for the second study in that it shows what L2 learners need to learn about derivational morphology in order to reach native-like levels of language competence. In other words, the purpose of Study 1 is to uncover which aspects of derivational knowledge are most difficult for L2 learners so that an appropriate instructional intervention can be designed. Studies 2 and 3 follows from the results of Study 1 and investigate the effects of two different types of language instruction (VanPatten's input-processing vs. Swain's pushed output model) on the second language acquisition of derivational knowledge using a mixed-method design. More specifically, these studies connect quantitative behavioral measures from linguistics and cognitive psychology with qualitative measures such as surveys, interviews, and observations that are prominent among proponents of Activity Theory (e.g., Donato & McCormick, 1994; Juffs et al., 2010, Leont'ev, 1981; Lantolf & Thorne, 2005; Thorne, 2005).

6.2 STUDY 1

6.2.1 Research context

Research from first language acquisition provides a relatively clear account of the development of derivational knowledge in child language acquisition. We know, for instance, that zero-derivation arises early in child language acquisition (Clark, 2001), that derivational knowledge correlates with vocabulary size (Anglin, 1993) and reading ability (Carlisle, Stone, & Katz, 2001), that derivational knowledge (relational, syntactic, and distributional: Tyler & Nagy, 1989) and decompositional abilities (Carlisle & Fleming, 2003) develop gradually throughout elementary and middle-school, and that affix characteristics (neutral and non-neutral affixes) may influence a child's ability to read derived words (Carlisle et al., 2001). In contrast, research in L2 acquisition provides a limited account of what L2 learners know about derivational morphology. Schmitt and Meara (1997), for instance, show that increases in L2 vocabulary size among EFL Japanese students do not necessarily correlate with increases in knowledge of verbal derivational suffixes. Even though these learners may have known one member of a word family, they generally had very poor knowledge of derived members of the same word family. Schmitt and Zimmerman (2002) have also taken up this issue in a study of derived word knowledge among undergraduate and graduate university students at advanced levels of language proficiency. The results of this study show: (1) that knowledge of one member of a word family does not imply that such knowledge will have a facilitative effect on productive knowledge of other members of a word class (i.e., derivates) even among the most advanced L2 speakers, (2) that verbal and nominal derivates are generally easier to produce than adjective and adverb

classes, and (3) that knowledge of derivates increases slightly as a function of language proficiency. These studies indicate that L2 learners have poor knowledge of derived words; however, they provide little indication as to what L2 learners know about derivational morphology in its own right and how they use morphological information during lexical processing.

In light of this gap in previous research, the purpose of Study 1 is to establish what L2 learners know and do not know about derivational morphology. This study aims to provide the foundation for a classroom intervention study by providing insights into the features of derivational morphology that present the most difficulties for L2 learners. In other words, before we teach derivational morphology in an ESL classroom, we need to know *what* exactly L2 learners need to learn about derivational morphology and how factors such as language proficiency and L1 influence might impact such knowledge.

6.2.2 Study 1 Research Hypotheses

Study 1 tests the following research hypotheses and sub-hypotheses:

(1) Native speakers (NS) are more sensitive to constraints on affix productivity and attachment than NNS.

(2) NS are more sensitive to relationships among derived words that share combinations of orthography, phonology, and meaning than NNS.

(3) NS are more sensitive to morphological relations such as bases and affixes when analyzing complex words than NNS.

(4) More proficient learners will know more about morphology than less proficient learners.

(5) L1 transfer influences L2 performance on morphological tasks.

- Speakers of a European language score higher on morphological tasks than learners from non-European languages (e.g., Chinese)

6.3 STUDY 2

6.3.1 Research context

Study 2 is designed to test the effectiveness of input-processing instruction and pushed output instruction on the development of L2 derivational knowledge. This study follows from the results of Study 1 in that it focuses on areas of weakness in the second language learning of derivational morphology. In particular, this study will provide instruction on: (1) constraints on affix attachment (e.g., affix ordering) and (2) relational knowledge between base words and related derived words (e.g., *creation* and *creative* are related to the base *create*), which were areas of concern within Study 1. This study is important because it bridges a gap between linguistic theories and applied classroom practice and aligns with current practices in learning science research. Nathan and Wagner-Alibali (2010: 1) explain, "the aims of the learning sciences are to understand the nature of learning from a broad range of perspectives, and to shape the ways that learning environments and resources are designed and used" (p. 1). From this perspective, Study 2 aims not only to advance our theoretical understanding of L2 derivational knowledge, but also

to connect theoretical findings from a broad range of research domains (linguistics, psycholinguistics, cognitive psychology) with practical classroom applications.

6.3.2 Study 2 Research Hypotheses

Study 2 tests the following research hypotheses regarding the effectiveness of L2 instruction on derivational knowledge:

(1) Instruction (of any type) on derivational morphology leads to enhanced productive and receptive knowledge of derivational knowledge from pretest to posttest.

(2) Pushed output instruction is more effective than input-processing instruction for teaching derivational morphology.

(3) Pushed output instruction leads to better long-term retention than input-processing instruction.

6.4 STUDY 3

6.4.1 Activity Theory and morphosyntactic development

The purpose of study 3 was to understand how factors such as participants' English-learning backgrounds, beliefs about language learning, and goals for language learning influenced morphological learning over the course of the morphology training. Here, activity theory provides an important framework for analyzing how the introduction of a cultural artifact such as a morphology intervention influences and transforms student action in the process of learning

derivational morphology. In addition, activity theoretic literature makes a strong case for research that can combine quantitative results with qualitative observations in the study of language learning behavior. Therefore, it is legitimate for the research in this dissertation which focuses on the acquisition of derivational morphology in a second language to incorporate both formal SLA theories and sociocultural theory in order to more fully understand how students learn and process derivational morphology within the context of an ESL classroom as well as to understand how their previous experiences with morphological learning (e.g., explicit knowledge) influence morphological learning.

6.4.2 Study 3 Research Hypothesis

(1) Students attitudes and beliefs about morphological learning will influence the effectiveness of the morphology training.

7.0 STUDY 1

7.1 INTRODUCTION

The purpose of Study 1 is to establish what L2 learners know and do not know about derivational morphology and how factors such as L1 background and L2 proficiency influence such knowledge. Previous investigations of L2 morphological knowledge have been instrumental in developing an understanding of how adult L2 acquisition diverges from child L1 acquisition in terms of the processing mechanisms involved in L2 acquisition. Nonetheless, these studies are limited in that they do not offer any real solutions to the problem of L2 derivational morphology, nor do they explain what exactly L2 learners know and do not know about derivational morphology. The present study contributes to SLA research and practice by investigating L2 derivational knowledge in greater detail.

7.2 RESEARCH QUESTIONS

Four research questions guide Study 1:

(1) Does proficiency matter for L2 derivational knowledge?

(2) Does L1 matter for the acquisition of derived words in an L2?

(3) Do NS and NNS differ in terms of morphological knowledge?

(4) What do L2 learners know and not know about English derivational morphology?

7.3 METHOD

7.3.1 Participants

A total of 81 adult subjects participated in this study. Twenty-three subjects were native speakers of English at a large public university. All native speakers participated in this experiment in the fall of 2009 in order to fulfill a course requirement for an introductory psychology course. Of the 23 native speakers, three subjects reported being fluent in another language besides English, but since these subjects reported that English was their native language, they were not excluded from this study. Fifty-eight subjects were second language learners of English who were enrolled in an intensive English program at a large public university. These L2 learners were at three different levels of proficiency as measured by the Michigan Test of English Language Proficiency (MTELP): Level 3 (low-intermediate) = MTELP 45-59, Level 4 (high-intermediate) = MTELP 60-79, and Level 5 (advanced) = MTELP 80-100. Of the 58 L2 learners, 13 were at Level 3, 22 were at Level 4, and 23 were at Level 5. These L2 learners came from a variety of different first language backgrounds to include Arabic (n = 23), Chinese (n = 9), Italian (n = 1), Japanese (n=4), Korean (n=4), Portuguese (n=3), Spanish (n = 6), Taiwanese (n = 1), Teke (n = 1), Thai (n = 4), and Turkish (n = 2). All L2 learners participated in this study as a part of their normal classroom activities during the spring of 2010.

7.3.2 Method and Procedure

All subjects completed a battery of three tasks that were designed to measure different components of morphological knowledge. Specifically, the tasks were lexical decision, word relatedness, and word analysis. These tasks were administered to native speakers in the fall of 2009 via a paper and pencil test (Appendix B). The L2 learners received the same version of the test as the native speakers; however, the testing was done via computer.[11] The lexical characteristics of the words on this test are described in detail in Appendix A. Each individual task is described in more detail below.

7.3.2.1 Lexical decision task

The primary purpose of the lexical decision task was to test L1 and L2 knowledge of affix constraints on derivational morphemes such as semantic blocking and affix ordering (see Figure 7). Lexical decision tasks are widely accepted in SLA as a means of assessing implicit grammatical knowledge (Fender, 2003). Participants were asked to rate words from 1 (not a word) to 6 (definitely a word). All words in the lexical decision task were morphologically complex (e.g., base + affix) and included some combination of a base word with the suffixes *-ness*, *-ity*, *-able*, *-al*, *-tion*, and *-ful*. There were 60 test items and four conditions (15 items/condition) in this task: 1) real words (e.g., *comfortable*), 2) semantic or morphological blocking (e.g., **realness* or **darkal*), 3) correct ordering (e.g., *respectability*), and 4) and incorrect ordering (e.g., **respectitiable*).

[11] The computer-based version of the test was designed using Runtime Revolution software.

The frequency of test items was controlled by using frequency data from the British National Corpus (BNC). The BNC is a 100 million word corpus that contains samples of spoken and written British English. Access to this corpus was obtained via the lextutor website (Cobb, 2011) at http://www.lextutor.ca/vp/bnc/, which also provides tools for examining the lexical characteristics (e.g., frequency) of individual words. One such tool computes a word's frequency in relation to frequency bands of 1000 words. If a word falls into the first frequency band (K1), this means that it is among the first 1000 most frequent words in the BNC corpus. Likewise, if a word falls into the K2 frequency band, this means that it is a member of the second group of highly frequent 1000 words in the BNC corpus.

The real words condition contained actual derived words in English. These words were composed of a highly frequent base word (K1-K3 in the BNC Corpus) and the derivational suffixes *-ness, -able*, and *-al*. The derived words were K1-K2 in BNC frequency with the exception of eatable, which is offlist on the BNC but is highly frequent on Google with a frequency of 541,000 hits.

The semantic blocking condition contained words that were formed from highly frequent base words (K1-K2 in the BNC) and the derivational suffixes *-ness, -able*, and *-al*. The key factor in this condition was that the suffixes were restricted, or blocked, from occurring with the base word. These words are not common in a standard English dictionary and have a relatively low frequency on Google when compared to words in the real words condition. For instance, the word *ethnicness* received 1,650 hits on Google while a standard word like *darkness* received over 87 million hits when entered into Google. The point is that the words in this condition were highly infrequent and not widely accepted by the English-speaking community.

The correct ordering condition contained actual derived words that were formed by combining a highly frequency base (K1-K2 in the BNC) with two derivational suffixes. The suffix combinations were *-ful+ness*, *-able+ity*, and *-tion+al*.

The incorrect affix ordering condition highly frequent base words (K1 in the BNC) that were combined with derivational suffixes that violated affix ordering constraints. The affixes in this condition were reversed from the affix ordering in the correct affix ordering condition: *ness+ful*, *ity+able*, and *al+tion*.

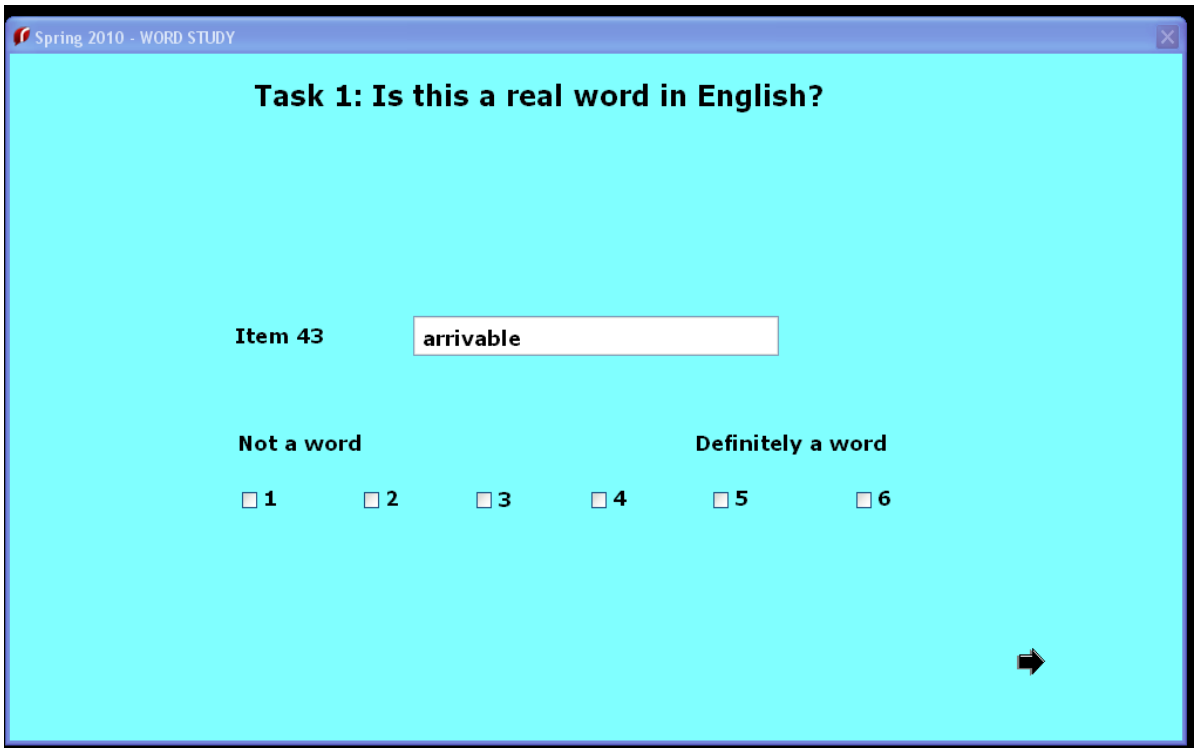

Figure 7. Screenshot of the lexical decision task

7.3.2.2 Word relatedness task

The word relatedness task was designed to assess L1 and L2 knowledge of the meaning relations between derived words when other factors such as orthographic/phonological overlap

may provide a competing, but incorrect, cue to meaning (cf. Gonnerman, Seidenberg, & Anderson, 2007). In this task, participants are asked to rate words based on their meaning from 1 (not related) to 6 (definitely related) in four different conditions: (1) no semantic overlap (e.g., *cat* -- *bus*), (2) simple semantic relatedness (e.g., *money* – *bank*), (3) related in meaning and orthography with different affixes (e.g., *productive* – *production*), (4) orthographic overlap only (e.g., *permanence* – *permission*), and (5) relationship in affix only (e.g., *reality* – *curiosity*). Participants completed a total of 50 items in this task, with roughly 10 items per condition.[12] Figure 8 illustrates the layout of this task on the computer-based system.

The no semantic overlap condition contained nine word pairs. These words were monosyllabic nouns with 3-4 letters with a frequency range of K1-K2 in the BNC corpus. Additionally, the words in this condition did contained minimal orthographic and phonological overlap. The simple semantic relatedness condition contained 10 word pairs. The words in this condition were related to one another by the semantic relationship of meronymy (i.e., part-whole relationship). These words were all K1-K3 in the BNC corpus and contained a minimal degree of phonological or orthographic overlap. The related in meaning and orthography with different affixes condition contained 11 word pairs. The words in this condition were derived from the same base word, but contained different derivational suffixes: *-ive* which changes verbs to adjectives and *-tion* which changes verbs to nouns. Base forms and the complex forms were K1-K2 in frequency in the BNC corpus. The orthographic overlap only condition contained bases that were related orthographically and phonologically, but were semantically unrelated. The

[12] There are 11 items in the related in meaning and orthography condition and only 9 items in the no semantic overlap condition. This error was due to oversight when preparing the test items.

orthographic and phonological overlap occurred only in the first four letters of the base word. The base words and the morphologically complex forms in this condition were K1-K4 in BNC frequency.

The relatedness in affix only condition contained words with the same affixes that did not share a common meaning. The base words and the derived words were K1-K3 in BNC frequency.

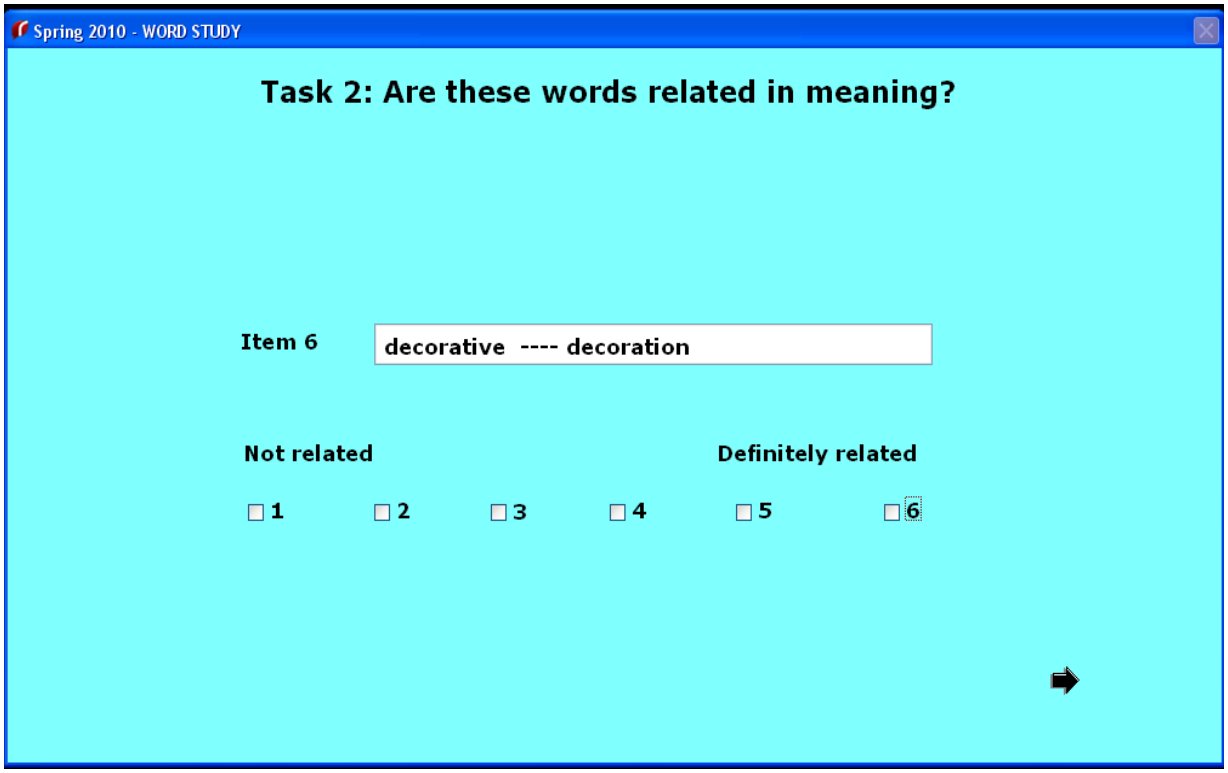

Figure 8. Screenshot of the word-relatedness task

7.3.2.3 Word Analysis Task

The purpose of the word analysis task is to capture whether or not L1 and L2 learners can decompose morphologically complex words into bases and affixes (cf. Carlisle, 2000; Marslen-Wilson, Bozic, & Randall, 2008). On this task, some of the words consist of a base and an affix

such as *musician*, which has *music* as a base. Other words, however, cannot be broken down into a base and an affix. For instance, *dollar* cannot be broken down into *doll* + *ar* because dollar is a base form.

Participants saw 30 words on this task, 15 from the decomposable condition and 15 from the non-decomposable condition. The derived words and base forms in the decomposable condition were K1-K3 in frequency in the BNC corpus. The derived words in this condition contained many different derivational affixes (e.g., *-tion, -er, -an, -al, -ous,* -and *-ic*) to reduce the possibility that students would develop an awareness of the testing conditions. The words in the nondecomposable condition contained smaller words within them, but were not themselves decomposable into bases and suffixes. The words in this condition were K1-K2 in frequency in the BNC corpus. Figure 9 illustrates the layout of this task on the computer-based system.

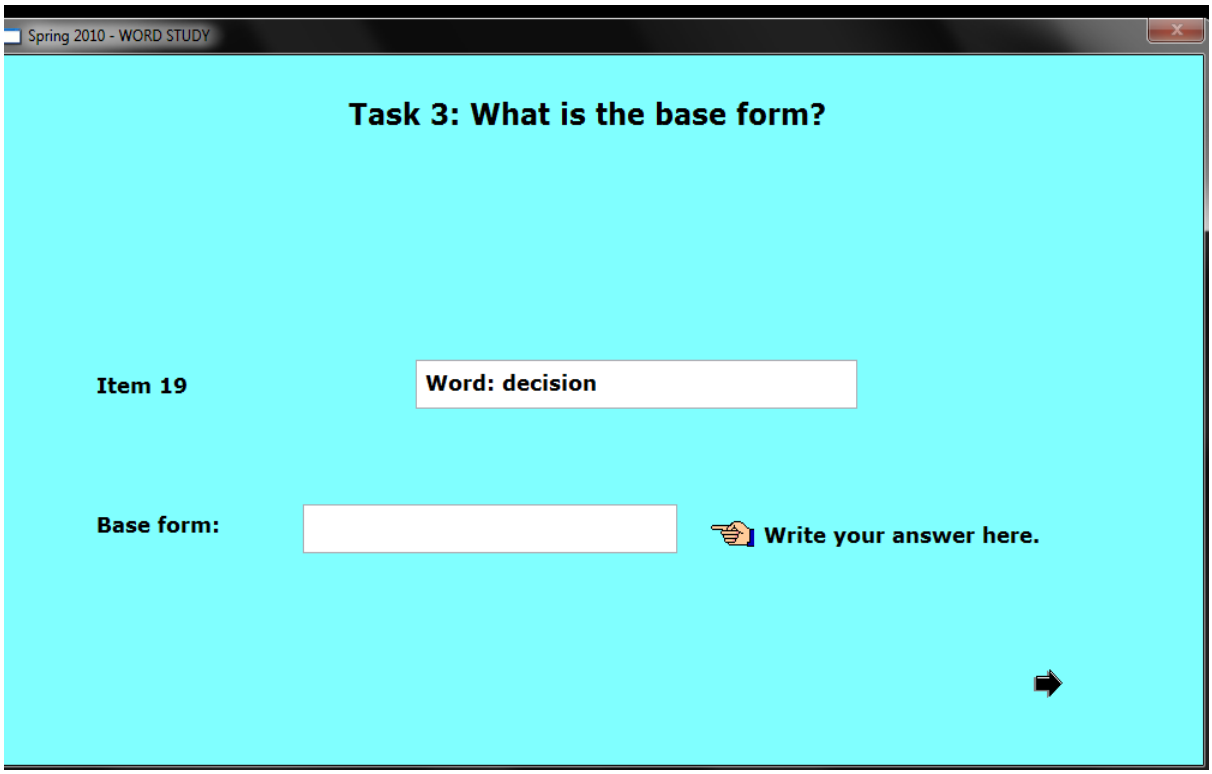

Figure 9. Screenshot from the word analysis task.

7.3.3 Description of Variables

Recall that the participants in this study included native speakers as well as non-native speakers from three different levels of language proficiency. The non-native speakers were also divided into groups based on their native languages and their language proficiency. This section describes how these participant variables as well as variables related to each task were categorized in this study.

Language. This independent variable categorizes participants' native language group. In order to obtain sufficient *N* sizes to perform statistical analyses, participants were combined into groups based on the areal typology of their native languages. These groups were Arabic (*n* = 23), Chinese (*n* = 10), English, (*n* = 23), Romance (*n* = 10) and Other (*n* = 15). The Chinese group included learners from Mandarin (*n* = 9) and Taiwanese (*n* = 1) first language backgrounds since both languages are typologically similar. Also due to typological similarities between languages, native speakers of Spanish (*n* = 6), Portuguese (*n* = 3), and Italian (*n* = 1) were incorporated in the Romance category. Finally, the Other group included learners from and Thai (*n* = 4), Teke (*n* = 1), Turkish (*n* = 2), Japanese (*n* = 4), and Korean (*n* = 4) native languages. Learners from this category were not included in the statistical analysis of L1 effects or proficiency due to the linguistic diversity of the participants in this category and the fact that each individual language group did not constitute a large enough sample size to perform statistical analysis.

Proficiency level. This independent variable categorizes participants' language proficiency into four levels, including native (*n* = 23), low-intermediate learner (*n* = 13), high-intermediate learner (*n* = 22), and advanced learner (*n* = 23).

Accuracy. This dependent variable categorizes participants' mean score on each task condition.

7.4 RESULTS

7.4.1 Lexical decision task[13]

7.4.1.1 Reliability tests

Test reliability for the lexical decision task was computed using Cronbach's Alpha α. The Cronbach's Alpha α was .693[14] for natives and .763[15] for non-natives, indicating that the lexical decision task provides a reliable estimate of morphological knowledge among native and non-native speakers.

7.4.1.2 Native vs. Non-native

The results from the lexical decision task suggest that native (M = 54.26) and non-native speakers (M = 43.45) know different things about derivational morphology, $t(68) = 9.665$, $p <$

[14] This reliability estimate includes 36 items from the test; 24 items were excluded due to zero variance among native speakers: *smartal, slowal, darkal, largeal, truthfulness, forgetfulness, institutional, educational, darkness, acceptable, traditional, fitness, regional, awareness, national, reliable, illness, comfortable, hopefulness, relatealtion, operatealtion, readitiable, dependitiable,* and *correctaltion*.

[15] This reliability estimate includes 56 items; four items were excluded due to zero variance: *additional, acceptable, traditional,* and *national.*

.001. Importantly, native speakers typically scored at ceiling on this task across all conditions and it is not appropriate to conduct further statistical analyses comparing the two groups. Therefore, descriptive statistics are provided here to explore how native and non-native speakers compare in terms of derivational knowledge (Table 1). Results are displayed graphically in Figure 10.

Table 1. Descriptive statistics for each lexical decision condition (Max Score = 15)

Condition	NS or NNS	*N*	*M*	*SD*	*SE*
Real Words	NS	23	14.00	.80	.17
	NNS	58	13.86	1.38	.18
Semantic	NS	23	12.17	1.90	.40
Blocking	NNS	58	8.34	3.47	.456
Correct Ordering	NS	23	13.87	1.55	.322
	NNS	58	10.34	3.47	.456
Wrong Ordering	NS	23	14.22	1.28	.266
	NNS	58	10.90	4.06	.532

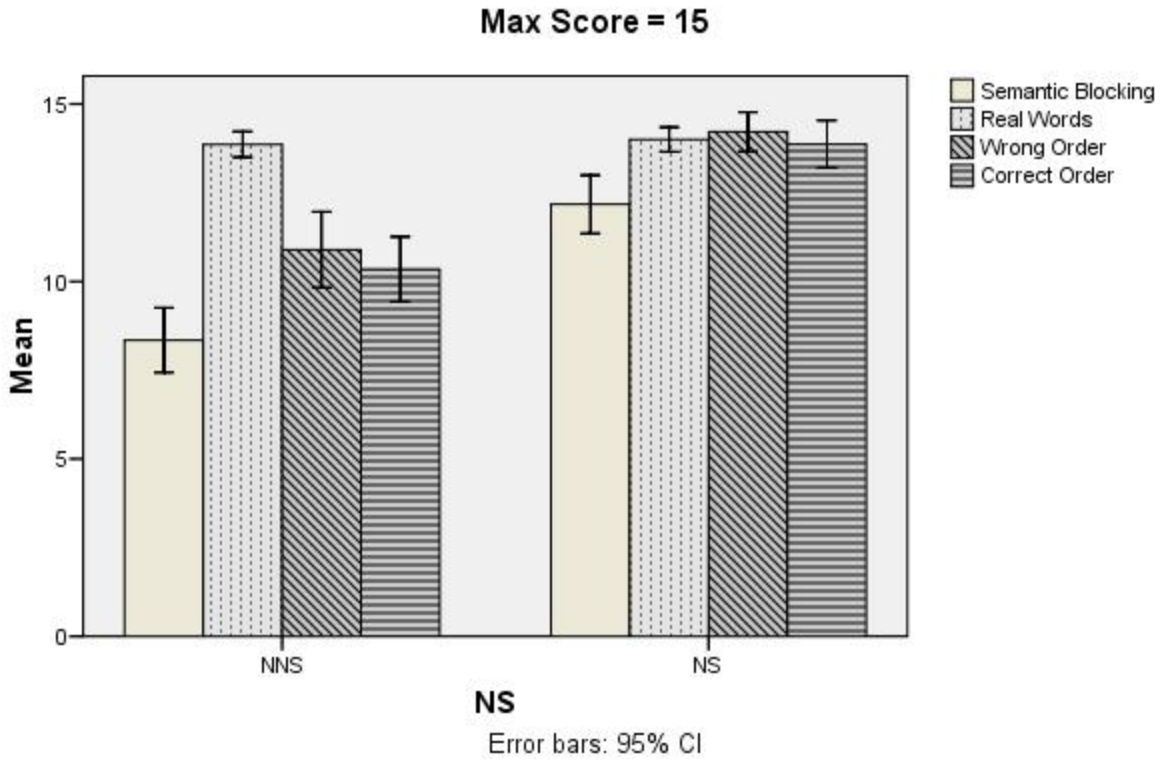

Figure 10. Descriptive results from lexical decision as a function of NS status

These results indicate that non-native speakers typically perform worse than native speakers when judging words that involve affix ordering (correct or incorrect) and semantic blocking. Although semantic blocking also presents some difficulties for the NS group (*M* = 12.17), NNS tend to perform much worse on this condition (*M* = 8.34) than NS. When judging highly frequent derived words with one derivational affix (i.e., real words condition); however, there is little difference between the scores of native (*M* = 14.00) and non-native speakers (*M* = 13.86).

7.4.1.3 Proficiency and L1 background

A two-way between-subjects ANOVA was conducted on overall lexical decision score as a function of language group and language proficiency. There were three levels of language

proficiency (low-intermediate, high-intermediate, and advanced) and three levels of native language (Arabic, Chinese, and Romance). There was no significant difference on scores for lexical decision among the levels of native language group averaged across proficiency levels, $F(2, 34) = .794$, $p = .460$, $\eta_p^2 = .045$, or among the levels of language proficiency averaged across native language groups, $F(2, 34) = 1.236$, $p = .303$, $\eta_p^2 = .068$. The patterns of difference on lexical decision scores among proficiency levels between the language groups was not significant, $F(4, 34) = .80$, $p = .534$, $\eta_p^2 = .086$. Descriptive statistics are displayed in Table 2 and Table 3.

Table 2. *Descriptive results for lexical decision score as a function of language proficiency*

	N	*M*	*SD*	*SE*
Low intermediate	10	37.70	5.38	1.70
High intermediate	17	42.59	6.33	1.54
Advanced	16	44.50	5.06	1.27

Table 3. *Descriptive results for lexical decision score as a function of native language*

	N	*M*	*SD*	*SE*
Arabic	23	40.70	5.87	1.22
Chinese	10	42.60	5.60	1.77
Romance	10	45.10	6.66	2.11

An additional analysis was conducted in order to investigate the effects of language proficiency and native language experience on scores on the individual conditions within this experiment. To this end, a 3 (condition) x 3 (language proficiency) x 3 (native language) mixed-effects ANOVA was conducted on lexical decision scores. Scores from the Other group were omitted from this analysis. The interactions between condition and language group, $F(2.50, 42.56) = .665$, $p = .552$, $\eta_p^2 = .038$, and condition and language proficiency, $F(2.50, 42,56) = .623$, $p = .576$, $\eta_p^2 = .035$, were not significant. The main effect of condition was significant at an

α = .10 level, $F(1.25, 42.56) = 3.28$, $p = .068$, $\eta_p^2 = .088$. There was no significant main effect for language group, $F(2, 34) = .925$, $p = .406$, $\eta_p^2 = .052$, or language proficiency, $F(2, 34) = 956$, $p = .395$, $\eta_p^2 = .053$, nor was the interaction between language group and language proficiency significant, $F(4, 34) = .810$, $p = .527$, $\eta_p^2 = .087$.

In order to follow up on the main effect of condition, marginal comparisons were performed on lexical decision scores as a function of condition. A Bonferroni correction was applied and statistical significance is determined at a .0167 level of significance. There was a significant difference on lexical decision scores between the Semantic Blocking condition and the Wrong Affix Ordering condition, $F(1,57) = 66.40$, $p < .001$, $\eta_p^2 = .43$. L2 learners scored significantly higher on the Wrong Affix Ordering condition ($M = 10.90$, $SE = .53$) than on the Semantic Blocking condition ($M = 8.34$, $SE = .46$). There were no other significant differences on lexical decision scores between the Semantic Blocking condition and the Correct Affix Ordering condition ($M = 10.35$, $SE = .46$), $F(1, 57) = 42.72$, $p = .018$, $\eta_p^2 = .43$ or between the Correct Affix Ordering condition and the Wrong Affix Ordering condition, $F(1, 57) = .439$, $p = .510$, $\eta_p^2 = .008$.[16]

[16] A Friedman's ANOVA was conducted in addition to the normal ANOVA due to violations in the assumption of normality. Similar to the standard ANOVA, there was a significant difference on lexical decision scores among levels of condition, $\chi^2(3) = 68.818$, $p < .001$. However, unlike the normal ANOVA, both of the affix ordering conditions were significantly different from the Semantic Blocking condition according to post-hoc Wilcoxon signed ranks tests. Scores on the semantic blocking condition ($Mdn = 9$), $T = 10$, $p < .001$, $r = -.67$ were significantly lower than scores on the wrong affix ordering condition ($Mdn = 12$) and the correct affix ordering condition ($Mdn = 11$), $T = 20$, $p = .029$, $r = -.286$. There was no significant different between scores on the wrong affix ordering condition and the correct affix ordering condition, $T = 21$, $p = .357$, $r = -.121$.

7.4.1.4 Hierarchy of difficulty for correct grammaticality judgments among NNS

Based on the previous statistical analyses, the following hierarchy of difficulty for constraints on affix attachment (from easiest to most difficult) is proposed:

Hierarchy of difficulty for affix conditions

REAL WORDS WITH ONE AFFIX < AFFIX ORDERING (CORRECT + INCORRECT) < SEMANTIC BLOCKING

This hierarchy of difficulty is also largely supported in the descriptive statistics that look at students' performance on the different affixes within each experimental condition As depicted in Table 4 and Figure 11, the words in the Real Words Condition with a single derivational affix do not present learners with any real difficulties. L2 learners recognize words on this condition as English words and their scores are over 4.00/5.00 on this condition. However, when it comes to judging words that involve more than one affix, students have trouble deciding if a word is a real word in English whether or not the affixes are in the correct order. Students appropriately say that words with the suffixes *-tion + al* like *educational* and *intentional* are real English words (score: 4.18/5.00), and they appropriately reject (say "no" to) to words such as **operatealtion* and **relatealtion* with the incorrect suffix combination *-al + tion* (score: 3.89/5.00). Yet, there abilities to discriminate between words on the basis of correct and incorrect affix ordering gradually decline as they judge words with the affixes *-ity* and *-able* and words with the affixes *-ness* and *-ful*. Students seem especially reluctant to select words with the *ful + ness* affix combination as correct English words; they tend to successfully accept (say "yes" to) words such as *truthfulness* only about 50% of the time. Finally, derived words that involve some type of semantic blocking seem to be among the most difficult words for L2 learners to acquire, with the

exception of blocked words with the *–al* suffix (e.g., **darkal*).[17] L2 learners tend to accept (say "yes" to) words like ?*neutralness* and ?*leavable* as English words, whereas native speakers correctly reject (say "no" to) these words. In other words, if a word is formed from a "rule," but blocked by an existing form, then it is hard for L2 learners to acquire.

Table 4. Mean scores on affix by condition (includes all NNS)

Affix * Condition	*M*	*SD*
Real (al)	4.86	0.44
Real (ness)	4.74	0.58
Real (able)	4.25	0.83
C.order (tion+al)	4.18	0.93
W.order (al+tion)	3.89	1.51
Block (al)	3.84	1.44
W.order (ity+able)	3.81	1.54
C.order (able+ity)	3.60	1.49
W.order (ness+ful)	3.19	1.67
C.order (ful+ness)	2.55	1.82
Block (ness)	2.29	1.51
Block (able)	2.21	1.61

[17] Words with the *-al* suffix are harder to judge than real words; yet, their difficulty lies somewhere in between real words and other words in the semantic blocking condition.

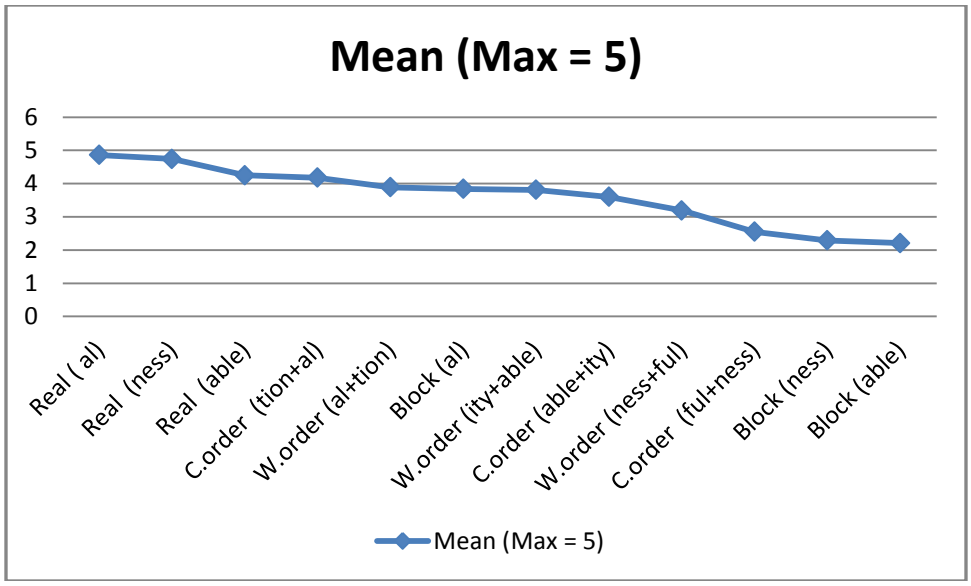

Figure 11. Mean scores on each individual affix within experimental conditions.

7.4.2 Word Relatedness

7.4.2.1 Reliability tests

Cronbach's alpha was computed separately for native and non-native speakers to test for the reliability of the test. The overall alpha for native speakers was .641 and for non-native speakers was .772, suggesting that the test was reliable for native and non-native speakers.

7.4.2.2 Native vs. Non-native

There was a significant difference between the overall scores on word relatedness between native (M = 45.87, SE = .77) and non-native speakers (M = 41.28, SE = .69), $t(79)$ = 3.84, $p < .001$. Descriptive results are reported in Table 5. However, this is not necessarily a fair comparison since native speakers scored at ceiling on all of the word relatedness conditions (Figure 12). Importantly, ceiling effects were also observed among the NNS for words with semantic and orthographic overlap (e.g., *competitive – competition*) and words with no semantic

or orthographic relationship (e.g., *shoe-door*). However, descriptive statistics suggest that non-natives may have difficulties judging word relatedness among words that are related in orthography in the first four graphemes/phonemes (e.g., *exploratory-explanation*) or the final affix (e.g., *personality* – *modernity*) and in words with simple semantic relatedness (e.g., *page* – *book*).

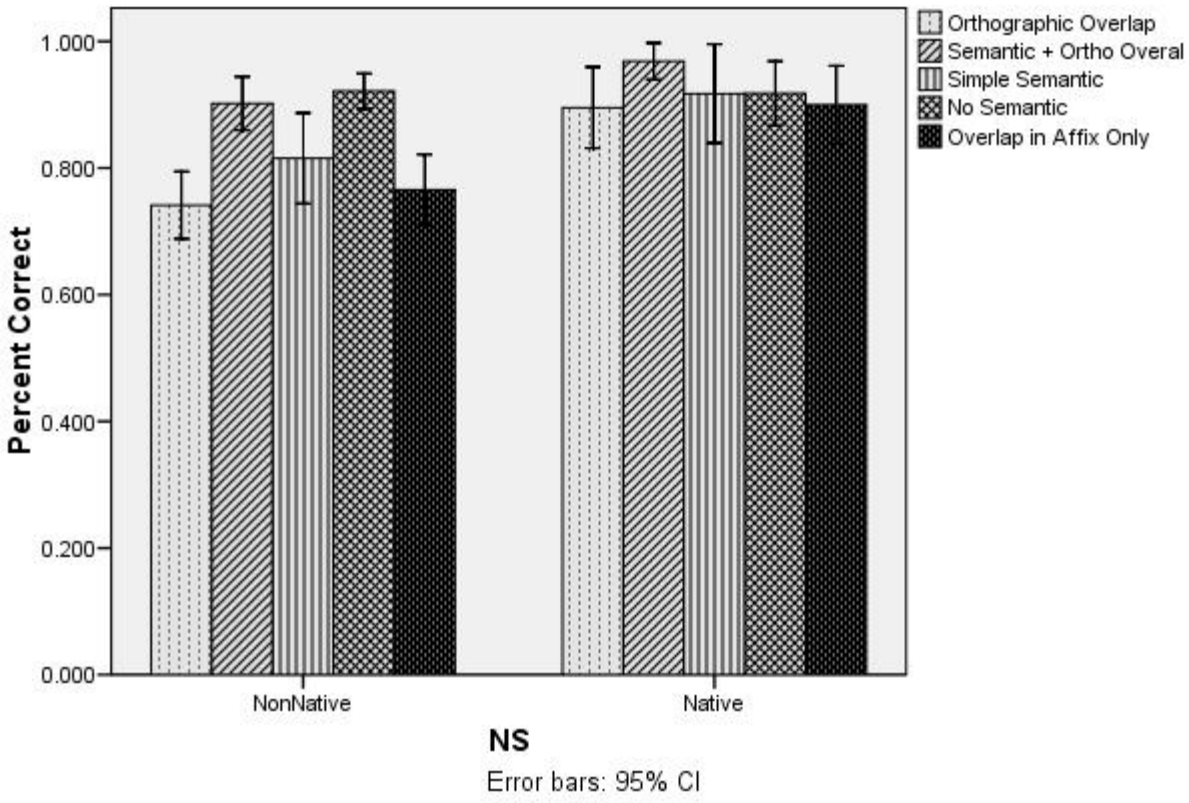

Figure 12. Scores on word relatedness conditions as a function of NS status

Table 5. Descriptive statistics for scores on word relatedness conditions as a function of NS status

Condition	NS Status	*M* (%)	*SD* (%)	*SE* (%)
Orthographic	Nonnative	.74	.20	.03
Overlap	Native	.90	.15	.03
Semantic + Ortho	Nonnative	.90	.16	.02
Overlap	Native	.97	.07	.01
Simple Semantic	Nonnative	.81	.27	.04
	Native	.92	.18	.04
No Semantic	Nonnative	.92	.11	.01
	Native	.92	.12	.02
Overlap in Affix	Nonnative	.76	.21	.03
Only	Native	.90	.14	.03

7.4.2.3 Proficiency and L1 background

Descriptive results suggest that scores on word relatedness conditions were influenced by language proficiency and L1 background.[18] This analysis focuses only on the orthographic overlap condition, the simple semantic condition, and the overlap in affix only conditions since learners' scores were typically not at ceiling on these measures. Regarding language proficiency (Table 6), the advanced learner group tends to outperform the low and high-intermediate proficiency groups on the Orthographic Overlap condition and the Overlap in Affix Only condition; however, the reverse is true in the simple semantic condition in which the low and high-intermediate groups appear to outperform the advanced group when judging words with Simple Semantic relatedness. On the Simple Semantic relatedness condition, the scores of low and high-intermediate learners approach the scores of native speakers (ceiling effect), whereas the scores of advanced learners tend to be well below the scores of the other groups.

[18] Ceiling effects among many of the conditions prohibit the use of inferential statistical methods (they are unreliable); hence, this section reports descriptive statistics only.

Table 6. Descriptive statistics for scores on word relatedness conditions as a function of proficiency

Condition	Proficiency	*n*	*M* (%)	*SD* (%)	*SE* (%)
Orthographic Overlap	Low-intermediate	13	.69	.23	.06
	High-intermediate	22	.71	.22	.05
	Advanced	23	.80	.15	.03
	Native	23	.90	.15	.03
Semantic + Ortho Overlap	Low-intermediate	13	.86	.21	.06
	High-intermediate	22	.88	.17	.04
	Advanced	23	.94	.12	.03
	Native	23	.95	.11	.02
Simple Semantic	Low-intermediate	13	.84	.19	.05
	High-intermediate	22	.88	.23	.05
	Advanced	23	.74	.33	.07
	Native	23	.92	.18	.04
No Semantic	Low-intermediate	13	.91	.10	.03
	High-intermediate	22	.89	.12	.03
	Advanced	23	.96	.08	.02
	Native	23	.92	.12	.02
Overlap in Affix Only	Low-intermediate	13	.66	.24	.07
	High-intermediate	22	.69	.20	.04
	Advanced	23	.89	.13	.03
	Native	23	.90	.14	.03

Note. Scores from the non-native groups include the Other group.

Differences between L1 groups were also observed among the experimental conditions (Table 7). One of the main observations from Table 7 is that Arabic speakers tend to perform worse than other groups on the two conditions involving orthographic overlap (overlap in affix and overlap in first four phonemes/graphemes). Chinese and Romance learners may also rely on orthographic information to some degree when interpreting word relatedness in that they perform slightly below the native speaker norm on the Orthographic Overlap condition. An additional observation that can be extracted from these data is that Arabic speakers perform similarly to native speakers on the simple semantic condition, whereas the Romance group and the Chinese group demonstrate performance levels that are well below the native-speaker norm. The Chinese

group appears to have a particularly difficult time judging words within the simple semantic relationship and they perform at slightly above chance (*M* = .58) on this condition.

Table 7. Descriptive statistics for scores on word relatedness conditions as a function of L1 background

Condition	L1 Background	*n*	*M* (%)	*SD* (%)	*SE* (%)
Orthographic Overlap	Arabic	23	.61	.21	.04
	Chinese	10	.76	.19	.06
	Romance	10	.84	.11	.03
	Native	23	.90	.15	.03
Semantic + Ortho Overlap	Arabic	23	.86	.18	.04
	Chinese	10	.87	.22	.07
	Romance	10	.94	.11	.03
	Native	23	.95	.11	.02
Simple Semantic	Arabic	23	.90	.17	.03
	Chinese	10	.58	.36	.12
	Romance	10	.72	.36	.11
	Native	23	.92	.18	.04
No Semantic	Arabic	23	.89	.12	.03
	Chinese	10	.96	.06	.02
	Romance	10	.94	.11	.03
	Native	23	.92	.12	.02
Overlap in Affix Only	Arabic	23	.64	.23	.05
	Chinese	10	.83	.16	.05
	Romance	10	.89	.13	.04
	Native	23	.90	.14	.03

Note. Scores from the non-native groups do not include the Other group.

7.4.2.4 Correlations between task conditions

The word-relatedness task was designed under the assumption that certain conditions would be related. Specifically, one would expect that participants would respond similarly to the conditions where the words were related in meaning (Simple Semantic condition and Semantic/Orthographic Overlap condition) and to the conditions where the words were not related in meaning (Orthographic Overlap condition, No Semantic Condition, and Overlap in Affix Only condition). In the interest of further investigating differences between native and non-

native responses on this task, two Spearman correlations[19] were conducted to explore correlations between word relatedness conditions for non-native speakers (Table 8) and for native speakers (Table 9).

As depicted in Table 8, several of the conditions were intercorrelated for non-native speakers. There were significant relationships between the Orthographic Overlap condition and the Semantic/Orthographic relatedness condition, $r_s = .372$, $p < .01$, between the Overlap in Affix Only condition and the Orthographic Overlap condition, $r_s = .613$, $p < .01$, and between the Overlap in Affix Only condition and the No Semantic condition, $r_s = .329$, $p < .05$.

Table 8. Summary of correlations among word relatedness conditions for NNS

Condition	Ortho Overlap	Semantic/ Ortho Overlap	Simple Semantic	No Semantic	Overlap in Affix Only
Ortho Overlap	1.000				
Semantic + Ortho Overlap	.372(**)	1.000			
Simple Semantic	-.043	-.014	1.000		
No Semantic	.148	.151	-.251	1.000	
Overlap in Affix Only	.613(**)	.229	-.098	.329(*)	1.000

Note. *$p < .05$, ** $p < .01$

There were also correlations between word relatedness scores among native speakers (Table 9). There was a significant correlation between the Orthographic Overlap condition and the No Semantic condition, $r_s = .506$, $p < .05$, between the Orthographic Overlap condition and the

[19] Spearman correlations were conducted due to non-normal distributions among several of the word-relatedness conditions.

Overlap in Affix Only condition, r_s = .613, p < .01, and between the Overlap in Affix Only condition and the No Semantic condition, r_s = .445, p < .05.

Table 9. Summary of correlations among word relatedness conditions for NS

Condition	Ortho Overlap	Semantic/ Ortho Overlap	Simple Semantic	No Semantic	Overlap in Affix Only
Ortho Overlap	1.000				
Semantic + Ortho Overlap	-.150	1.000			
Simple Semantic	.033	.065	1.000		
No Semantic	.506(*)	-.135	-.241	1.000	
Overlap in Affix Only	.613(**)	-.394	-.186	.445(*)	1.000

Note. *p < .05, ** p < .01

In sum, NS correctly reject words that overlap in orthography (both in affix and in the first four graphemes/phonemes) and a significant correlation exists between these conditions and the scores on the condition containing words that do not overlap in meaning (i.e., the No Semantic condition). The pattern of results among NNS is similar to that of the NS in terms of the correlation between the words the Overlap in Affix Only condition and the No Semantic condition; however, a difference is observed between these groups in that the NNS group tends to respond incorrectly to words in the Orthographic Overlap condition. For the NNS group, there is a significant correlation between the words in the Orthographic Overlap condition and the words in the Semantic/Orthographic Overlap condition, but no correlation between the words in the No Semantic condition and the words in the Orthographic Overlap condition as is observed in the NS data. This finding suggests that NS tend to use semantic and orthographic information to determine word relatedness, whereas NNS may base their judgments on orthographic

similarities between word pairs when interpreting meaning relations. Importantly, orthographic similarities between two word pairs only matters for NNS when orthographic overlap occurs in the initial part of the word.

7.4.3 Word Analysis Task

7.4.3.1 Reliability tests

The Cronbach's alpha for native speakers on the word analysis task was .678[20] and the Cronbach's alpha for non-native speakers on the word analysis task was .818.

7.4.3.2 Native vs. Non-native

There was a significant difference between NS (M = 26.87, SE = .542) and NNS (M = 21.02, SE = .662) on overall word analysis scores, $t(73.46) = 6.84$, $p < .001$. The difference between native and non-native speakers is also observed among the word analysis conditions in that native speakers tended to outperform non-native speakers when decomposing (or choosing not to decompose) English words (Figure 13); however, this difference could not be investigated statistically due to ceiling effects among the NS group. Descriptive statistics are displayed in Table 10.

[20] Several of the scaled variables had zero variance and were removed from the scale: *ribbon, musician, butter, history, jacket, corner, teacher, flower, dollar, soldier,* and *worker.*

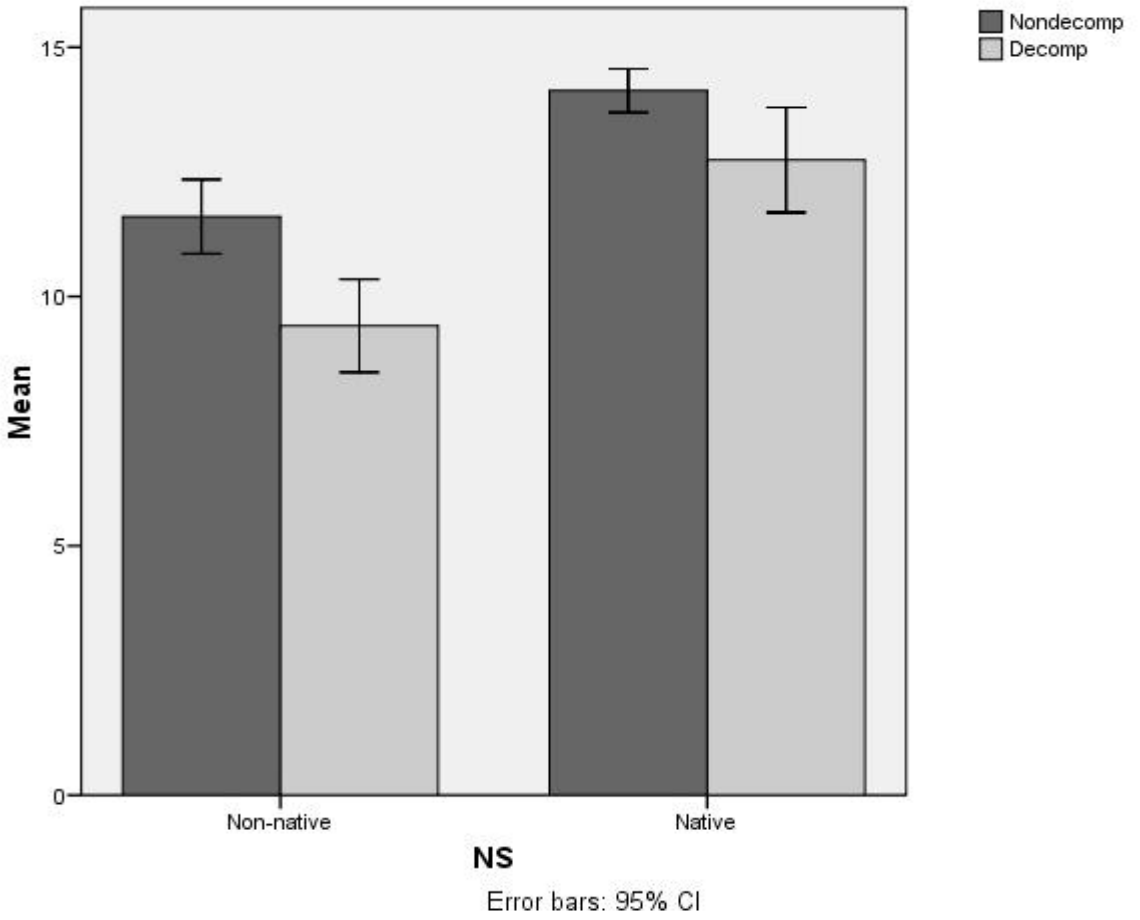

Figure 13. Mean score on word analysis conditions as a function of NS status (Max score = 15)

Table 10. Scores on word analysis conditions as a function of NS status

Condition	NS Status	*n*	*M*	*SD*	*SE*
Decomposable	Native	23	12.74	2.43	.51
	Nonnative	58	9.41	3.54	.47
Non-	Native	23	14.13	1.01	.21
Decomposable	Nonnative	58	11.60	2.83	.37

7.4.3.3 Proficiency and L1 background

Several independent analyses were conducted in order to investigate how L2 proficiency and L1 experience influence scores on word analysis. The first analysis focuses on language proficiency. Descriptive results for scores on word analysis conditions as a function of language proficiency are reported in Table 11. Although scores from native speakers are reported, they are used for comparison only and not part of the statistical analysis. When computing means for the decomposition condition, one outlier was removed from each of the four proficiency groups. An outlier from the advanced group was also removed from the analysis when computing means for the non-decomposable condition.

Table 11. Word analysis scores as a function of language proficiency

Condition	Proficiency	*n*	*M*	*SD*	*SE*
Decomposable	Low-intermediate	12	10.17	2.04	.59
	High-intermediate	21	10.00	3.27	.71
	Advanced	22	9.73	2.88	.61
	Native	22	13.14	1.55	.33
Non-Decomposable	Low-intermediate	13	10.62	2.79	.77
	High-intermediate	22	12.09	2.67	.57
	Advanced	22	12.18	1.89	.40
	Native	23	14.13	1.01	.21

A 2 x 3 mixed-effects ANOVA was conducted on word analysis scores as a function of condition (decomposable vs. non-decomposable) and proficiency (low-intermediate, high-intermediate, and advanced). Results from the ANOVA are reported here because the pattern of results for proficiency effects does not change when data are analyzed using non-parametric tests.[21]

[21] A Kruskal-Wallis test was performed on scores from the decomposable word analysis condition as a function of language proficiency. There was no significant difference on decomposable scores between proficiency

The pattern of differences on word analysis scores among proficiency groups was not significantly different between decomposable words and non-decomposable words, $F(2, 51) = 2.11$, $p = .132$, $\eta_p^2 = .076$. Scores on the non-decomposable condition ($M = 11.60$, $SE = .33$) were significantly higher than scores on the decomposable condition ($M = 10.02$, $SE = .40$), $F(2, 51) = 12.22$, $p = .001$, $\eta_p^2 = .19$. There was no significant difference on word analysis scores between the levels of language proficiency, $F(2, 51) = .776$, $p = .466$, $\eta_p^2 = .03$.

An additional analysis was performed in order to investigate the effects of L1 background on word analysis scores. Descriptive statistics for word analysis scores as a function of L1 background are reported in Table 12.

Table 12. Word analysis scores as a function of L1 background

Condition	L1 Background	*n*	*M*	*SD*	*SE*
Decomposable	Arabic	21	10.10	2.27	.54
	Chinese	8	9.25	3.85	1.36
	Romance	10	9.30	3.27	1.03
	Native	22	13.14	1.55	.33
Non-Decomposable	Arabic	21	12.62	1.91	.42
	Chinese	8	11.38	2.45	.87
	Romance	10	11.10	3.32	1.05
	Native	23	14.13	1.01	.21

groups, $H(2) = .158$, $p = .924$. In addition, a Kruskal-Wallis test was performed on scores form the non-decomposable word analysis condition as a function of language proficiency. There were no significant differences on non-decomposable scores between proficiency groups, $H(2) = 3.40$, $p = .183$. Wilcoxon signed-rank test was performed on word analysis scores as a function of test condition. This test revealed that scores on the Decomposable condition (*Mdn* = 11) were significantly lower than scores on the Nondecomposable condition (*Mdn* = 12), $z = -3.62$, $p < .001$, $r = -.35$.

A 2 x 3 mixed-effects ANOVA was conducted on scores on word analysis conditions as a function of L1 background. There were two levels of condition (decomposable vs. non-decomposable) and three levels of L1 background (Arabic, Chinese, and Romance). The pattern of difference on word analysis scores among the experimental conditions between L1 backgrounds was not significant, $F(2,36) = .165$, $p = .848$, $\eta_p^2 = .009$. The scores on non-decomposable words ($M = 11.70$, $SE = .424$) were significantly higher than the scores on decomposable words ($M = 9.55$, $SE = .52$), $F(1,36) = 13.54$, $p = .001$, $\eta_p^2 = .273$. There was no significant difference on word analysis scores as a function of L1 background, $F(2,36) = 1.29$, $p = .287$, $\eta_p^2 = .067$.[22]

7.4.3.4 Error analysis

Since non-natives and natives alike provided written responses to the word analysis task, these data were further analyzed to explore common errors on this task. As reported in Table 13, non-native participants made frequent errors when asked to decompose words such as *extension, decision,* and *reduction*, which involved a phonological change to the base word (i.e., non-neutral affixes). Errors of this type occurred to some extent among natives, but to a much larger extent among the non-native learners. When non-natives were asked to provide the base word of words such as *extension*, they frequently provided *extense, extence, extent, or extension* (i.e., the

[22] A Kruskal-Wallis test was performed on scores from the decomposable word analysis condition as a function of L1 background. There was no significant difference on decomposable scores as a function of L1 background, $H(2) = .933$, $p = .627$. An additional Kruskal-Wallis test was performed on scores from the non-decomposable word analysis condition as a function of L1 background. There were no significant differences on non-decomposable scores as a function of L1 background, $H(2) = 1.96$, $p = .376$.

complex form) as the base form, while such errors among native speakers were much less frequent. What is also interesting about these words is that higher language proficiency does not necessarily entail higher decomposition abilities. When decomposing words with non-neutral affixes, scores do not necessarily improve as learners become more proficient in English.

Table 13. Common errors on the word analysis task

Word	Common Errors	Native English Speakers	Level 3 (Low-intermediate)	Level 4 (High-intermediate)	Level 5 (Advanced)
extension	extense, extence, extent, extension	83%	8%	41%	26%
decision	decise, decision	87%	8%	45%	43%
spacious	spac, spaci, spacy, spacious	91%	46%	59%	65%
monstrous	monstrou, monstry, monstrous	78%	54%	45%	48%
reduction	reduct, reduc, reducti, reduction	91%	46%	55%	48%
musician	musician, musi	100%	92%	95%	87%

7.5 DISCUSSION

7.5.1 Native vs. non-native

Results from these experiments indicate that NS and NNS know very different things about derivational morphology in English. However, before going into any great depth about how native and non-native speakers differ in terms of knowledge of derivational morphology, it is critical to point out that these results may not apply to *all* adult second language learners (i.e., adult NNS) since the sample is largely restricted to L2 learners in an intensive English program who have not yet attained sufficient L2 proficiency to enroll in university programs in the United States. Although the terms native and non-native are used to refer to these groups in the following discussion, these results pertain only to a subset of ESL learners and may not be generalizable to the entire ESL population.

On the lexical decision task, the pattern of results supports the hypothesis (Hypothesis 1) that the NS are highly sensitive to constraints on affix productivity and attachment, whereas, non-native speakers are less sensitive to these constraints. More specifically, when dealing with words with only one derivational morpheme in the block condition (e.g., **arrivable*), non-natives exhibited a strong tendency to select such words as real words in English, whereas the native speakers were more likely to choose the 'not a real word' option. A similar trend was evident in non-native performance on the correct order and incorrect order conditions in that non-natives performed much lower than native speakers on both conditions. On conditions involving affix-ordering, the correctness of the affix ordering had little impact on non-native performance. What is interesting, however, is that non-native performance on highly-frequent derived words in

English was no different than native-speaker knowledge. Taken together, these findings indicate that non-native speakers have little difficulty recognizing high frequency derived words (e.g., *darkness*), but they have significant difficulty when confronted with words that do not exist in English (e.g., **arrivable*) or words that involve complex morphological operations such as affix ordering (e.g., *thoughtfulness* vs. **thoughtnessful*). On one hand, L2 performance on high frequency derived words is consistent with previous research on the L1 acquisition of derivational morphology among children who are poor readers in that poor readers typically do not have problems with high-frequency words because they are processed as lexicalized chunks without being decomposed into bases and affixes (Gordon, 1989). On the other hand, however, L2 learners may differ from poor readers in their abilities to discriminate between words with legal and illegal letter sequences. Previous research has established that poor readers correctly reject words with illegal letter sequences in lexical decision (Carlisle et al., 2001), whereas the L2 learners in this study may not be as capable of rejecting incorrect letter sequences as the results from the incorrect affix ordering condition reveal.

Recent work in psycholinguistics provides a potential explanation for these findings. That is, research on the processing and storage of derived words shows that derived words may be either stored in lexical memory or else produced by a rule-based mechanism (e.g., Alegre & Gordon, 1999; Hagiwara et al., 1999). Theories such as the DP-model (Bowden et al., 2010) and the Shallow Structure Hypothesis (Silva & Clahsen, 2008) predict that L2 learners have impaired access to the mechanisms (e.g., procedural memory) that underlie rule-based knowledge. As such, L2 learners may rely heavily on declarative memory for memorizing L2 vocabulary instead of constructing derived words online using rule-based processes as do native speakers. Hence, it is possible that impairment to rule-based mechanisms in addition to the inability to access items

with complex morphology through lexical storage impedes L2 learners abilities to correctly rate words with affix attachment violations. The native speakers are able to correctly identify deviant patterns among novel nonce words (these words would not be stored in the native lexicon) with ease because they have full access to rule-based word-building mechanisms.

The second hypothesis was also related to the differences between NS and NNS. The key prediction was that NS would be more sensitive to the relationships among derived words that share combinations of orthography, phonology, and meaning than NNS. This hypothesis was supported to some degree by the results of the correlational analysis comparing NS and NNS performance across the five word conditions in this task. The most significant finding from the correlations is the difference between NS and NNS in terms of the relationship between the Orthographic Overlap condition and the No Semantic condition. The native speakers perform as expected on this condition in that there is a strong correlation between scores on the Orthographic Overlap condition and the No Semantic condition. More specifically, one would expect that these two categories would be correlated because words in both conditions were not related in meaning and participants should say "no" to words in these conditions, which is exactly the pattern that is observed in the NS data. However, a different pattern emerges in the data from NNS in that there are significant correlations among the Orthographic Overlap Condition and the Semantic/Orthographic Overlap condition, but no relationship between the Orthographic Overlap condition and the No Semantic Condition. The correlations between conditions involving overlap in orthography (there was no semantic relationship between the words in this condition) with conditions involving overlap in orthography *and* semantics may suggest that learners may rely on sub-optimal processing skills when interpreting word meaning

instead of using a combination of orthographic and semantic processing to interpret word meaning.

Although this experiment does not point out exactly what NNS are attending to when processing complex derived words in a second language, it shows that processing failures might be occurring when L2 learners are tasked with comparing the meaning relationships between two morphologically complex words. One question that remains open for future research is: how do phonology, orthography, and semantics interact within L2 morphological processing? This is a question that has been the subject of multiple L1 studies on morphological processing (see Feldman, Soltano, Pastizzo, & Francis, 2004; Gonnerman et al., 2007; Marslen-Wilson et al., 2008; Morris et al., 2007). These studies have yielded mixed results about the factors that influence L1 morphological processing. On one hand, some priming studies (masked and cross-modal) show that factors such as semantic transparency and phonological overlap facilitate morphological processing more than morphological structure (e.g., Feldman et al., 2004; Gonnerman et al., 2007) or orthographic similarity (e.g., Morris et al., 2007). On the other hand, some priming studies show that morphological structure has a more important role in morphological processing than semantic factors (e.g., Marslen-Wilson et al., 2008). Research in this area would benefit from studies that investigate how L2 learners utilize phonology, orthography, semantics, and morphological structure when processing morphologically complex words. Such research may be integral to understanding how native and non-native speakers compare and contrast in the domain of morphological processing.

In support of the third hypothesis, morphological knowledge differed between NS and NNS on sensitivity to morphological relations when decomposing complex words into bases and affixes. Native speakers performed significantly better than NNS on decomposable words and

non-decomposable words regardless of NNS' experience with English or native language background. Beyond the quantitative results, the results from the error analysis were particularly striking in that non-natives from all levels of L2 proficiency were largely unsuccessful at parsing derived words with phonological changes to the base form (i.e., non-neutral affixes) despite the fact that base words were highly frequent in the BNC corpus and, in some cases, focus words on a vocabulary list in the second language learners' English language classroom. These results may indicate that many of the non-native participants do not recognize the relationships in form and meaning between base words and their derivates, which is consistent with the claim from psycholinguistic research that procedural memory is attenuated in L2 acquisition, forcing reliance on lexical learning and shallow processing strategies (Bowden et al., 2010; Clahsen et al., 2010). Simply put, L2 learners may learn words such as *extend* and *extension* as two separate, unrelated lexical entries (two different lemmas), thus making decomposition of complex forms into bases and affixes a haphazard process of chopping off perceived affixes in order to arrive at base forms. This process seems to involve little consideration of how a base and a derived word might be related in both phonological form and meaning.

At the same time, however, it is not fair to say that all NS know how to decompose complex words, whereas all NNS perform poorly on decomposition. The pattern of results in Table 14 clearly illustrates that there are some among all proficiency levels of the NNS group who do indeed perceive the relationship between derived words and the base word from which they are derived. For a word like *reduction*, approximately 50% of all NNS recognize that the base word is *reduce*, whereas 91% of NS decompose the word correctly. The point here is that although NNS make more errors than NS, some native speakers also have problems decomposing words that involve phonological/orthographic shifts. The difficulty with shift

words is somewhat expected given previous research on the L1 acquisition of derivational morphology. We know, for instance, that derived words that involve complex phonological operations are often difficult for L1 English children to acquire (Carlisle et al., 2001; Tyler & Nagy, 1989). In this case, L2 learners somewhat resemble children with reading disabilities in L1 studies in that they have developed limited sensitivity to morpho-phonological rules when decomposing words with non-neutral affixes in their L2 (Carlisle et al., 2001).

7.5.2 The effects of L1 and language proficiency

The previous section focuses on the contrasts between native and non-native knowledge of derived words; however, the discussion in this section may obscure important differences among non-native learners in that it does not explore how differences between native languages or proficiency levels may have influenced knowledge of derivational morphology. Hence, this section sheds light on how linguistic characteristics and proficiency among non-native speakers may have influenced their performance on knowledge of derivational morphology in connection with the research hypotheses related to native language and proficiency.

7.5.2.1 Language proficiency

Contrary to the prediction in hypothesis 3, language proficiency (measured by classroom placement) was not necessarily a good predictor of morphological knowledge across the three morphological tasks. To a large extent, performance among proficiency groups was similar across tasks, especially among the low-intermediate and high-intermediate groups. There were no statistically reliable differences between the scores of low-intermediate, high-intermediate,

and advanced learners across all of the morphological tasks: lexical decision, word-relatedness, and word analysis. This is not to say that there were no between-group differences related to language proficiency. In fact, advanced learners tended to score higher than the low and high-intermediate learners on the word-relatedness task and the lexical decision task even though these differences were not statistically reliable. However, it is difficult to say that these differences are the byproduct of significant improvement in overall morphological knowledge. Recall that many of the base forms and the derived words themselves were high frequency in the BNC corpus. In effect, the advanced learners may score higher than the low-intermediate learners simply because they recognize more vocabulary items, not necessarily because they have learned to apply morphological knowledge to a greater degree than the low-intermediate learners. The results from the word analysis task are particularly relevant for this argument since the L2 learners from all proficiency levels struggle with word decomposition and make frequent errors when asked to decompose (or choose not to decompose) morphologically complex words. The mean score on non-decomposable words (e.g., *dollar* ≠ *doll* + *ar*), for instance, indicates that learners from all proficiency groups tend to incorrectly decompose approximately 5 out of 15 non-decomposable words. This result is reminiscent of the finding in L1 morphology research that first-graders were prone to err on word analysis by trying to decompose words like *dollar* into *doll* + *ar* (Carlisle & Fleming, 2003). Hence, L2 performance on this task suggests that the L2 learners in this study, regardless of L2 proficiency, have failed to acquire the semantic and syntactic specifications underlying the use of derivational morphology.

Such an account would still be compatible with models of L2 morphological processing such as the Shallow Structure Hypothesis (Clahsen et al. 2010; Silva & Clahsen, 2008). Specifically, if we assume that all second language learners employ lexical memory in lieu of

rule-based mechanisms we might hypothesize that learners' abilities to recognize words in English would be augmented by the amount of experience with the target language. Hence, low-intermediate learners, who may have had minimal exposure to complex derived words in their home countries, may differ from more advanced learners because they have not reached a threshold level of experience with English vocabulary. In other words, it is possible that the performance differences between the intermediate groups and the more advanced group on the lexical decision and word relatedness tasks occur simply because the advanced groups *recognize* more words than the less proficient groups, not because the more advanced groups are any more knowledgeable of derivational morphology in English. The fact that advanced learners perform worse than NS on both lexical decision and word analysis also lends support to this conclusion.

The finding that advanced speakers perform similarly to NS on the word relatedness task is also interesting because it suggests that the task itself is a factor in L2 morphological knowledge. This task is somewhat different from the other tasks in that it looks specifically at meaning relations among words that very along the dimensions of orthographic/phonological overlap (by word and by affix) and meaning relations, whereas the other tasks deal more explicitly with knowledge of constraints on affix attachment and morphological decomposition. We know from previous work on lexical/syntactic processing that L2 learners rely heavily on lexical and semantic cues instead of morphosyntactic cues when processing L2 sentences (VanPatten, 1990,1996). In effect, this task plays directly into what L2 learners are already good at doing – using lexical and semantic cues to interpret meaning – and it is not surprising that the most proficient L2 group uses these processing strategies effectively to complete the task similarly to the NS group.

In sum, the hypothesis that more proficient groups would outperform less proficient groups on morphological knowledge received only marginal support based on the present data. It is true that advanced learners performed better than low-intermediate learners on some tasks; however, it is not clear based on data from the word analysis task that advanced learners know anything more about complex derived words than their lower-proficiency counterparts since their performance can be explained by vocabulary size and/or task complexity. In any case, this issue warrants further study using even more advanced learners than those used in this study. In order to address larger theoretical questions such as the validation of the Shallow Structure Hypothesis, performance data from L2 learners who have attained native-like levels of L2 proficiency will be required.

7.5.2.2 L1 effects

Based on previous work on morphological processing, it was hypothesized that speakers of a European language would perform significantly better than speakers of non-European languages on morphological tasks. In line with this prediction, speakers from the Romance group typically scored higher than speakers with Chinese or Arabic native language backgrounds on the lexical decision and the word relatedness task (these differences were not statistically reliable). The finding that Romance speakers perform better than Chinese speakers is somewhat expected given what we know from previous psycholinguistic investigations comparing these groups. In effect, there is a body of research that argues that speakers of a European language are not as limited in L2 morphological processing as speakers of an Asian language (Basnight-Brown, 2007; Jia et al., 2002). These authors attribute this effect to the similarities between English and European languages in terms of familiarity with an alphabetic script as well as

familiarity with highly inflected languages. It may be the case that these features facilitate Romance speakers' recognition of semantically and morphologically relevant features when judging word relatedness and grammaticality.

Beyond this comparison between European and Chinese speakers, data from Arabic speakers is also of interest to the current discussion because Arabic speakers tend to perform worse than the Romance group despite the fact that Arabic and English both use an alphabetic script and have complex inflectional and derivational systems (cf. Fehri, 1993). Yet, this is not the complete story because although on the surface Arabic and English may appear to have similar structures, this does not mean that Arabic and English speakers utilize the same skills when processing words in their native language. According to Fender (2003), English word recognition relies on processing both orthography and phonology, whereas Arabic word recognition relies heavily on phonological processing. Hence, one would expect Arabic speakers to perform worse than NS and Romance speakers on tasks such as word relatedness that force simultaneous processing of orthographic and phonological form. Based on the analysis between NS and Arabic speakers on each word condition, it appears that this is exactly what happened when Arabic speakers were judging the relatedness of morphologically complex words with any type of phonological overlap (orthographic condition, semantic condition, and affix condition). That is, instead of using orthography and phonology to determine word meaning, Arabic learners looked primarily at overlap in phonology and based their decisions on similarities between the phonological structure of the words. Importantly, relatedness judgments tended to be similar between NS and Arabic speakers for monomorphemic words that involved minimal overlap in phonological and orthographic structure.

A word of caution is in order when using the results from this study to support an L1 influence account of morphological processing. For one, none of the differences between groups were statistically reliable. This means that although there are descriptive tendencies that illustrate that learners with a Romance language background tend to perform better than Arabic or Chinese L1 groups, none of these differences are statistically reliable. Second, in the context of the word analysis task, Romance learners actually score worse on the word analysis conditions than learners from Arabic L1 backgrounds and there is no real difference between the scores of the Romance speakers and the Chinese speakers. This result suggests that although Romance speakers may be slightly better at recognizing grammatical violations (lexical decision) and word relatedness, they still have not acquired the syntactic and semantic knowledge underlying the use of derivational morphological patterns. Finally, it may be the case that the learners in this study have not reached the requisite threshold of L2 proficiency for L1 influences to obtain during morphological processing. In a masked-priming study of very advanced L2 speakers of English, Rehak (2010) found processing differences on the derivational suffix *-ity* between Chinese and Spanish speakers. In this particular study, the Spanish speakers reacted to derived words with *-ity* significantly faster than a group of Mandarin Chinese speakers.

7.6 CONCLUSION

7.6.1 Revisiting the research questions

Returning to the original research questions, the results from Study 1 indicate that language proficiency (RQ#1) and L1 influence (RQ#2) have a limited effect on L2 derivational knowledge. The pattern of results in Study 1 suggest that task specific requirements and subjects' overall vocabulary knowledge may be important determinants in how non-native speakers perform on tasks measuring derivational knowledge. More importantly, perhaps, is the finding that NS typically significantly outperform non-native speakers (RQ#3) on morphological tasks involving grammaticality judgments and word decomposition. These tasks provide a good measure of L2 learners' receptive knowledge of constraints on affix attachment (lexical decision) and morphological parsing abilities (word decomposition) and suggest that ESL learners have gaps in derivational knowledge even at the most advanced stages of language acquisition. These gaps become especially apparent on the word analysis task which forces learners to act on their morphological knowledge and make choices about decomposing or not decomposing words into their respective parts. Regardless of language background or language proficiency learners make frequent errors on this task (*eros + ion --> erosion* or *doll + ar --> dollar*), which resemble the errors that children make when acquiring English as a first language (Carlisle & Fleming, 2003). Unlike these children, however, there does not appear to be improvement on morphological abilities as a function of language proficiency. That is, Carlisle and Fleming (2003) found a reduction in word analysis errors among third-graders when compared to the performance of the first-graders.

These results do not entail that L2 learners know nothing about derivational morphology in English (RQ #4). Second language learners clearly know the following about derived words in English:

(1) Knowledge of highly frequent derived words (vocabulary knowledge).

(2) Knowledge that derived words can be broken down into bases and affixes.

At the same time, the results of the present study also indicate that that second language knowledge of derivational morphology may be particularly weak in these areas:

(1) Knowledge of constraints on affix attachment or affix ordering (distributional knowledge).

(2) Knowledge that overlap in orthography/phonology does not imply overlap in meaning (relational knowledge: for Arabic and Chinese learners).

(3) Knowledge that derivation sometimes involves phonological changes to a base word.

7.6.2 Significance

These results are important for theoretical SLA because they extend a research program dominated by studies on L2 inflection into the domain of L2 derivation. Although a few SLA studies have broached the subject of L2 derivation, these studies have been limited in focus in that they show that derivational morphology is problematic for L2 learners, without giving any real indication of the aspects of derivational knowledge that prove to be problematic (Clahsen & Neubauer, 2009; Silva & Clahsen, 2008) as do studies on the L1 acquisition of derivational morphology (Carlisle et al., 2001; Tyler & Nagy, 1989). In connection with its theoretical significance, this study is also important for applied SLA theories because it provides an

indication of specific areas of derivational knowledge that might serve as good candidates for classroom instruction. Prior to this study, we knew that derivational morphology was problematic for L2 learners (Friedline & Juffs, 2010; Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002); however we did not know which aspects of derivational morphology were problematic from the standpoint of derivational processes such as morpho-phonological rules, affix ordering, and constraints on affix attachment. By looking at how these factors influence L2 derivational knowledge, Study 1 provides clear connection between theoretical SLA research on derivation and the classroom-based learning needs of ESL learners.

8.0 STUDY 2

8.1 INTRODUCTION

The purpose of Study 2 is to investigate how instruction influences the second language acquisition of derivational morphology. This study follows from the results of Study 1 in that it focuses on areas of weakness in the second language learning of derivational morphology. In particular, this study considers the effect of instruction with second language learners on: (1) constraints on affix attachment (e.g., affix ordering) and (2) relational knowledge between base words and related derived words (e.g., *creation* and *creative* are related to the base *create*), which were areas of concern within Study 1.

Study 2 is unique in that it represents an *in-vivo* micro-intervention that targets the learning of derivational morphology within the broader context of an ESL reading course. Since this study was part of a pre-existing curriculum, it was designed to complement the pre-existing goals and objectives within the curriculum instead of do something completely different. Specifically, this research addressed the reading curriculum objective within the University of Pittsburgh's English Language Institute that "students will be able to use morphosyntactic information (including articles, affixes, sentence position) to identify the part of the speech when presented with an unknown word in context." As such, it did not make sense to explicitly teach derivational morphology outside of meaningful contexts, therefore, a more implicit, meaning-

based approach was selected in order to align this research with curriculum objectives. At the same time, this research was designed to be a practical solution for addressing L2 problems with derivational morphology given the fact that ESL curricula are already crowded with tasks and learning objectives. The five interventions are 15-20 minutes each for a total of 75-100 minutes of class time (roughly two class periods), which constitutes a minimal amount of class time used for teaching derivational morphology.

8.2 RESEARCH QUESTIONS

The following research questions will be addressed in this study:

(1) Does instruction enhance knowledge of derivational morphology from pre to posttest?

(2) Is one type of instruction better than another type of instruction in terms of outcomes overall?

(3) What do students learn about morphology from each treatment?

8.3 METHOD

8.3.1 Participants

8.3.1.1 Participant characteristics

Eighty-one participants[23] took part in this research as part of their normal classroom activities. There were seven classrooms taught by seven different highly trained ESL instructors. Forty-one students received the input treatment and 40 students received the output treatment. Students were also distributed across two different levels of language proficiency that are generally based on a standardized measure of language proficiency (Michigan Test of English Language Proficiency (MTELP)): low-intermediate (MTELP composite score, M = 47.93) and high-intermediate (MTELP composite score, M = 66.00).[24] There were 32 low-intermediate learners and 49 high-intermediate learners from diverse L1 backgrounds: 48 Arabic-speakers, 14 Chinese-speakers, 3 Japanese-speakers, 7 Korean-speakers, 4 Spanish-speakers, 2 Russian-speakers, 1 Slovak-speaker, and 1 Turkish speaker.

[23] The *n*-size varies for the WKT, the grammaticality judgment task, and the comparison between pretest, posttest, and delayed posttest because some participants did not complete all of the testing measures due to failures to complete all of the testing materials in the allotted time or due to absences on test days.

[24] Scores are only reported here for participants whose placement was determined by the MTELP during the semester that this research was conducted. MTELP scores are available for participants who progressed in proficiency level through the completion of coursework; however, these scores are out of date and may not be a reliable measure of students' language proficiency after a semester of intensive English instruction (i.e., MTELP scores should be significantly higher). Twenty-eight members of the low-intermediate group and 31 members of the high-intermediate group provided current MTELP scores (59 total).

8.3.1.2 Standardized measure of English language proficiency

The Michigan Test of English Language Proficiency (MTELP) provided a standardized measure of participants' English proficiency. Overall, the standardized scores on the MTELP of the high-intermediate group were reliably higher than the scores of the low-intermediate group across all measures of language proficiency (Table 14). Scores on the vocabulary and grammar sections of the test are out of 40 and scores on the reading section are out of 20. In addition, there were no significant differences on standardized measures between the input and the output groups; therefore, any observed differences in performance after the experimental treatment cannot be attributed to differences in global English proficiency. Table 15 summarizes the scores of each treatment group split by proficiency level.

Table 14. MTELP scores as a function of language proficiency

	Low-intermediate		High-intermediate			
MTELP	*M*	*SD*	*M*	*SD*	*t*	*df*
Vocabulary	11.43	2.90	18.16	5.05	-6.36***	1,49
Grammar	14.04	3.36	20.77	4.92	-6.19***	1,53
Reading	5.82	2.13	9.06	2.62	-5.19***	1,57
Composite Score	47.93	5.72	66.00	6.25	-11.60***	1,57

Note: Degrees of freedom were adjusted for homogeneity of variance as needed.
*$p < .05$, **$p < .01$, ***$p < .001$

Table 15. MTELP scores as a function of treatment condition for low and high-intermediate learners

	Input Group			Output Group				
Low-proficiency								
MTELP	*n*	*M*	*SD*	*n*	*M*	*SD*	*t*	*df*
Vocabulary	23	14.30	3.08	5	12.80	4.66	.904*ns*	1,26
Grammar	23	11.09	2.59	5	13.00	4.00	-1.36*ns*	1,26
Reading	23	5.96	2.10	5	5.20	2.39	.714*ns*	1,26
Composite Score	23	48.09	5.66	5	47.20	6.61	.309*ns*	1,26
High-proficiency								
Vocabulary	11	18.91	5.03	20	17.75	5.14	.605*ns*	1,29
Grammar	11	20.00	5.64	20	21.20	4.57	-.644*ns*	1,29
Reading	11	9.82	2.52	20	8.65	2.64	1.20*ns*	1,29
Composite Score	11	66.45	6.86	20	66.75	6.05	.296*ns*	1,29

8.3.1.3 Pre-treatment knowledge of derivational morphology

In order to measure participants' abilities with derivational morphology prior to the treatment, scores from the fill-in-the-blank section of the pretest were calculated for each level of English language proficiency. The fill-in-the-blank test provides the best measure of L2 derivational knowledge since it requires participants to derive morphologically complex words from base words within the context of meaningful sentences without any outside assistance. In other words, the use of derivational morphology is obligatory in these sentences in order to make the sentence grammatical; therefore, the absence of derivational morphology is a good indicator that learners do not have a good grasp of derivational processes.

According to pretest results, participants demonstrate a poor grasp of derivational processes through their performance on the fill-in-the-blank section of the pretest. Out of 53 possible points on the fill-in-the-blank test, low-intermediate learners' scores range from 0 (0%) - 17 (32%) correct with a mean score of 5.50 (10%) (*SD* = 4.36), whereas high-intermediate learners' scores range from 0 (0%) - 32 (60%) with a mean score of 12.76 (24%) (*SD* = 7.83).

These results suggest not only that derivational morphology is problematic for *all* of the learners in this study, but also that L2 knowledge of derivational morphology varies greatly among individual ESL learners. The range and standard deviation evince that some members of each proficiency group have mastered some aspects of derivational morphology while others clearly are not aware of derivational processes. Importantly, higher proficiency does not necessarily entail better performance on derivational tasks since there are several among the high-proficiency group who score well below the mean of the low-proficiency group. Moreover, poor performance on these derived words among these learners indicates that these words have not been stored as lexicalized chunks (at least to the extent that they can be summarily retrieved to complete the fill-in-the-blank type items).

8.3.2 Materials and Procedure

This study took place over the course of one semester (14 weeks) within the context of an intensive English program at the University of Pittsburgh (Table 16). The pretest was administered during the start of the third week in the semester and was followed by the first treatment session in week four. These treatment sessions ran consecutively from session one to session five with one session per week. The posttest was administered the day after the final training session during week eight, and the delayed posttest was administered approximately five weeks after the immediate posttest in weeks thirteen and fourteen. Qualitative interviews (Study 3) were conducted between weeks nine and thirteen.

Table 16. Overview of study 2 procedures

Timeline	Topic	Input Group	Output Group
Week 3	N/A	Pretest	
Week 4	The Cinema	Input 1 Treatment	Output 1 Treatment
Week 5	Love and Dating	Input 2 Treatment	Output 2 Treatment
Week 6	Strange Phenomena	Input 3 Treatment	Output 3 Treatment
Week 7	Love and Dating	Input 4 Treatment	Output 4 Treatment
Week 8 (Day 1)	The Environment	Input 5 Treatment	Output 5 Treatment
Week 8 (Day 2)	N/A	Immediate Posttest	
Weeks 9-13	N/A	Qualitative Interviews (Study 3)	
Week 13-14	N/A	Delayed Posttest	

The classroom experiment took place as part of students' normal classroom activities within an ESL reading class. Seven different teachers administered the tests and the instruction within eight different ESL classrooms over the course of 6 weeks. Four classes received input-enhancement instruction and four classes received pushed-output instruction. The treatment sessions were typically administered at the beginning of class and lasted for approximately 15-20 minutes (Table 17). Each session (excluding the first session) began with a short review of morphology to remind students of the importance of the study and to demonstrate morphological processes with the word *govern* (Figure 14). This short introduction was provided to increase the face validity of the study in the eyes of students so that they knew what they were supposed to learn from the morphology trainings. Beyond the introduction, students received minimal explicit instruction on derivational morphology.

Table 17. Time on task: Output condition vs. input condition

Output treatment	Input treatment
1) Introduction to morphology (~1 min)	1) Introduction to morphology (~1 min)
2) Read an unenhanced text (~4 mins)	2) Input enhancement task (~6 mins)
3) Generation task (~3 mins)	3) Enhanced text (~5 mins)
4) Dehydrated sentences (~8 mins)	4) Multiple choice (~ 4 mins)
Total time: ~15 - 20 mins	Total time: ~15- 20 mins

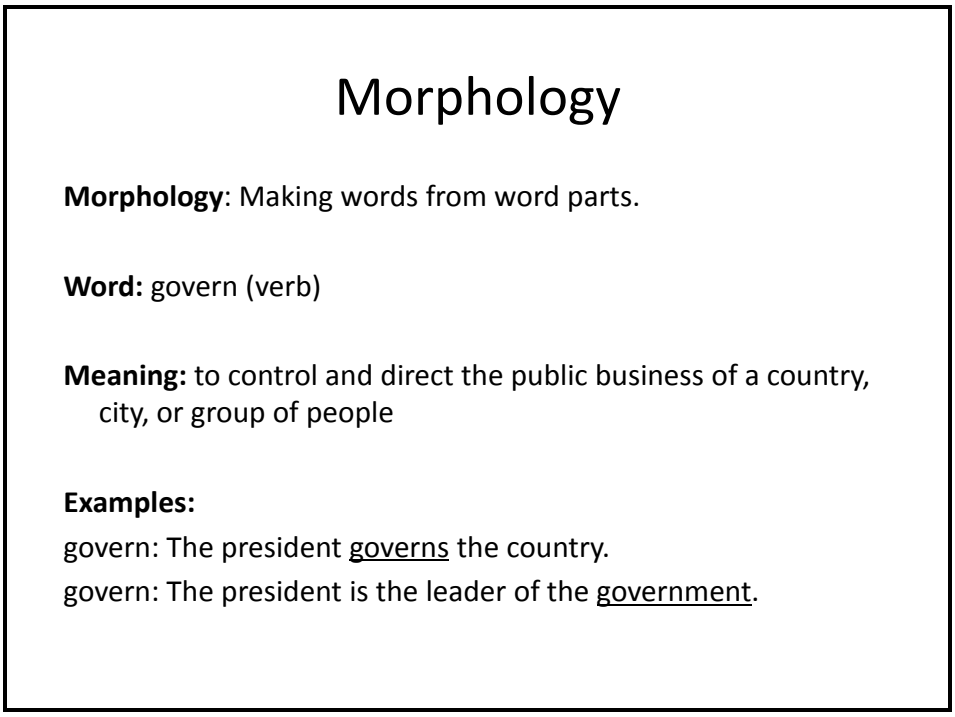

Figure 14. Introduction to morphology from the morphology trainings

The training sessions were administered via Microsoft PowerPoint to ensure that exposure to derivational morphology (input + feedback) would be uniform across the ESL classes. In addition, lesson plans for each treatment session were provided to teachers in order to promote consistency among teachers in presenting the training sessions as part of their normal classroom activities (Appendix G). The institution in which this experiment was conducted did not permit experiments with control conditions due to ethical considerations (i.e., all groups must

have similar learning opportunities), so the input group is treated as a "control condition" given the findings of previous research in SLA studies (e.g., Izumi, 2003) and in cognitive science literature on the generation effect (e.g., Slamecka & Graf, 1978) which favor output-based instruction over input-based instruction.

8.3.2.1 Pushed output treatment

Students within the pushed-output group learned about derivational morphology from the standpoint of output-based model of L2 instruction (deBot, 1996; Kormos, 1999; Swain, 1985, 1998; Swain & Lapkin, 2003) as well as work on the generation effect in cognitive science (Burns, 1990; Crutcher & Healy, 1989; DeWinstanley & Bjork, 2004; Hirshman & Bjork, 1988; Slamecka & Graf, 1978). The impetus behind this type of instruction is that pushed-output leads to better learning because it forces deeper, more elaborate processing of linguistic material and typically results in better long-term retention. In line with this model, students in this group practiced derivational morphology primarily through two different tasks: a generation task and a dehydrated sentence task. The generation task consisted sentences containing derived words with missing derivational endings as in Examples (16a) and (16b). In Example (16a) and (16b) the learner would fill in the blanks with *-sion* to complete the activity and then receive feedback from the teacher via PowerPoint (Figure 15). This feedback consisted of the original sentences with the missing letters (i.e., derivational morphemes) correctly specified.

(16a) It started when Micah found a strange book in the library titled

The (base: expand) *Expan* __ __ __ __ *of the Mind*.

(16b) Soon, he began to talk about his (base: convert) conver __ __ __ __to a new way of thinking.

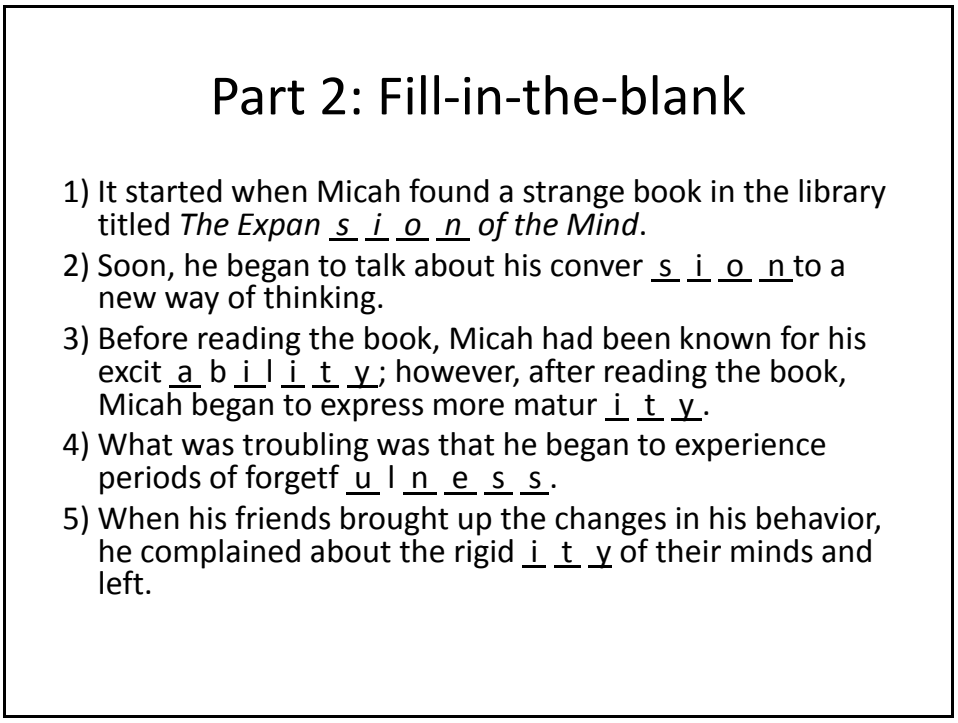

Figure 15. Feedback slide from the fill-in-the-blank task

For the dehydrated sentence section, students produced sentences containing derived words from a list of words that lacked inflectional and derivational morphology (dehydrated words). The list of word included specific instructions on how the base word (e.g., rigid) was to be used in the sentence as in Example 17. After students had completed this section, the teacher elicited answers from the students and then provided models of appropriate sentences from PowerPoint slides (Figure 16). The dehydrated sentences were different than the sentences in the previous sections.

(17) The man / not / bend / piece of metal / due to its / rigid. (Use rigid as a noun.)

_____

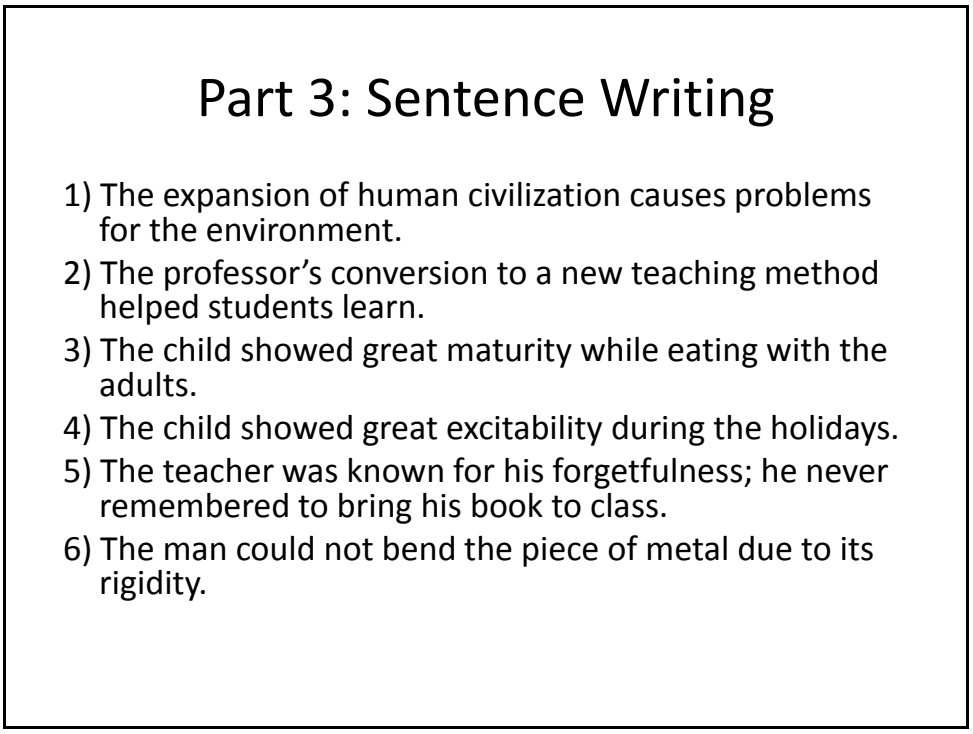

Figure 16. Feedback slide for the dehydrated sentence task

Although output was emphasized in the pushed-output treatment, students also received some input before completing the output exercises in the form of a short reading section containing many derived words. These passages were created specifically for this study. Each passage was approximately 125 words in length and contained six derived words. The words in these texts (with the exception of the derived words) were typically words from the top 4000 words in the BNC corpus. Students read these unenhanced reading passages so that they could potentially see derivational morphology in use prior to completing the other productive activities (Figure 17). Feedback from the teacher could also be counted as a source of input. (See Appendix E for copies of the pushed output activities and Appendix F for copies of the pushed output PowerPoint slides.)

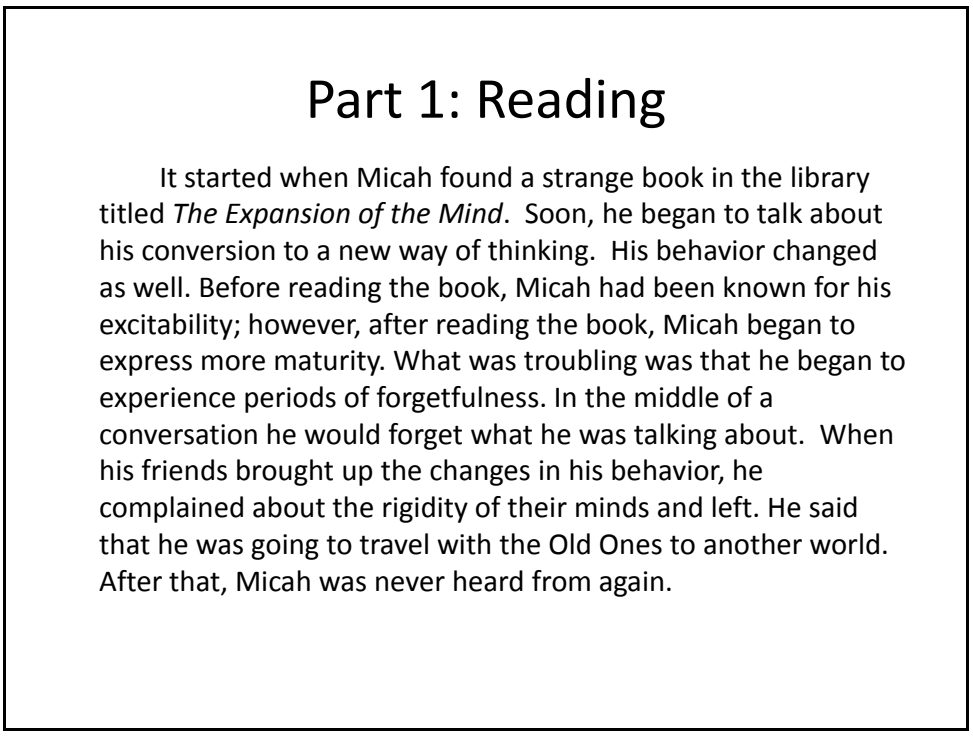

Figure 17. Unenhanced reading passage from pushed-output condition

8.3.2.2 Input-processing treatment

Students in the input-processing treatment studied derivational morphology from the standpoint of theories on input-processing (Sharwood Smith, 1993; VanPatten, 1996; 2002; VanPatten & Cadierno, 1993). These theories emphasize that language instruction is most effective when it pushes L2 learners to attend to relevant form-meaning connections during language processing. As such, students in this group learned about derivational morphology through a series of activities that drew their attention to morphological forms within meaningful contexts. These activities include an interpretation task, an enhanced text, and a multiple-choice activity. The lesson materials were administered via PowerPoint. After a brief introduction to morphology, the lesson began with the interpretation task. The purpose of this task was to push

students to listen for derived words in the context of a sentence and then choose the picture that best represented the meaning of the sentence among two picture choices as in Figure 18 (Sentence: *It started when Micah found a strange book in the library titled The* ***Expansion*** *of the Mind*). After choosing a picture, students received immediate feedback after each individual interpretation task item as in Figure 19. Although the derived words had high semantic value in each of these sentences, the drawback to using derivational suffixes in a task such as the interpretation task is that part of the meaning of the derived word can be retrieved from the base word without processing any derivational morphemes. Hence, teacher feedback was a crucial aspect of the interpretation task because teachers used it to draw students' attention to the meaning of the derived word *and* the function of the derivational morphemes in the context of meaningful sentences.[25] The derivational morphemes were enhanced on the feedback slides by changing the font colors (base word = red, 1st affix = blue, 2nd affix = green) to make them more salient during the provision of feedback. Teachers typically elicited answers (Picture A or Picture B) and had students explain why they chose a particular answer before showing the feedback slides. (See Appendix E for copies of the input-processing activities and Appendix F for copies of the input-processing PowerPoint slides.)

[25] Feedback also ensured that students had an opportunity to focus specifically on the function of the derived word in the sentence without being distracted by other words within the sentence that may have provided clues to the meaning of the sentence.

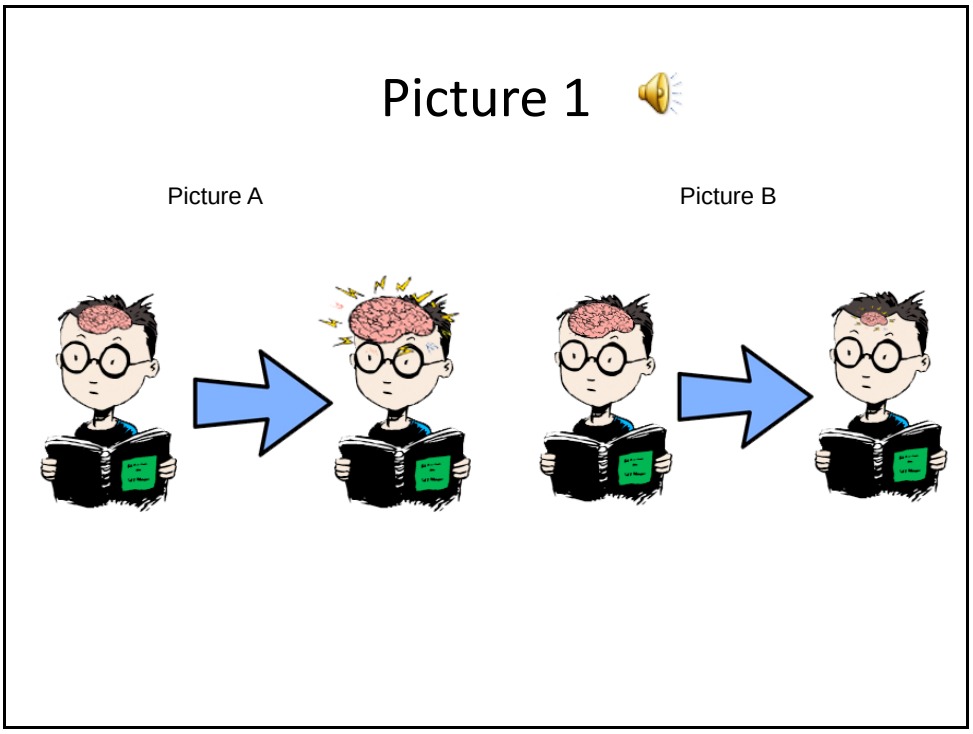

Figure 18. Example from the interpretation task

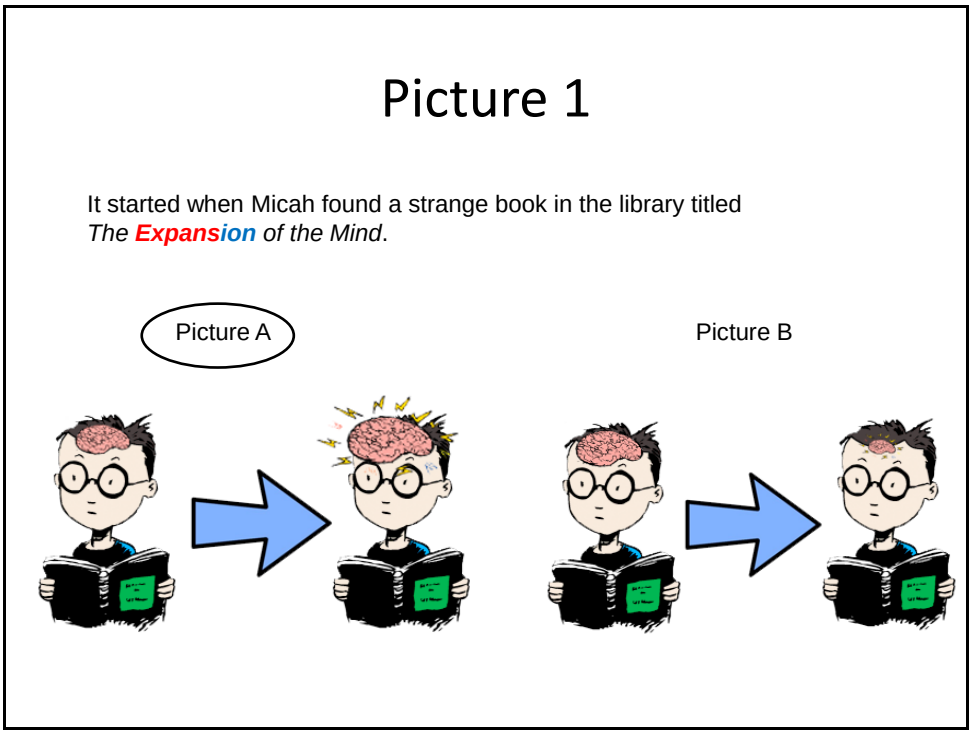

Figure 19. Example of a feedback slide from the interpretation task

After completing the interpretation activity, students were instructed to read an enhanced text that contained derived words (Figure 20). The purpose of this task was to direct students' attention to derived words and get them to notice the function of derivational morphemes within a meaningful context through input-enhancement. This text was read directly from a PowerPoint slide and contained exactly the same sentences that students practiced during the interpretation task. As depicted in Figure 20, derived words were enhanced (base word = red, 1st affix = blue, 2nd affix = green) and the base word was displayed in parenthesis immediately after each derived word. This text was exactly the same as the text in the pushed-output treatment except for the textual enhancement.

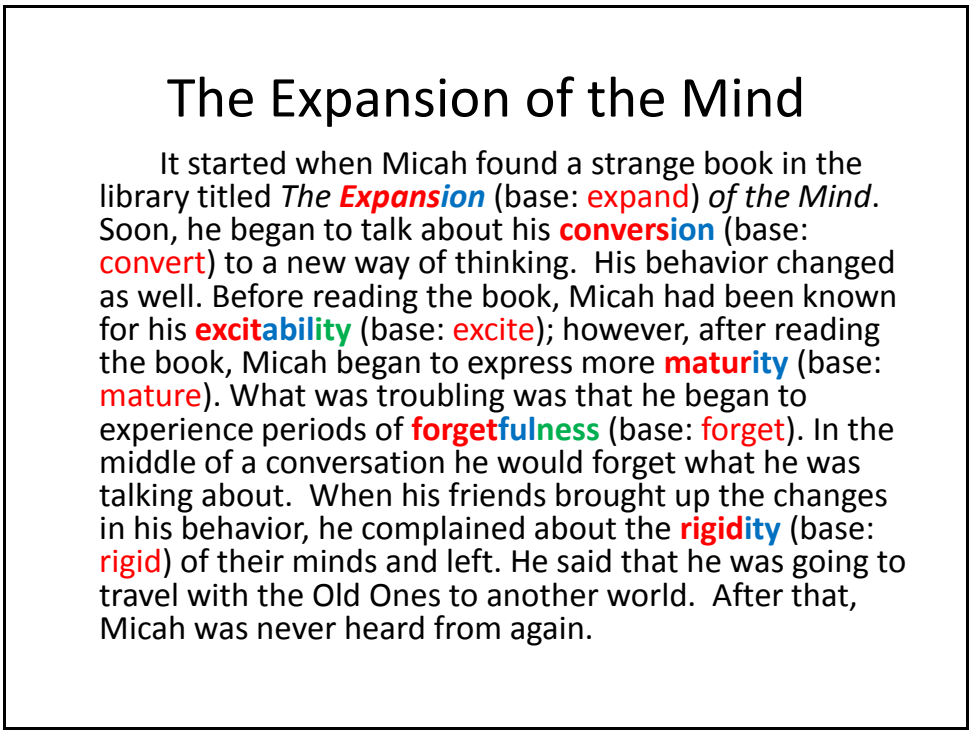

Figure 20. PowerPoint slide with enhanced text from the input-processing treatment.

The final task from the input-processing treatment was a recall task in which students were asked to select the correct form of a derived word from a set of related items as in Examples (18a) and (18b) The purpose of this task was to direct students attention to the

connection between the form of a derived word and its function in a sentence without inducing generation (or production) of the target items. As such, the sentences in this exercise were the same as the sentences in the interpretation task and the reading passage. The activities themselves were designed to induce recall or recognition of the correct derived forms (e.g., *expansion* vs. *expansive* or *expand*) without evoking spontaneous generation of the target items. Feedback was provided via PowerPoint slides which showed the correct answers for each item (Figure 21).

(18a) It started when Micah found a strange book in the library titled *The* _____ *of the Mind*.

a. expansive b. expand c. expansion

(18b) Soon, he began to talk about his _____ to a new way of thinking.

a. conversion b. convert c. convertible

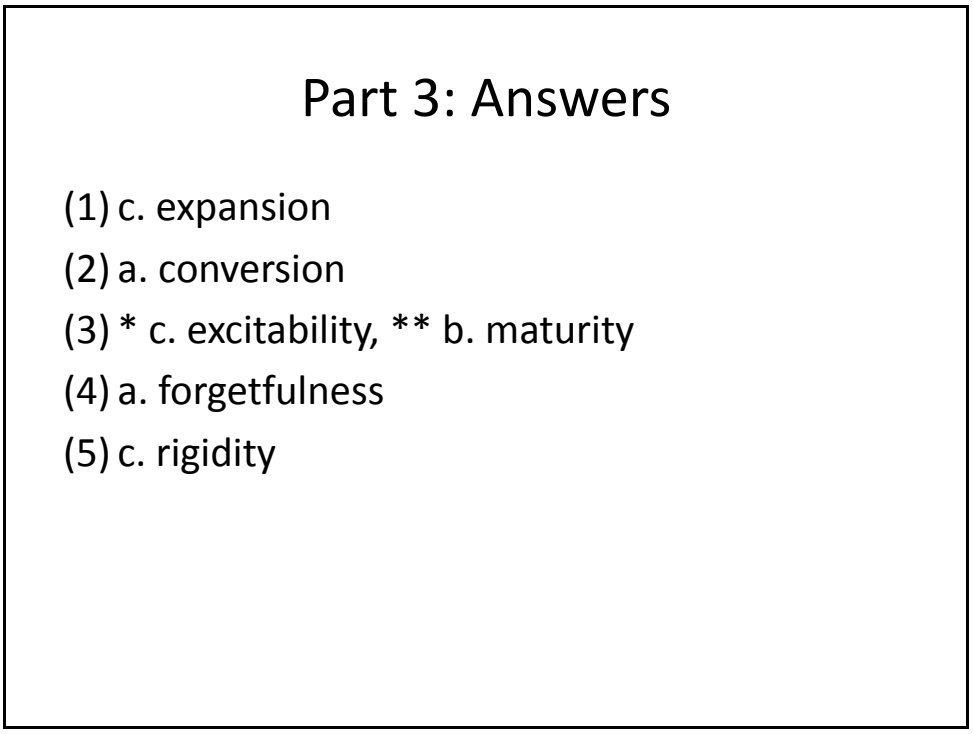

Figure 21. Feedback slide for multiple-choice (recall) section from the input-processing treatment

8.3.2.3 Training/testing stimuli

The training and testing items were selected because they contained the derivational features that proved to be difficult for students in study 1 and because the base words themselves were not uncommon for an ESL setting. Many of the base words were taken directly from the Academic Word List (AWL: Coxhead, 2000) and/or from Study 1. The base words for the thirty training items were among the top 4000 most frequent words in the BNC corpus and had an average log frequency of 9.59 (range 7.55-11.92) according to the English Lexicon Project's (Washington University, 2009) database.[26] In addition, these base words could be combined with

[26] The base word *erode* (BNC 5000) was the only training item that exceeded the 4000 level in the BNC. It was kept on the training list because it was an AWL word.

the derivational affixes *-ness, -ity, -tion, -ful,* and *-able* as well as the affix combinations *-able+ity, -ful+ness,* and *-tion+al* to form the derived words in Table 18. The derived words were typically lower in frequency than the base words from which they were derived although most of the derived words in Table 18 were still among the top 4000 most frequent words in the BNC. Nonetheless, some derived words on this list were not listed in the BNC corpus (*excitability, painfulness,* and *correctional*) or went beyond the 4000 word level (*sensational, expansion, erosion,* and *brevity*). These words were kept on the training word list either because they had affix ordering (*excitability, painfulness, correctional*, and *sensational*) or because they were listed on the AWL (*expansion, erosion,* and *brevity*) and fit with the curriculum goals for the institution in which this study was conducted. Generally, the derived words with multiple affixes (Mean log frequency = 5.71) were associated with much lower log frequencies than the derived words with single affixes (Mean log frequency = 8.39). The affixes and affix combinations *-tion, -ity, able+ity, ful+ness,* and *-tion+al* were studied directly as part of these words, whereas the affixes *-ness, -able, -ful,* and *-al* were studied indirectly as subcomponents of one of the affix combinations. These training items did not vary between the input and the output group. Appendix C (Table 37) contains a full list of trained items along with their lexical characteristics.

Table 18. Training words form the morphology treatments

able + ity	**ful + ness**	**tion + al**	**tion**	**ity**
reliability	cheerfulness	sensational	acquisition	rigidity
adaptability	forgetfulness	inspirational	absorption	similarity
predictability	painfulness	relational	perception	brevity
excitability	hopefulness	oppositional	expansion	security
accountability	playfulness	correctional	erosion	ethnicity
accessibility	wastefulness	educational	conversion	maturity

The test items paralleled the training items in terms of derivational morphology and overall lexical characteristics. Importantly, not all derivational morphemes were included in all of the testing measures due to time constraints on the testing measures (one full 50 minute class was allotted to both the pretest and the posttest). The 10 items from the interpretation task focused specifically on the affixes *-able, -ity,* and *-able+ity.* The base words from this condition were among the 4000 most frequent words in the BNC corpus and had an average log frequency of 9.85 (range 8.04 - 12.06) in the English Lexicon Project (Washington University, 2009) database. The derived words were also among the top 4000 most frequent words in the BNC corpus, however, they were slightly less frequent than their bases with an average log frequency of 8.74 (range: 8.51-9.29).[27] A full list of these items along with their lexical characteristics is appended in Appendix C (Table 38). The fill-in-the-blank section of the pretest/posttest contained 60 items, 54 of those items were derived words and 6 items were inflected words (Note: inflected words were included in order to gauge students' abilities to recognize inflectional tense/agreement morphology in comparison with their knowledge of derivational morphology). Of the 54 derived words, 24 items came directly from the training (15 exact matches (e.g., *forgetfulness*) and 9 sub-component words (e.g., *forgetful*). The remaining 30 derived words were novel items that students did not see at any point during the training. The

[27] Four words were not found in the English Lexicon Project database (*sustainability, bikeable, animality,* and *trainability*). *Sustainability* was included due to its status as an AWL word. The derived words *bikeable, animality,* and *trainability* were included because they have common, highly concrete base words (*bike, animal, train*) and can be combined with derivational affixes to create unique interpretations that require a high degree of morphological awareness. In other words, these words were included to test if learners were able to interpret highly infrequent and semantically opaque, but, nonetheless, highly decomposable derived words.

base words for this test were all among the 4000 most frequent tokens in the BNC corpus (with the exception of *ambiguous* which is BNC 5000) and had an average log frequency of 9.45 (range: 7.55 - 11.55; Washington University, 2009). The inflected words were also within the top 4000 BNC words; however, the average log frequency for these items was 6.90. For the most part, the derived words also fit within the BNC 1000-4000 range, however a few items were off-list (*dependability*, *painfulness*, and *thankfulness*) and some items extended beyond the BNC 4000 range: *retention* (BNC 6000), *sensational* (BNC 5000), *ambiguity*[28] (BNC 6000), *brevity* (BNC 8000), and *sensation* (BNC 5000). The log frequency for derived words with one affix (*M* = 7.64) was higher than the log frequency for words with two derivational affixes (*M* = 5.94). Several items with the *ful+ness* affix combination were exceptionally low in log frequency with the lowest being *painfulness* (log frequency = 1.1) and the highest being *truthfulness* (log frequency = 5.57). A list of the words from the fill-in-the-blank task is included in Appendix C (Table 39). Finally, the words from the grammaticality judgment test were copied from study 1 and the items on the grammaticality judgment section were exactly the same as the items on the grammaticality judgment section of Study 1.

8.3.2.4 Pretest/posttest

A test of derivational knowledge was administered to students before and after the morphology treatment. There were two versions of the test: Version A and Version B. (See Appendix D). These tests included multiple measures in order to assess the effects of the

[28] Ambiguity was included to test how students performed on an item that did not decompose into a base with full-word status (e.g., *ambigu-*) and a derivational affix. Students generally performed very poorly on this item.

morphology treatment on different aspects of derivational knowledge including (1) a word knowledge test, (2) an interpretation task, (3) a fill-in-the-blank task, and (4) a grammaticality judgment task. Before the pretest, students were told that they were going to be receiving a training that would help them develop better vocabulary learning strategies and that this test was to measure how much they knew before and after the training. Students were not told that the training pertained to derivational morphology at the time of the pretest; however, students clearly knew that the study was about derivational morphology at the time of the posttest. This introduction took approximately 3-5 minutes.

The first section of the test was a word knowledge test. This section did not directly assess morphological knowledge, but was instead designed to determine how well students knew the base words (of the derived words) that were to be used in the fill-in-the-blank section. Thirty-five items[29] were included in this section of the pretest/posttest and students were asked to rate these items on a scale from 1 to 4. A rating of 1 meant that the word was not known, a rating of 2 meant that the form of the word was recognized, but the meaning was unknown, a rating of a 3 meant that the meaning of the word was known, and a rating of 4 meant that the word would be used in a sentence. The words appeared in a table and the scale was provided to the right of each word as in Table 19. Students completed this task in approximately 3-5 minutes.

Table 19. Example from the word knowledge test

Word	**How well do you know the word?**			
rich	1	2	3	4
ambiguous	1	2	3	4
thank	1	2	3	4

[29] The base word *force* was omitted in this count and from the analysis because it did not appear correctly on the copies of Version B of the pretest/possttest

The interpretation task followed the word knowledge test as the second section of the test. The purpose of this task was to assess students' abilities to interpret sentences with derivational morphology. As such, students viewed a series of three pictures while listening to a sentence with an important derived word. After listening to each sentence, students were directed to select the picture that best represented the meaning of the sentence. The pictures were presented via PowerPoint (Figure 22). Students listened to each sentence two times and then selected an answer from a set of choices: Picture A, Picture B, or Picture C. Feedback was not provided on these items at any time during the experiment. Students completed this task in approximately 10 minutes.

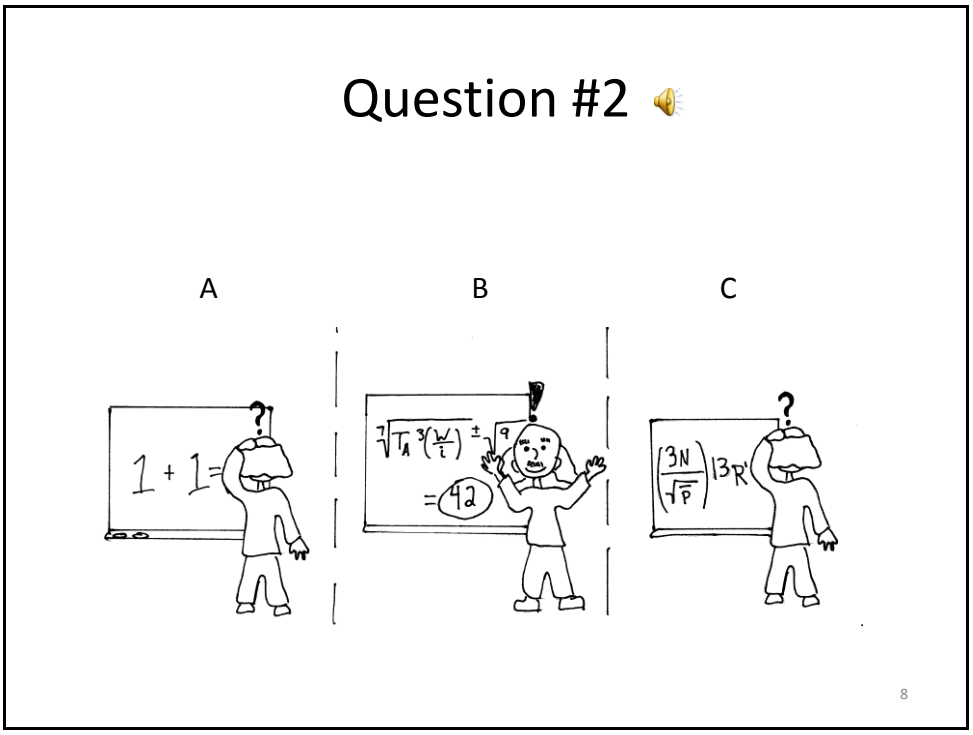

Figure 22. Interpretation item: *Due to its complexity, the problem has not been solved.*

The third section of the test was a fill-in-the-blank task. The purpose of this task was to test students' productive morphological abilities insofar as their ability to look at a base word and successfully transform the given base word into the appropriate alternate form within a sentential

context (See examples 19 and 20). Before beginning this task, students reviewed two example sentences via PowerPoint with the word *govern* to illustrate what kind of answers they were expected to provide (Examples 19 and 20). For instance, in Example 19, *govern* requires an /s/ in order to agree with the subject *president.* In Example 20, *govern* (verb) is changed to a noun by adding /*ment*/ to form *government*. Students were informed that all of the given words required a change. The derivational suffix *-ment* was used in the example instead of one of the affixes from the experiment in order to avoid priming students to expect one of the experimental affixes. There were two versions of the fill-in-the-blank test which correspond to the test Version A and test Version B. The order of the test items was reversed from Version A to Version B in order to control for ordering effects. Students completed this task in approximately 20 minutes.

(19) Govern: The president *govern*s_____the country.

(20) Govern. The *govern*ment____ makes the country's laws.

The final section of the test was a grammaticality judgment test. This test was exactly the same as the grammaticality judgment test in study 1. During the final 10-15 minutes of class, classroom teachers stopped students from working on the fill-in-the-blank section in order to briefly explain the grammaticality judgment task. Teachers explained that students were supposed to decide whether the word was a real English word by using the example words of *teacher* and *xjibrax* from the PowerPoint slides (Figure 23). After this explanation, students were directed to continue to complete the fill-in-the-blank section before moving on to the grammaticality judgment. Most students completed the grammaticality judgment in 10 minutes or less.

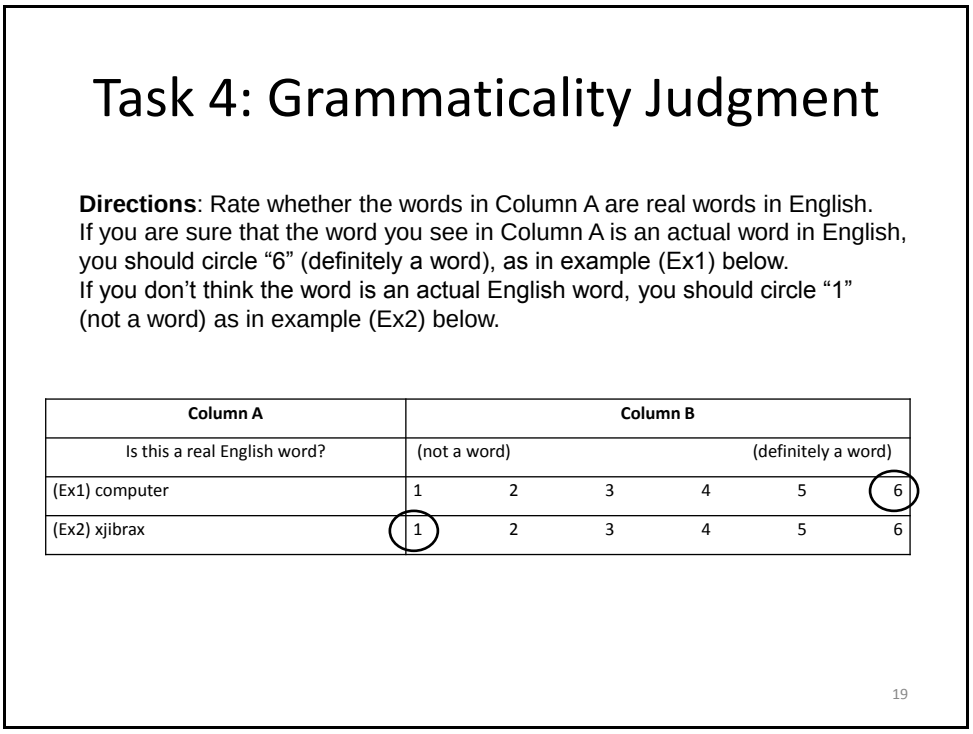

Figure 23. Directions from the grammaticality judgment test

8.3.2.5 Delayed posttest

The delayed posttest was administered approximately five weeks after the immediate posttest as a section on a final English exam. This delayed posttest was a significantly shorter version of the fill-in-the-blank section of the original pre/posttest. It was not possible to administer the original pre/posttest at this time due to time constraints in the curriculum. Hence, 24 derived words with relatively "high" pre-post gains were selected as items for the delayed posttest (Table 20). The words on the delayed test were also divided into a taught category and an untaught category, which reflects whether or not students saw the word during the morphology training. (See Appendix H for a copy of the delayed posttest.)

Table 20. Words on the delayed posttest

Condition	Taught	Pre_post Gain	Untaught	Pre_post Gain
ful+ness	cheerfulness	60%	thankfulness	54%
able+ity	predictability	20%	sustainability	13%
ity	similarity	30%	legality	12%
tion	absorption	12%	exclusion	11%
able	reliable	26%	dependable	10%
ness	N/A	N/A	toughness	19%
ful	forgetful	12%	truthful	18%
ful+ness	forgetfulness	39%	forcefulness	42%
able+ity	adaptability	10%	dependability	8%
ity	brevity	7%	neutrality	8%
tion	sensation	12%	intention	5%
able	adaptable	25%	variable	5%
ness	N/A	N/A	closeness	12%

8.3.3 Data coding

Participants' scores for each section of the pretest/posttest were computed using the following criteria. Scores on the word knowledge test were calculated by adding up participants' rating on each word to compute a raw score for participants' overall word knowledge. The maximum possible score on this task was 140 and the minimum was 35. Scores on the interpretation task were calculated based on a participants' accuracy on the 10 interpretation items. If a participant selected the correct answer, he/she received one point, and there were a total of 10 possible points on this test. Scores on the fill-in-the-blank section were divided into two categories: inflection and derivation. The score on fill-in-the-blank inflection was computed based on a participant's accuracy on the 6 inflection items on the test. The score on fill-in-the-blank

derivation items was calculated based on a participant's accuracy on the 53 derivation items[30] on the test. One point was given if the item was correctly used in the context of the sentence. No credit was given if the item was misspelled or otherwise deviated from the correct answer(s).[31] The same procedure was followed when coding the scores on the posttest; however, the posttest only included 24 test items (none involving inflection). Finally, scores from the grammaticality judgment test were converted from the likert-scale response (1 = not a word to 6 = definitely a word) into a binary response. Scores from one to three were converted into 0 (not a word) and scores from four to six were converted into 1 (definitely a word).

8.3.4 Description of variables

Statistical analyses will be conducted using the following dependent and independent variables:

Score. This dependent variable categorizes participants' mean score on the testing measures.

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[30] The item for *relational* was omitted from the accuracy analysis because it had correct responses that were unrelated to the affixes that were being studied.

[31] The decision to not accept misspelled responses was not an easy one. Many times students clearly knew which derivational morpheme to use, but failed to correctly spell the target item (*similarty vs. similarity or *sustainabel vs. sustainable). The key to this decision was that one of the objectives of this study was to develop L2 knowledge of the phonological/orthographic changes that occur in shift words (e.g., erode --> erosion NOT *erodion or *erodsion), for which orthographic accuracy is crucial. Hence, it was determined that misspelled words would not be counted in a participants' overall accuracy score because they were not, in fact, *accurate* answers.

Treatment. This independent variable categorizes the type of instruction that a particular student received during the intervention. The two levels of this variable are traditional instruction and input-processing instruction.

Proficiency. This independent variable categorizes L2 English proficiency and consists of two levels: low-intermediate and high-intermediate.

Time. This within-subjects independent variable categorizes the time of the test and consists of three levels: pretest, posttest, and delayed posttest.

8.4 RESULTS

8.4.1 Preliminary comparisons

8.4.1.1 Reliability statistics

Test reliability was computed using Cronbach's Alpha α. The alpha was .564 (pre)/.587 (post) for the interpretation task, .895 (pre)/.908 (post) for the fill-in-the-blank test, .727 (pre)/.756 (post) for the grammaticality judgment test, and .854 for the delayed posttest. These results indicate that all of the tests were reliable, except for the interpretation task.

8.4.1.2 Summary of pretest results

A series of two-way and three-way (for the fill-in-the-blank test) between-subjects ANOVAs were conducted as a function of treatment, proficiency, and pretest version in order to determine the influence of these factors at the time of the pretest. Table 21 displays the means,

standard deviations, and the *F*-statistics for the input treatment group and the output treatment group. The results are split by language proficiency because the main effect of proficiency was significant ($p < .05$) across all tests except grammaticality judgment. Besides language proficiency, there were no significant differences between the input and the output group on derivational scores at the time of the pretest nor were there any significant interactions among proficiency and treatment, proficiency and pretest version (fill-in-task only), or treatment and pretest version (fill-in-task only) for any of the tasks on the pretest. There was a significant interaction between condition and pretest version for the inflection results and students in the input group scored significantly higher on Version A than on Version B of the pretest. Full statistical results (including interactions) are reported in the next section (8.4.1.2).

Table 21. Pretest scores on morphological tasks as a function of proficiency and treatment group

Task	Proficiency	Input Group		Output Group		Input vs. Output	
		M	*SD*	*M*	*SD*	*F*	*df*
WKT	Low	99.95	17.75	98.44	16.26		
(Max: 140)	High	116.50	17.23	113.94	15.86		
	Total	108.23	2.66	106.190	3.17	.242*ns*	1,76
Interpretation	Low	5.13	1.84	4.67	1.73		
(Max: 10)	High	7.17	1.89	6.45	1.96		
	Total	6.15	.297	5.56	.280	1.61*ns*	1,77
Fill-in (der)	Low	6.35	4.74	3.33	2.12		
(Max: 53)	High	13.44	9.04	12.35	7.17		
	Total	9.69	1.08	7.57	1.32	1.56*ns*	1,73
Fill-in (infl)	Low	3.09	2.09	2.67	1.23		
(Max: 6)	High	4.90	2.66	4.81	1.33		
	Total	3.95	.373	3.71	.454	.163*ns*	1,73
Gram. Judg.	Low	35.26	11.73	39.00	3.16		
(Max: 60)	High	41.11	9.46	39.80	11.26		
	Total	38.19	1.65	39.40	1.99	.222*ns*	1,76

8.4.1.3 Pre-treatment effects

A 2 x 2 between-subjects ANOVA was performed on WKT scores as a function of language proficiency (high vs. low) and instruction (input vs. output). The pattern of differences on WKT scores among the treatment groups was not significantly different between the high proficiency and low proficiency groups, $F(1,76) = .016$, $p = .899$, $\eta_p^2 < .001$. There was no significant difference between the WKT scores of students in the input group ($M = 108.23$, $SE = 2.66$) and the scores of students in the output group ($M = 106.19$, $SE = 3.17$), $F(1,76) = .242$, $p = .624$, $\eta_p^2 = .003$. There was a significant difference between the scores of the low proficiency and the high proficiency group, $F(1,76) = 14.97$, $p < .001$, $\eta_p^2 = .165$. The scores of the high proficiency group ($M = 115.22$, $SE = 2.48$) were significantly higher than the scores of the low proficiency group ($M = 99.20$, $SE = 3.31$).

A 2 x 2 between-subjects ANOVA was conducted on interpretation task scores as a function of instructed group (input vs. output) and language proficiency (high vs. low). The pattern of differences among the treatment groups was not significantly different between the high proficiency and low proficiency groups, $F(1,77) = .073$, $p = .788$, $\eta_p^2 = .001$. There was no significant difference between the input ($M = 6.15$, $SE = .297$) and output group ($M = 5.56$, $SE = .36$), $F(1,77) = .1.61$, $p = .21$, $\eta_p^2 = .02$. There was a significant difference between the high proficiency and low proficiency groups, $F(1,77) = 16.88$, $p < .001$, $\eta_p^2 = .180$. The scores of the high proficiency group ($M = 6.81$, $SE = .280$) were significantly higher than the scores of the low proficiency group ($M = 4.90$, $SE = .371$).

A 2 x 2 x 2 between-subjects ANOVA was conducted on fill-in-the-blank derivation scores as a function of instructed group (input vs. output), language proficiency (high vs. low) and test version (Version A vs. Version B). The three-way interaction effect between

proficiency, instructed group, and pretest version was not significant, $F(1, 73) = .306$, $p = .582$, $\eta_p^2 = .004$. The pattern of difference among treatment groups was not significantly different between pretest versions, $F(1,73) = .641$, $p = .426$, $\eta_p^2 = .009$, or between proficiency levels, $F(1, 73) = .285$, $p = .595$, $\eta_p^2 = .004$. The pattern of difference among scores across pretest versions was not significantly different among proficiency levels, $F(1,73) = .293$, $p = .590$, $\eta_p^2 = .004$. There was not a significant difference on fill-in-the-blank scores between Version A ($M = 9.49$, $SE = 1.16$) and Version B ($M = 7.77$, $SE = 1.25$), $F(1,73) = 1.03$, $p = .314$, $\eta_p^2 = .014$. There was not a significant difference on fill-in-the-blank scores between the input group ($M = 9.69$, $SE = 1.08$) and the output group ($M = 7.57$, SE = 1.32), $F(1,73) = 1.56$, $p = .216$, $\eta_p^2 = .021$. There was a significant difference between the low proficiency and the high proficiency groups, $F(1,73) = 20.66$, $p < .001$, $\eta_p^2 = .221$. The fill-in-the-blank derivation scores of the high proficiency group ($M = 12.50$, $SE = 1.05$) were significantly higher than the fill-in-the-blank scores of the low proficiency group ($M = 4.77$, $SE = 1.33$).

A 2 x 2 x 2 between-subjects ANOVA was conducted on fill-in-the-blank inflection scores as a function of instructed group (input vs. output), language proficiency (high vs. low) and test version (Version A vs. Version B). The three-way interaction effect between proficiency, instructed group, and pretest version was not significant, $F(1,73) = .404$, $p = .527$, $\eta_p^2 = .006$. The pattern of difference on fill-in-the-blank inflection scores among treatment groups was not significant between high and low proficiency groups, $F(1,73) = .085$, $p = .771$, $\eta_p^2 = .001$. However, there was a significant interaction on fill-in-the-blank inflection scores between treatment conditions and Version A and Version B of the pretest, $F(1,73) = 4.29$, $p = .042$, $\eta_p^2 = .055$. The pattern of difference on fill-in-the-blank inflections among proficiency levels was not significant between test versions, $F(1,73) = .001$, $p = .971$, $\eta_p^2 < .001$. There were

no significant differences between the input group (M = 3.95, SE = .373) and the output group (M = 3.71, SE = .454), $F(1,73) = .163$, $p = .687$, $\eta_p^2 = .002$, or between Version A (M = 4.26, SE = .40) and Version B (M = 3.40, SE = .43) of the pretest, $F(1,73) = 2.153$, $p = .147$, $\eta_p^2 = .029$. There was a significant difference between proficiency groups, $F(1,73) = 11.60$, $p = .001$, $\eta_p^2 = .137$. The high proficiency group (M = 4.83, SE = .365) scored significantly higher on fill-in-the-blank inflection than the low proficiency group (M = 2.83, SE = .461). Students from the input group scored significantly higher on Version A (M = 4.99, SE = .487) of the pretest than Version B (M = 2.91, SE = .564) of the pretest, $F(1,73) = 7.78$, $p = .007$, $\eta_p^2 = .096$. There were no significant differences between scores on Version A (M =3.53, SE = .634) and Version B (M = 3.89, SE = .651) for the output group, $F(1,73) = .152$, $p = .697$, $\eta_p^2 = .002$.

A 2 x 2 between-subjects ANOVA was conducted on grammaticality judgment scores as a function of instructed group (input vs. output) and language proficiency (high vs. low). The pattern of difference among the treatment groups was not significantly different between the high proficiency and the low proficiency groups, $F(1,76) = .959$, $p = .331$, $\eta_p^2 = .012$. There was no significant difference between the input group (M = 28.19, SE = 1.65) and the output group (M = 39.40, SE = 1.99), $F(1,76) = .222$, $p = .639$, $\eta_p^2 = .003$. There was no significant difference between the grammaticality judgment scores of the high proficiency (M = 40.46, SE = 1.56) and the low proficiency (M = 37.13, SE = 2.06), $F(1, 76) = 1.66$, $p = .201$, $\eta_p^2 = .021$.

In sum, the only difference between groups at the time of the pretest was a significant difference between proficiency groups in which the higher proficiency students typically performed significantly better on tasks involving derivational morphology than their lower proficiency counterparts. This difference was expected given the fact that higher proficiency learners ultimately know more about English than lower proficiency learners; however, there

was no significant difference between the high and low proficiency groups on the grammaticality judgment test. There were no significant differences on scores on derivation scores between groups that could be attributed to grouping factors such as a pretest version (this applies to the fill-in-the-blank task only) or group placement (input vs. output groups) among any of the experimental pretest tasks. Importantly, this means that any differences between the training groups from pretest to posttest or delayed posttest are due to the instructional treatment since differences cannot be attributed to superior prior knowledge among instructed groups before the training or ordering effects among the two different versions of the pretest.[32]

8.4.1.4 Correlations between components of derivational knowledge

On one hand, previous SLA research has established that there are correlations between L2 vocabulary size and knowledge (productive and receptive) of derivational suffixes (Schmitt & Meara, 1997). On the other hand, this same research has failed to find any relationship between standardized measures of vocabulary knowledge (TOEFL scores) and productive knowledge of derivational suffixes. The following Spearman correlations were performed to investigate how the L2 learners in this study compare and contrast with the learners in previous research (Schmitt & Meara, 1997) in regards to derivational knowledge. This research measures receptive and productive knowledge of derivational morphology by using different tasks: grammaticality judgment (receptive), interpretation task (receptive), fill-in-the-blank (receptive); however, the constructs receptive and productive knowledge remain the same between Schmitt and Meara's

[32] The pretest version matters only for inflectional morphology which is not the focus of this paper.

research and the present study. The results for each analysis are split by language proficiency to examine the relationship between knowledge components among each level of proficiency.

Correlation results between pretest measures and standardized proficiency measures are compiled for low-proficiency (Table 22) and high-proficiency (Table 23) learners. The results vary slightly between the low and high-proficiency learners; yet, the two groups share some of the same characteristics. For one, there are positive correlations between L2 learners knowledge of the base words (WKT score) and their performance on the interpretation task (receptive) and the derived words portion of the fill-in-the-blank task (productive). In other words, if students know the base words, they tend to interpret sentences with derived words more accurately and correctly produce derived suffixes in fill-in-the-blank type sentences. In addition, scores on the fill-in-the-blank (derivation) test were correlated with scores on the fill-in-the-blank (inflection) test and scores on the interpretation task. This suggests that L2 learners' abilities to produce derivational suffixes are related to their ability to interpret derivational suffixes in sentence contexts as well as their abilities to produce inflectional suffixes. Interestingly, there are never any relationships between standardized measures of vocabulary and grammar and students' receptive and productive abilities with derivational suffixes. These results indicate that there are no relationships between students knowledge of derivational morphology and their vocabulary and grammar abilities, as measured by the MTELP test. Moreover, there are no significant correlations between global MTELP score and any of the experimental measures.

Table 22. Summary of correlations between pretest measures among low-intermediate learners

Measure	1	2	3	4	5	6	7	8	9
1. WKT Score (pre)	_								
2. Listening (pre)	.391*	--							
3. Fill-in-derivation (pre)	.675**	.350*	--						
4. MTELP VOCAB	-.056	-.289	.115	--					
5. MTELP READING	.031	.075	.239	.158	--				
6. MTELP GRAMMAR	.153	.349	.149	.052	-.177	--			
7. Gram. Judg. (pre)	.204	.170	.235	-.025	.236	.055	--		
8. Fill-in-infl (pre)	.542**	.295	.603**	.153	.199	.275	.203	--	
9. MTELP score	.032	-.046	.192	.721**	.383*	.521**	.045	.306	--

There are also several differences between the low and high-intermediate group in correlations among the different tests of knowledge. First, scores on the WKT among high-intermediate learners are positively correlated with scores on the MTELP vocabulary section and the grammaticality judgment test. This suggests that (1) knowledge of the base words (WKT) is related to global vocabulary abilities as measured by the MTELP vocabulary section, and (2) that students' global vocabulary knowledge may have a facilitative effect on correctly answering questions related to the grammaticality judgments. The former is expected since MTELP vocabulary and the WKT both measure vocabulary knowledge, and the latter is expected given that greater word knowledge would make it easier for a participant to pick out words that were previously memorized in the L2. Second, scores on the MTELP reading section correlated positively with grammaticality judgment scores and scores on the fill-in-the-blank (derivation)

task. These results suggest that being a better reader may aid in L2 grammaticality judgments as well as L2 production of derivational suffixes. Finally, correlations between scores on the grammaticality judgment task (receptive) were positively correlated with scores on the interpretation task (receptive) and the fill-in-the-blank (derivation) task. Hence, if one is good at grammaticality judgments, he/she also appears to be good at comprehending derivational morphology in speech and generating appropriate derivational suffixes in sentence contexts.

Table 23. Summary of correlations between pretest measures among high-intermediate learners

Measure	1	2	3	4	5	6	7	8	9
1. WKT Score (pre)	--								
2. Listening (pre)	.481**	--							
3. Fill-in-derivation (pre)	.628**	.538**	--						
4. MTELP VOCAB	.418**	.250	.240	--					
5. MTELP READING	.001	.294	.374*	.180	--				
6. MTELP GRAMMAR	-.025	.142	.175	.352	.564**	--			
7. Gram. Judg. (pre)	.334*	.305*	.458**	.026	.359*	.058	--		
8. Fill-in-infl (pre)	.263	.230	.423**	-.108	.152	.156	.225	--	
9. MTELP score	.183	.253	.261	.741**	.629**	.843**	.098	.077	--

Note: ** $p \leq .01$, * $p \leq .05$

8.4.2 Does instruction matter?

This section investigates how instruction influenced derivational knowledge immediately after the five weeks of training. Although the Word Knowledge Test (WKT) does not directly measure derivational knowledge, the scores from this task are included in the results to show how knowledge of the base words developed over the course of the experiment. Table 24 summarizes posttest results for each task as a function of treatment and proficiency level (please refer back to Table 21 for pretest results). This table reports means, standard deviations, and the *F*-statistic to compare the performance of the two treatment groups at the time of the posttest. Table 25 summarizes how performance changed across the experimental tasks as a function of time and proficiency. As such, this table reports the means, standard deviations, and *F*-statistics of each proficiency group at each point in time during this experiment. The *F*-statistics in Table 24 and Table 25 were computed within the broader context of a series of three-way mixed-effects (proficiency x level x time) ANOVAs, which are reported in detail in the next section of the paper.

The results from the posttest (Table 24) indicate that the two treatment groups performed very similarly at the time of the posttest across all testing measures. There were no statistically significant differences between the input group and the output group on any of the testing measures at the time of the posttest.

Table 24. Posttest scores on morphological tasks as a function of proficiency and treatment group

Task	Proficiency	Input Group		Output Group		Input vs. Output	
		M	*SD*	*M*	*SD*	*F*	*df*
WKT	Low	113.05	13.47	110.67	13.84		
(Max: 140)	High	128.47	11.18	122.32	10.63		
	Total	119.95	14.58	119.70	12.27	1.23*ns*	1,74
Interpretation	Low	6.35	1.34	5.00	2.74		
(Max: 10)	High	7.72	1.99	7.26	1.75		
	Total	6.95	1.77	6.75	2.19	3.42*ns*	1,77
Fill-in (der)	Low	12.83	6.72	9.89	5.62		
(Max: 53)	High	23.06	11.26	21.87	8.14		
	Total	17.32	10.25	19.18	9.11	1.44*ns*	1,77
Fill-in (infl)	Low	4.09	1.95	2.44	2.19		
(Max: 6)	High	4.78	1.63	4.19	1.58		
	Total	4.39	1.83	3.80	1.86	2.89*ns*	1,77
Gram. Judg.	Low	43.19	6.04	40.75	3.99		
(Max: 60)	High	45.07	7.65	47.04	5.50		
	Total	44.10	6.81	45.56	5.80	.410*ns*	1,61

Note: *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$

Although there was no effect of type of treatment on any of the testing measures, Table 25 shows that there was clearly a treatment effect between the pretest and the posttest. This treatment effect extended to all of the tasks that measured derivational knowledge, but had no effect on inflectional knowledge.

Table 25. Scores on morphological tasks as a function of time and proficiency

Task	Proficiency	Pretest		Posttest		Time	
		M	*SD*	*M*	*SD*	*F*	*df*
WKT	Low	99.37	17.34	112.33	13.39		
(Max: 140)	High	115.56	15.68	124.50	11.11		
	Total	109.33	18.07	119.82	13.35	51.97***	1,74
Interpretation	Low	5.00	1.80	5.97	1.89		
(Max: 10)	High	6.71	1.95	7.43	1.84		
	Total	6.04	2.06	6.85	1.93	11.36***	1,77
Fill-in (der)	Low	5.50	4.36	12.00	6.49		
(Max: 53)	High	12.76	7.83	21.87	8.14		
	Total	9.89	7.55	18.23	9.69	118.27***	1.77
Fill-in (infl)	Low	2.97	1.88	3.63	2.12		
(Max: 6)	High	4.90	2.66	4.41	1.61		
	Total	4.14	2.55	4.10	1.86	.009*ns*	1,77
Gram. Judg.	Low	40.17	4.73	42.37	5.48		
(Max: 60)	High	43.78	5.71	46.32	6.35		
	Total	42.45	5.61	44.86	6.30	9.43**	1,61

Note: *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$

8.4.2.1 Word Knowledge Test (WKT)

A 2 x 2 x 2 mixed-effects ANOVA was performed on WKT scores as a function of language proficiency (high vs. low), time of test (time: pretest vs. posttest), and treatment condition (input vs. output). There were no significant interactions between time and proficiency level, $F(1,74) = 1.39$, $p = .241$, $\eta_p^2 = .018$; between time and treatment condition (Figure 24), $F(1,74) = .185$, $p = .668$, $\eta_p^2 = .002$; between time and treatment condition and proficiency, $F(1,74) = .007$, $p = .936$, $\eta_p^2 < .001$; or between proficiency and treatment condition, $F(1,74) = .293$, $p = .590$, $\eta_p^2 = .004$. WKT scores on the posttest ($M = 108.63$, $SE = 1.49$) were significantly higher than WKT scores on the pretest ($M = 107.67$, $SE = 2.06$), $F(1,74) = 51.97$, $p < .001$, $\eta_p^2 = .413$ (Figure 25). There was no significant difference between the scores of the input group ($M =$

114.95, *SE* = 2.13) and the output group (*M* = 111.34), $F(1,74) = .1.23$, $p = .271$, $\eta_p^2 = .016$. The scores of the high proficiency group (*M* = 120.82, *SE* = 1.97) were significantly higher than the scores of the low proficiency group (*M* = 105.48, *SE* = 2.60).

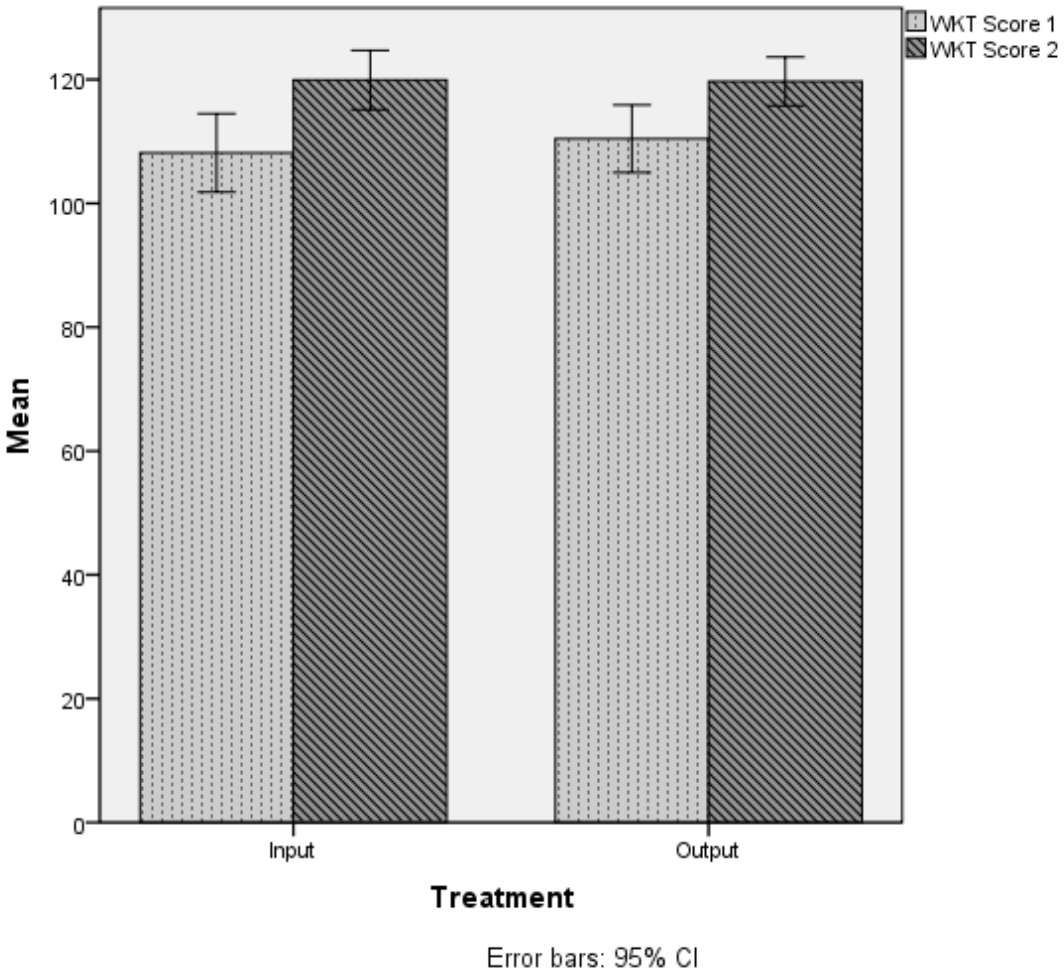

Figure 24. Scores on WKT as a function of time and treatment

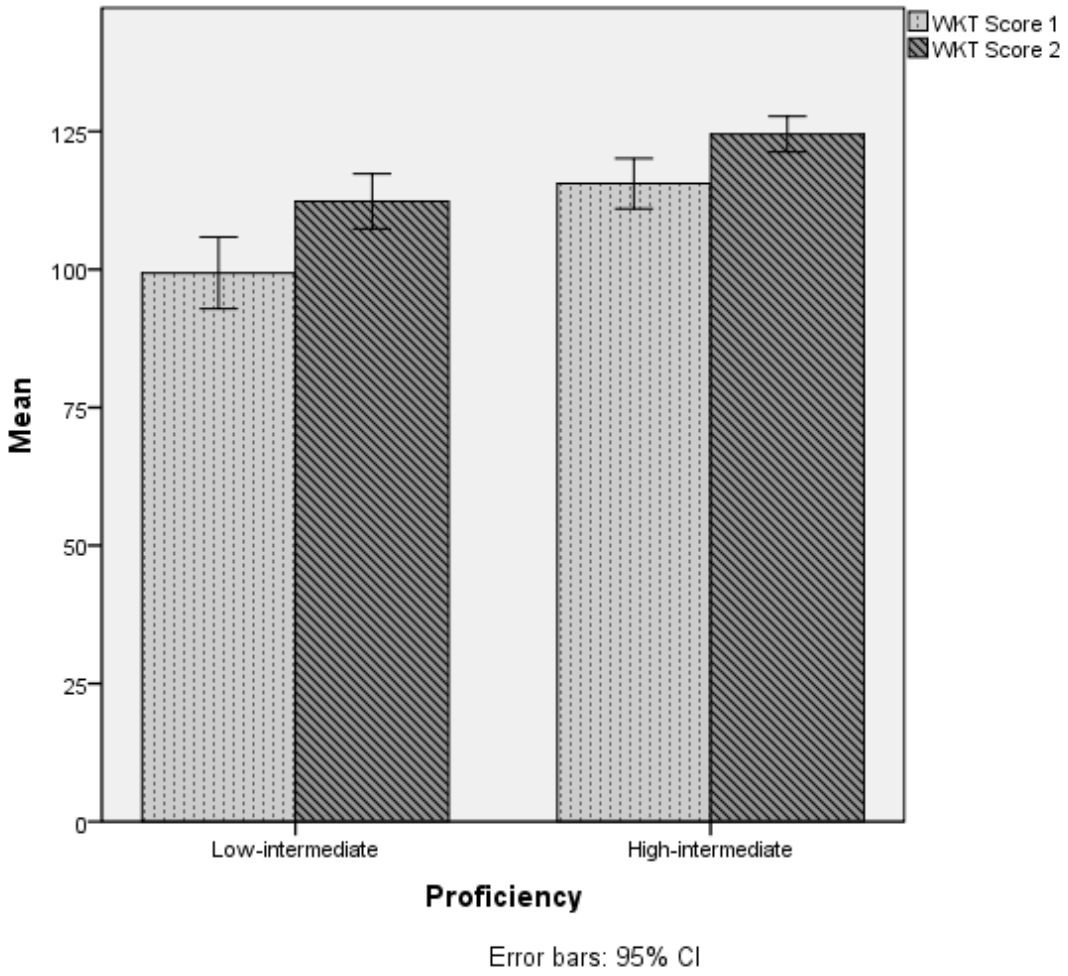

Figure 25. Scores on WKT as a function of time and proficiency level (Max = 140)

To put this into perspective, students generally knew the base words on the WKT at the time of the pretest and the posttest even though the posttest scores were significantly higher. Upon converting the raw WKT scores back into the likert scale responses (divide the raw score by 35), low intermediate students averaged 2.84/4.00 (a score of 3 is the equivalent of knowing the meaning of the word) and the high-intermediate students averaged 3.30/4.00. Knowledge of word meanings increased on the posttest; low-intermediate students rated word knowledge at 3.21/4.00 and high-intermediate students rated word knowledge at 3.56/4.00 respectively. These

results suggest that the students in this study generally knew the base words beyond the level of basic recognition (a score of 2 is the equivalent of recognizing the word, but not knowing its meaning) at the time of the pretest. Base word knowledge only improved as students participated in the training and both groups averaged scores above 3.00/4.00 (4 is the equivalent of knowing the word so well that it can be used in a sentence) on base words at the time of the posttest. Despite the fact that students generally had knowledge of these base words, this knowledge did not translate into their ability to produce alternate forms of the word in a fill-in-the-blank type task.

8.4.2.2 Interpretation task

A 2 x 2 x 2 mixed-effects ANOVA was performed on scores from the interpretation task as a function of language proficiency (high vs. low) time of test (time: pretest vs. posttest), and treatment (input vs. output). There were no significant interactions among time and condition, $F(1,77) = .537$, $p = .466$, $\eta_p^2 = .007$, time and proficiency, $F(1,77) = .048$, $p = .828$, $\eta_p^2 = .001$, time and condition and level, $F(1,77) = 1.725$, $p = .193$, $\eta_p^2 = .022$, or between condition and level, $F(1,77) = .153$, $p = .697$, $\eta_p^2 = .002$. Scores on the posttest ($M = 6.58$, $SE = .23$) were significantly higher than scores on the pretest ($M = 5.85$, $SE = .23$), $F(1,77) = 11.36$, $p = .001$, $\eta_p^2 = .129$, and the scores of high proficiency learners ($M = 7.15$, $SE = .24$) were significantly higher than the scores of low proficiency learners ($M = 5.29$, $SE = .32$), $F(1, 77) = 21.27$, $p < .001$, $\eta_p^2 = .216$ (Figure 26). There was no significant difference between the scores of the input group ($M = 6.59$, $SE = .26$) and the output group ($M = 5.84$, $SE = .31$), $F(1,77) = 3.42$, $p = .068$, $\eta_p^2 = .043$ (Figure 27).

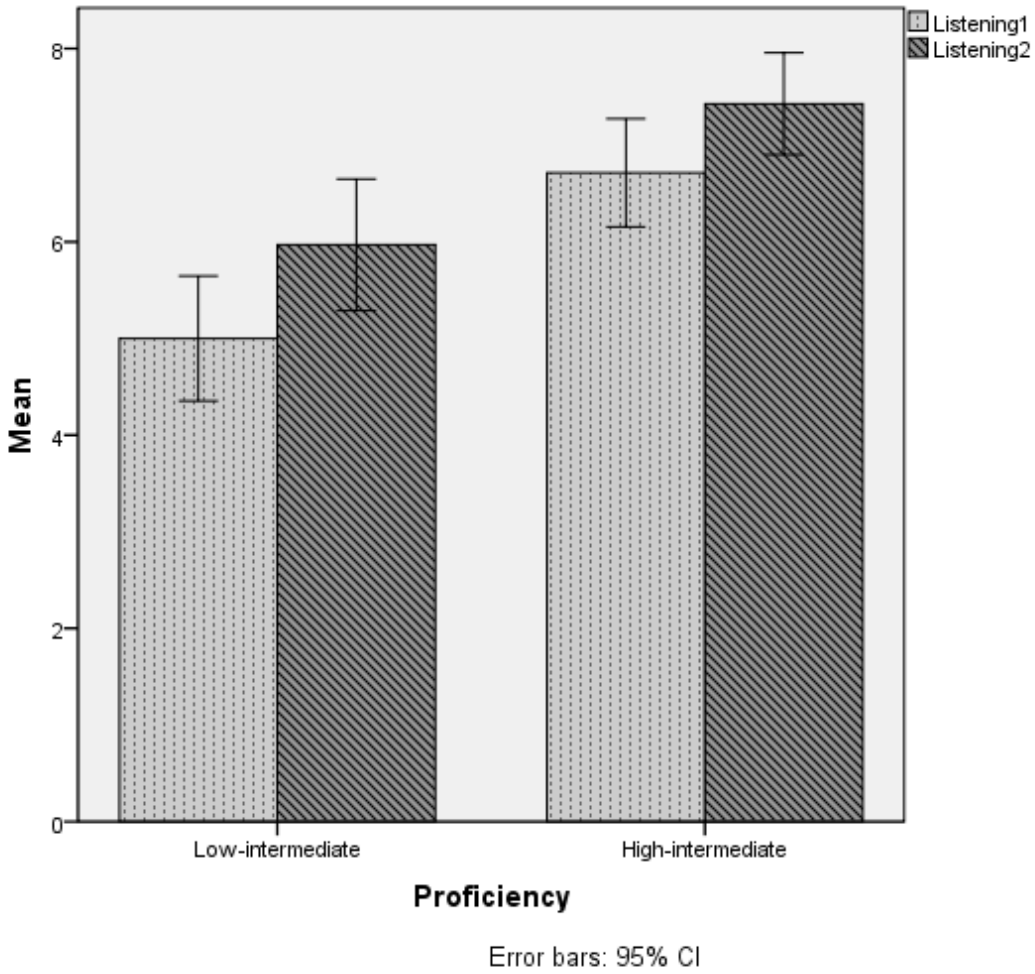

Figure 26. Scores on the interpretation task (i.e., listening) as a function of time of test and language proficiency (Max = 10)

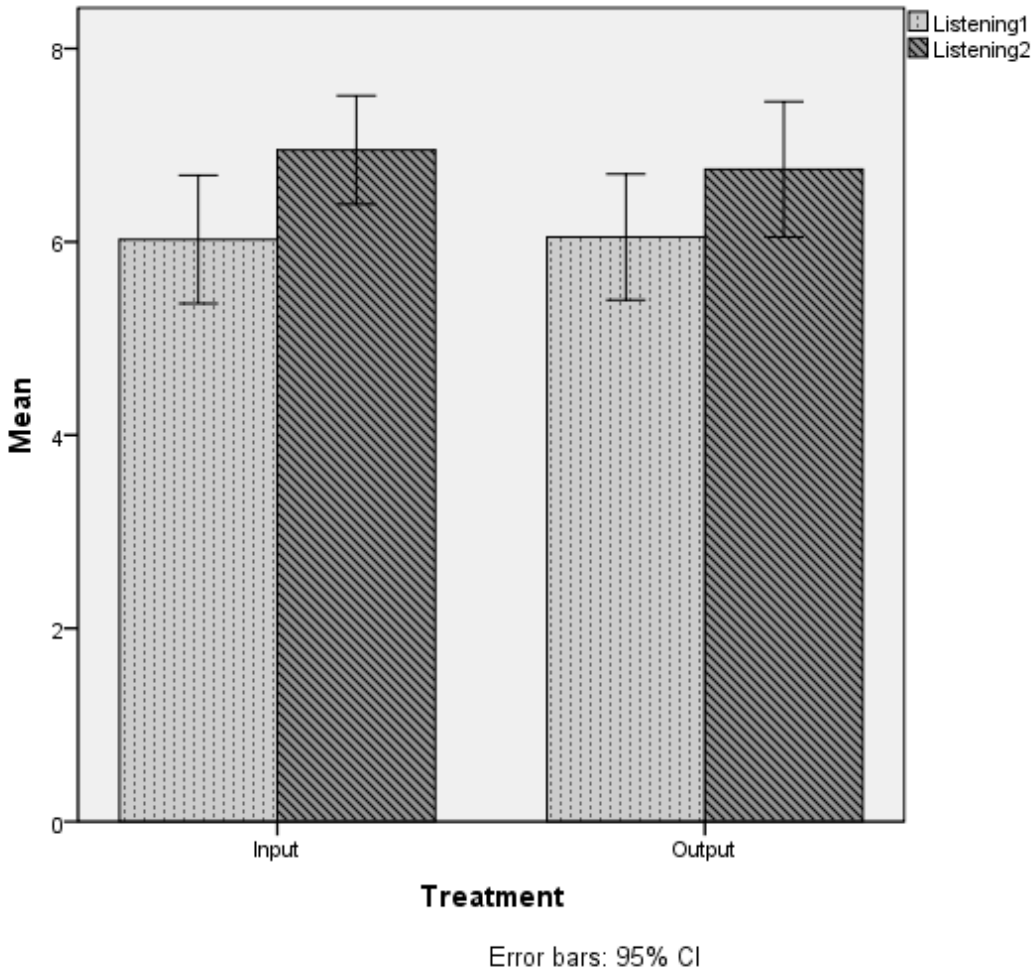

Figure 27. Scores on the interpretation task (i.e., listening) as a function of time and treatment (Max = 10)

8.4.2.3 Fill-in-the-blank test (derivation)

A 2 x 2 x 2 mixed-effects ANOVA was performed on fill-in-the-blank derivation scores as a function of time of test (time: pretest vs. posttest), treatment (input vs. output), and proficiency (low-proficiency vs. high-proficiency). There were no significant interactions between time of test and treatment, $F(1, 77) < .001$, $p = .995$, $\eta_p^2 < .001$; between treatment and proficiency, $F(1,77) = .288$, $p = .593$, $\eta_p^2 = .004$. There was a significant interaction between time of test and proficiency, $F(1,77) = 4.25$, $p = .043$, $\eta_p^2 = .052$. The three-way interaction

between time and treatment, and proficiency was not significant, $F(1,77) = .003$, $p = .954$, $\eta_p^2 < .001$. Scores on the posttest ($M = 16.91$, $SE = 1.03$) were significantly higher than scores on the pretest ($M = 8.87$, $SE = .83$), $F(1,77) = 118.27$, $p < .001$, $\eta_p^2 = .606$ (Figure 28), and the high-proficiency group ($M = 17.68$, $SE = 1.03$) scored significantly higher than the low-proficiency group ($M = 8.10$, $SE = 1.37$) averaged across the pretest and posttest, $F(1,77) = 31.27$, $p < .001$, $\eta_p^2 = .289$.

In order to further explore the interaction between time and proficiency post-hoc simple main effects were performed on scores from pretest to posttest for each level of language proficiency (Figure 29). A Bonferroni correction was applied and significance is reported at an alpha level of .025. For the low-proficiency group, posttest scores ($M = 12.00$, $SE = 1.15$) were significantly higher than pretest scores ($M = 5.50$, $SE = .77$), $F(1,77) = 64.09$, $p < .001$, $\eta_p^2 = .674$. Similarly, for the high-proficiency group, posttest scores ($M = 22.31$, $SE = 1.33$) were significantly higher than pretest scores ($M = 12.76$, $SE = 1.12$), $F(1,77) = 101.01$, $p < .001$, $\eta_p^2 = .678$.

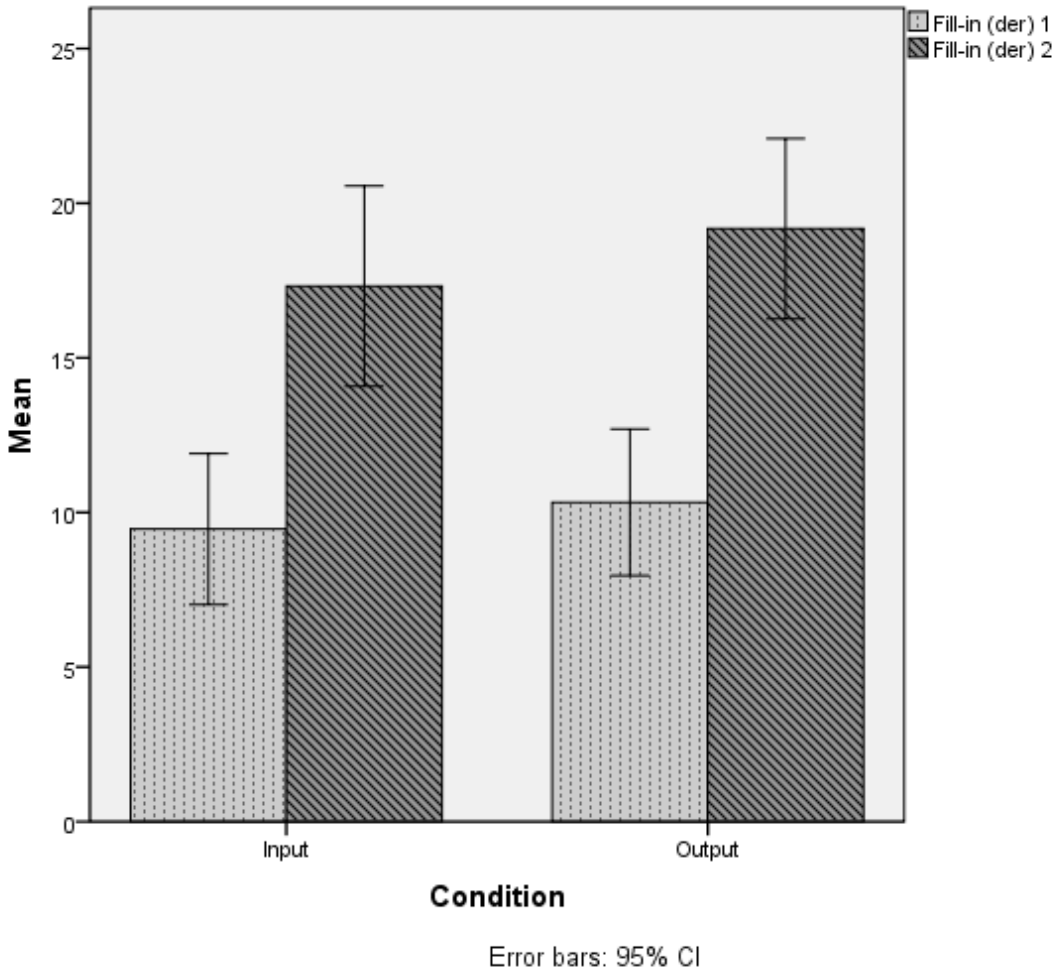

Figure 28. Scores on fill-in-the-blank (derivation) as a function of time of test and treatment

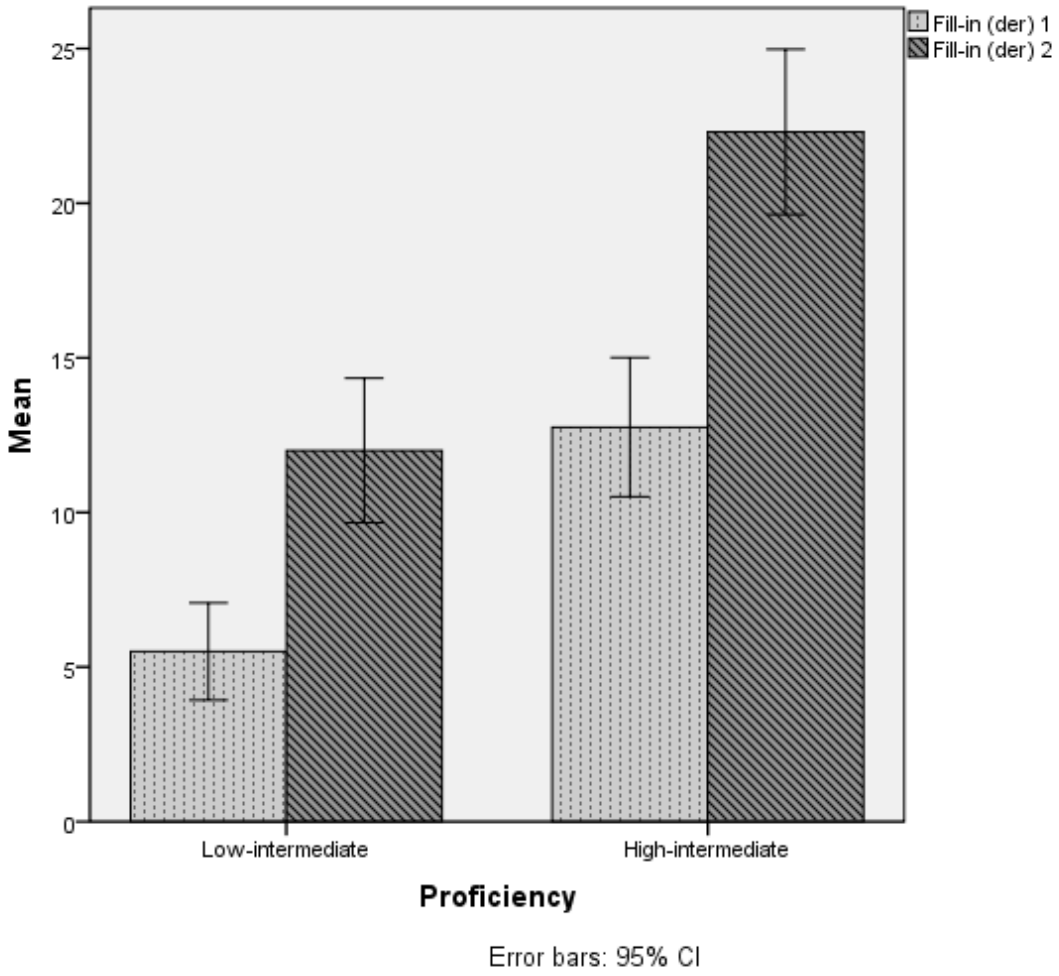

Figure 29. Scores on fill-in-the-blank (derivation) as a function of time of test and language proficiency

8.4.2.4 Fill-in-the-blank (inflection)

A 2 x 2 x 2 mixed-effects ANOVA was performed on fill-in-the-blank inflection scores as a function of time of test (time: pretest vs. posttest), treatment (input vs. output), and proficiency (low-proficiency vs. high-proficiency). There were no significant interactions between time and proficiency, $F(1,77) = 1.954$, $p = .166$, $\eta_p^2 = .025$ (Figure 30), time and treatment, $F(1,77) = 1.70$, $p = .20$, $\eta_p^2 = .022$ (Figure 31), or proficiency and treatment, $F(1,77) = .520$, $p = .473$, $\eta_p^2 = .007$. There was no significant difference between inflection scores on the pretest ($M = 3.90$, $SE = .296$) and inflection scores on the posttest ($M = 3.87$, $SE = .218$), $F(1,77) = .009$, $p = .925$, $\eta_p^2 < .001$. There was no significant difference between scores from the input treatment ($M = 4.25$, $SE = .272$) and scores from the output treatment ($M = 3.53$, $SE = .328$), $F(1,77) = 2.89$, $p = .093$, $\eta_p^2 = .036$. The scores of the high proficiency group ($M = 4.71$, $SE = .256$) were significantly higher than the scores of the low proficiency group ($M = 3.07$, $SE = .34$), $F(1,77) = 14.76$, $p < .001$, $\eta_p^2 = .161$.

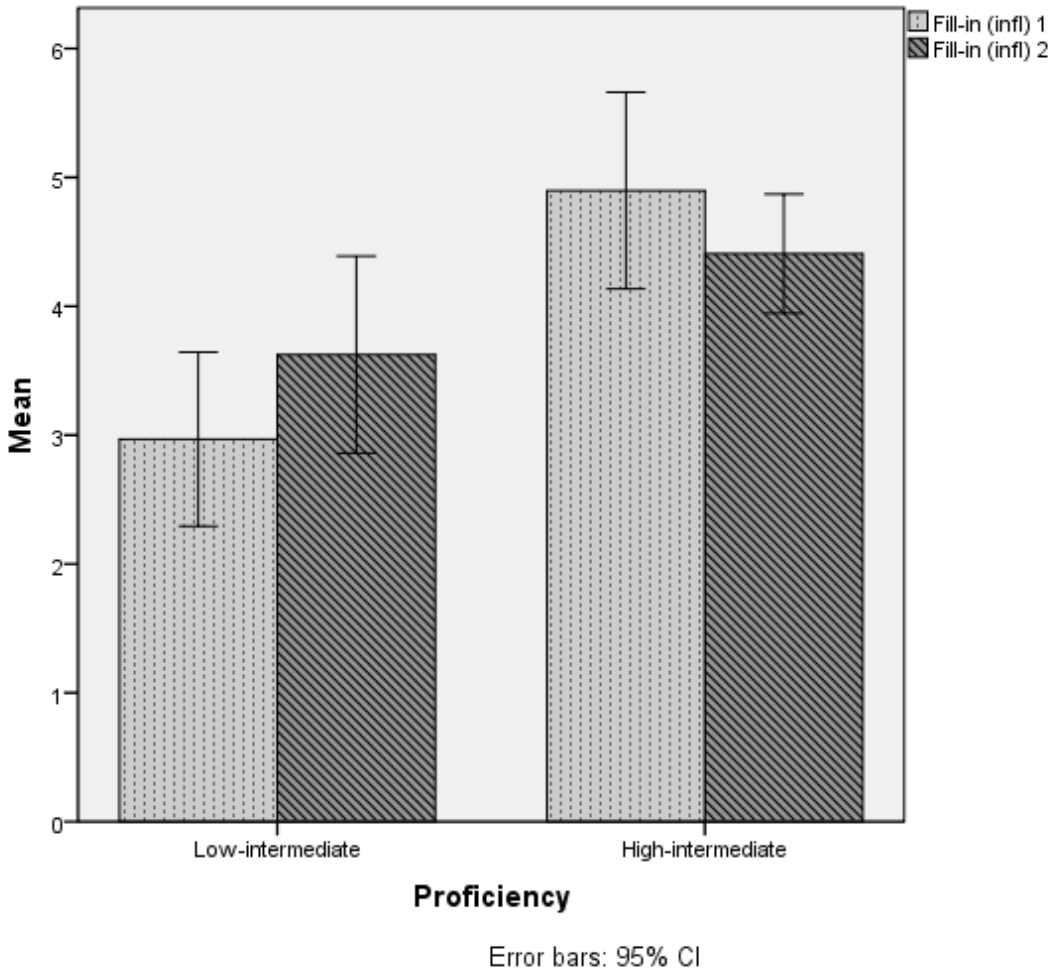

Figure 30. Scores on fill-in-the-blank (inflection) as a function of time and language proficiency (Max = 6)

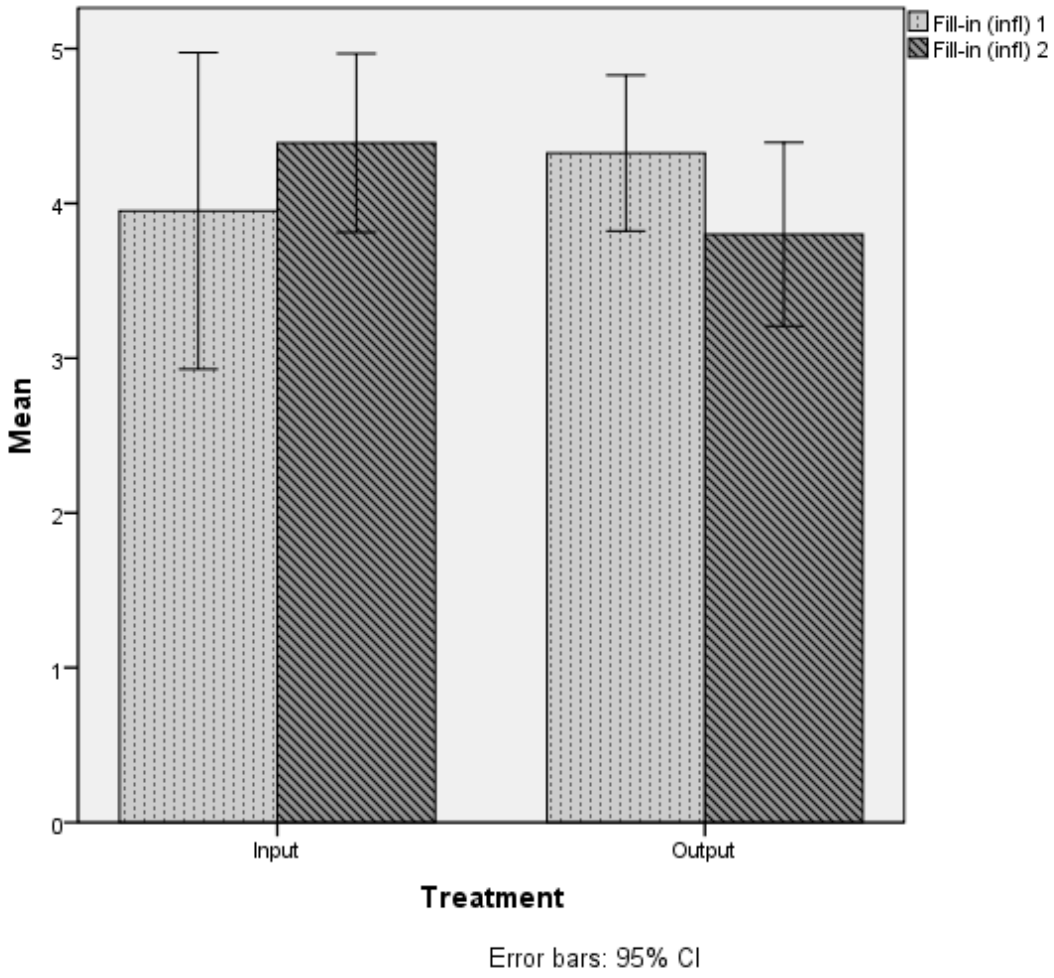

Figure 31. Scores on fill-in-the-blank (inflection) as a function of time and treatment (Max = 6)

8.4.2.5 Grammaticality judgment

A 2 x 2 x 2 mixed-effects ANOVA was performed on grammaticality judgment scores as a function of time of test (time: pretest vs. posttest), treatment (input vs. output), and proficiency (low-proficiency vs. high-proficiency). Seventy-five students completed the grammaticality judgment section of the pretest and posttest; however, data from ten students was removed because their scores were outliers (scores ≤ 30/60). Data from sixty-five students remained for

analysis: 24 low-intermediate (16 Input, 8 Output), 41 high-intermediate (15 Input, 26 Output). The three way interaction between time, proficiency, and treatment was not significant, $F(1, 61) = .735$, $p = .395$, $\eta_p^2 = .012$. There were no significant interactions between time and proficiency, $F(1, 61) < .001$, $p = .988$, $\eta_p^2 < .001$ (Figure 32), time and treatment, $F(1,61) = .811$, $p = .371$, $\eta_p^2 = .013$ (Figure 33), or between proficiency and treatment, $F(1,61) = .1.34$, $p = .252$, $\eta_p^2 = .021$. The main effect of time was significant, $F(1,61) = 9.43$, $p < .003$, $\eta_p^2 = .134$; scores on the posttest ($M = 44.01$, $SE = .82$) were significantly higher than scores on the pretest ($M = 41.80$, $SE = .73$). There was a significant difference on grammaticality judgment scores between the low-intermediate ($M = 40.86$, $SE = 1.10$) and the high-intermediate ($M = 44.95$, $SE = .824$) groups, $F(1,61) = 8.87$, $p = .004$, $\eta_p^2 = .127$. There were no significant differences between the scores of the input ($M = 41.55$, $SE = 1.11$) and the output ($M= 41.38$, $SE = 1.34$) group, $F(1,61) = .410$, $p = .524$, $\eta_p^2 = .007$.

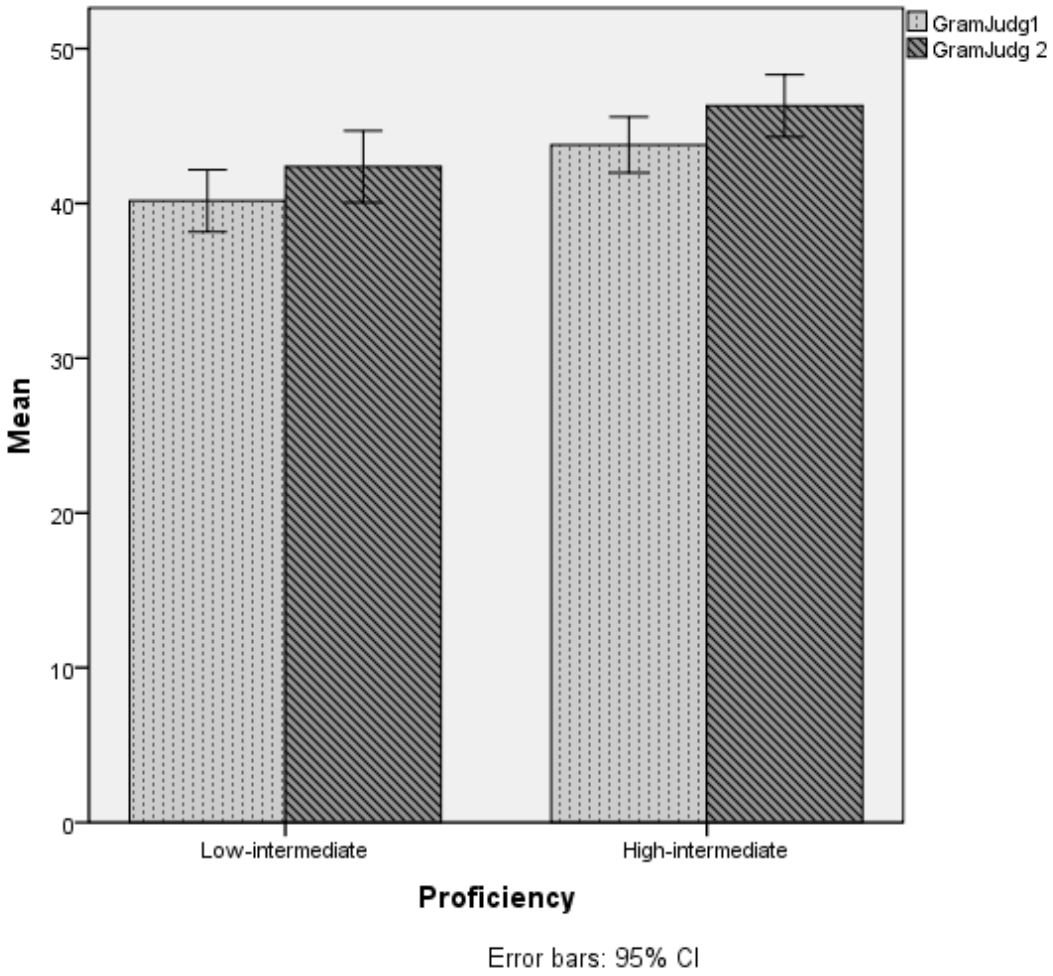

Figure 32. Scores on grammaticality judgment as a function of time and proficiency

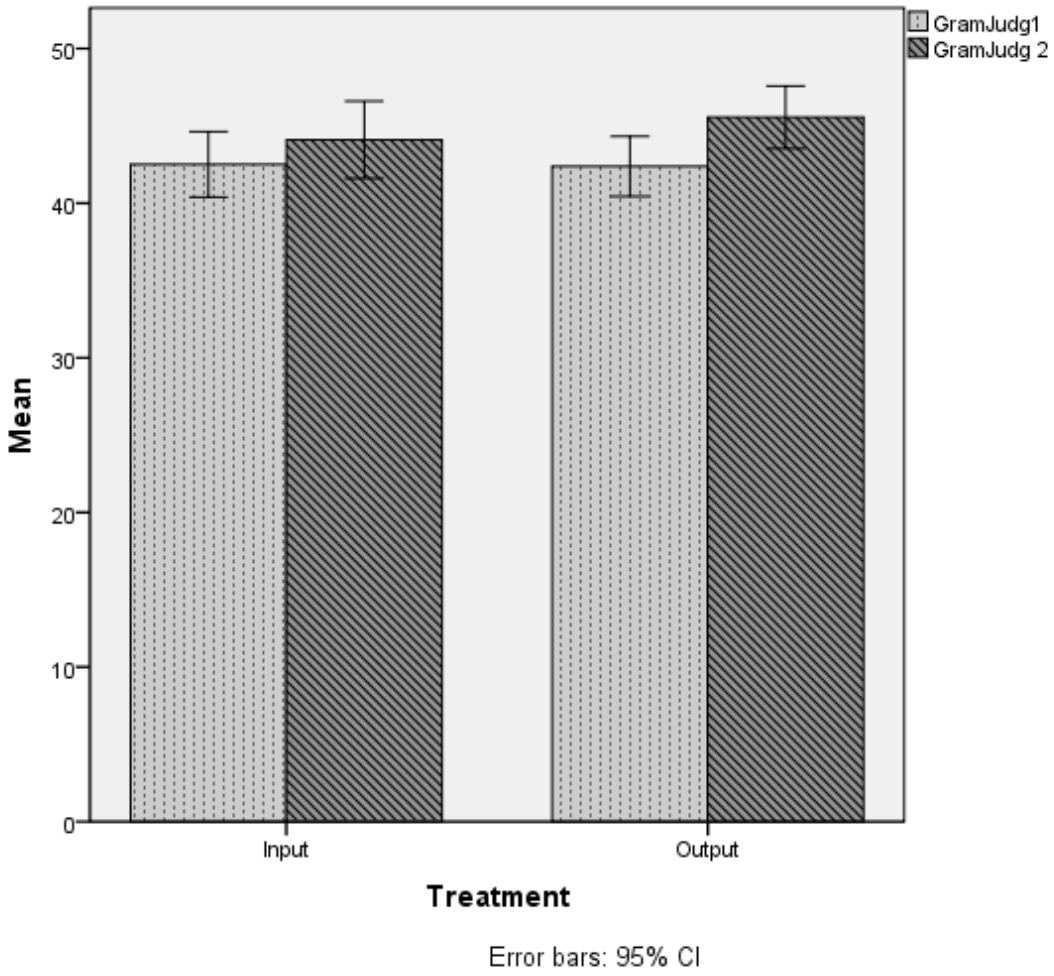

Figure 33. Scores on grammaticality judgment as a function of time and treatment

8.4.3 Delayed measures

Twenty-four items from the fill-in-the-blank section of the pretest/posttest were placed on the final exam for the reading classes in order to look at how the different types of treatment influenced long term retention of derivational morphology. There were 11 items that students saw during the morphology training sessions and 13 items that were not seen in any of the sessions. These items also represented the affixes that were tested on the pretest and posttest; there were four items for the affixes *-ful+ness, -able+ity, -ity, -tion,* and *-able* and two items for the affixes *-ful* and *-ness.* These items were selected because students improved on them from pretest and posttest. Scores on this test were determined by measuring students' overall accuracy on derivational morphology on the test. A student received one point for each correct answer for a total possible score of 24 points. No partial credit was given for incorrect answers that came close to the correct answer (e.g., **excludion* vs. *exclusion*). A list of items on the delayed posttest and a copy of the delayed posttest are included in Appendix H.

The analyses reported in this section compare students' performance on these words across the pretest, the posttest, and the delayed posttest. All eighty participants in this analysis completed the pretest, posttest, and delayed posttest. Table 26 summarizes results from all three tests.

Table 26. Descriptive statistics for test scores as a function of time, treatment, and proficiency

Time	Treatment	Proficiency	*n*	*M*	*SD*
Pretest	Input	3	15	1.47	2.13
		4	18	5.11	4.47
		Total	33	3.45	4.00
	Output	3	17	0.88	1.27
		4	30	4.53	3.90
		Total	47	3.21	3.44
	Total	3	32	1.16	1.73
		4	48	4.75	3.91
		Total	80	3.31	3.66
Posttest	Input	3	15	4.4	4.24
		4	18	8.5	7.24
		Total	33	6.64	6.32
	Output	3	17	3.71	3.80
		4	30	9.8	4.87
		Total	47	7.6	5.36
	Total	3	32	4.03	3.96
		4	48	9.31	5.83
		Total	80	7.2	5.76
Delayed Posttest	Input	3	15	4.6	4.01
		4	18	9.06	5.08
		Total	33	7.03	5.08
	Output	3	17	3.59	3.73
		4	30	8.13	4.30
		Total	47	6.49	4.62
	Total	3	32	4.06	3.84
		4	48	8.48	4.58
		Total	80	6.71	4.79

A 2 x 2 x 3 mixed-effects ANOVA was performed on fill-in-the-blank scores as a function of treatment (input vs. output), proficiency (low vs. high), and time (pretest, posttest, delayed posttest). Descriptive results are displayed in Table 27. There were no significant interactions between time and treatment, $F(2,152) = 1.05$, $p = .352$, $\eta_p^2 = .014$ (Figure 34), time and proficiency, $F(2,152) = 1.32$, $p = .271$, $\eta_p^2 = .017$, treatment and proficiency, $F(1,76) = .164$,

p = .686, η_p^2 = .002, or between time and proficiency and treatment, F(2, 152) = .785, p = .458, η_p^2 = .01. The main effect of time was significant, F(2, 152) = 40.136, p < .001, η_p^2 = .346. The scores of the high-intermediate learners (M = 7.52, SE = .553) were significantly higher than the scores of low-intermediate learners (M = 3.11, SE = .658) averaged across time and treatment, F(1, 76) = 26.38, p < .001, η_p^2 = .258. There was no significant difference between the scores of the input group (M = 5.52, SE = .649) and the output group (M = 5.12, SE = .564), F(1,76) = .233, p = .631, η_p^2 = .003.

In order to follow-up on the main effect of time, post-hoc simple main effects were performed on test scores for each of the levels of time. Scores on the posttest (M = 7.20, SE = 5.76) were significantly higher than scores on the pretest (M = 3.31, SE = 3.66), F(1,79) = 68.71, p < .001, η_p^2 = .465. Scores on the delayed posttest (M = 6.71, SE = 4.79) were also significantly higher than scores on the pretest, F(1, 79) = 81.98, p < .001, η_p^2 = .509. However, there were no significant differences between scores on the delayed posttest and scores on the immediate posttest, F(1,79) = 1.13, p = .290, η_p^2 = .014.

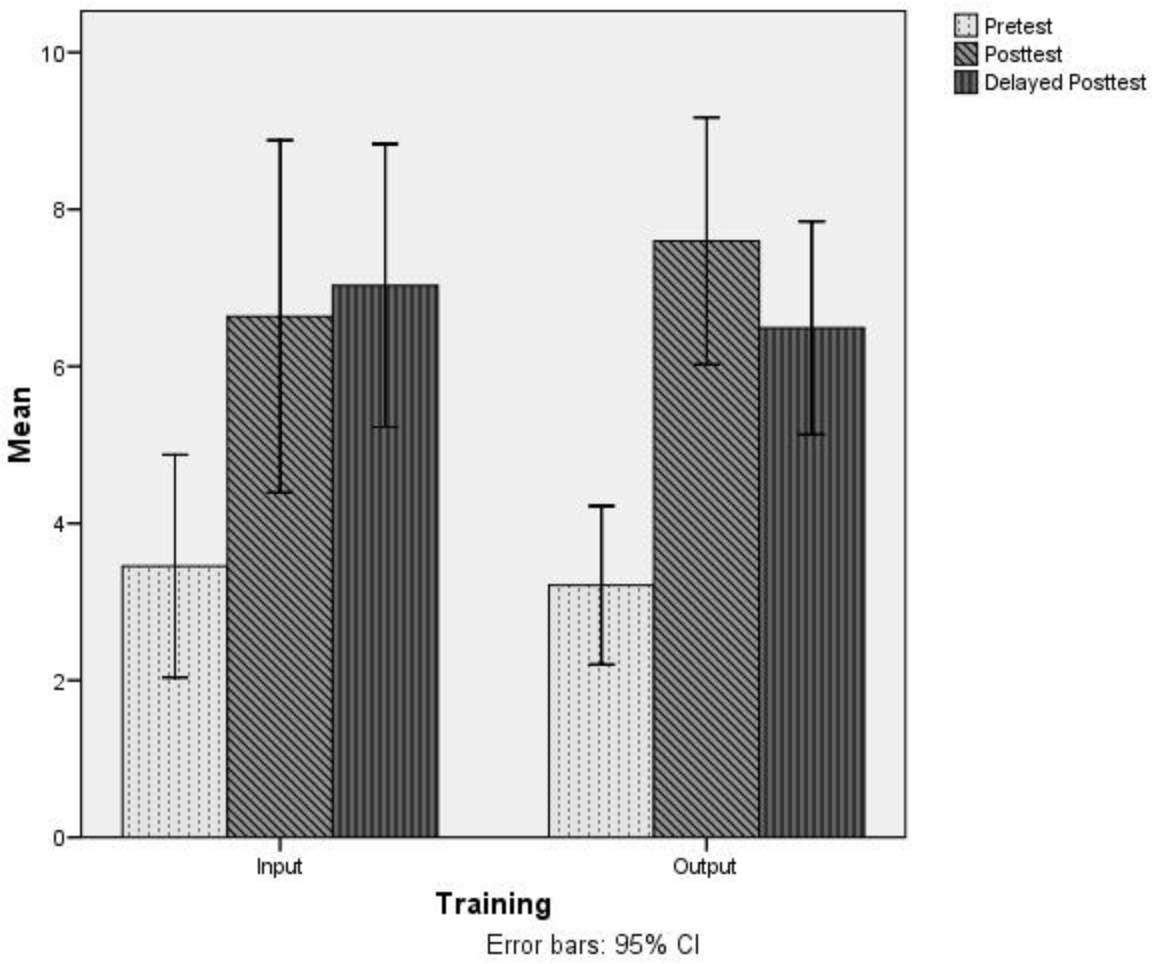

Figure 34. Test scores as a function of time and treatment (Max score = 24)

8.4.4 What do students learn about morphology through each treatment?

The results presented so far provide strong evidence that students are learning *something* about derivational morphology; however, these results do not show what exactly students are learning about specific affixes or, more generally, derivational phenomenon (e.g., affix ordering) as a result of the morphology training nor do they show whether or not the type of treatment received affects different aspects of derivational knowledge. Hence, this section compares treatment

effects across different affix conditions on the grammaticality judgment test and the fill-in-the-blank (derivation) task.

8.4.4.1 Grammaticality judgments

Table 28 displays descriptive statistics on overall grammaticality judgment scores among the non-native participants in Study 1 and Study 2. The results from 34 participants (13 Low-intermediate, 21 High-intermediate) from Study 2 are included here for comparison. (Note: The participants in Study 1 completed the grammaticality judgment test one year earlier at approximately the same time in the semester as the posttest for Study 2. These participants received no morphology training.)

Table 27. Overall grammaticality judgment (GJ) score as a function of time (Max score = 60)

Condition	Proficiency	Study 1 (non-native)		Study 2 (pretest)		Study 2 (posttest)	
		M	*SD*	*M*	*SD*	*M*	*SD*
Overall GJ Score	Low	39.38	5.88	40.17	4.73	42.37	5.48
	High	44.38	5.64	43.78	5.71	46.54	6.20

A two-way between-subjects ANOVA was performed on overall GJ scores as a function of time (study 1, study 2 (pretest), study 2 (posttest)) and proficiency (low vs. high). The interaction effect between time and proficiency was not significant, $F(2, 158) = .156$, $p = .856$, $\eta_p^2 = .002$ There was a significant difference between the low-intermediate ($M = 40.62$, $SE = .758$) and the high-intermediate group ($M = 44.90$, $SE = .588$), $F(1, 158) = 19.70$, $p < .001$, $\eta_p^2 = .111$; the high-proficiency group scored significantly higher than the low proficiency group. There was also a significant main effect of time, $F(2, 158) = 3.59$, $p = .030$, $\eta_p^2 = .043$. Post-hoc pairwise comparisons with a Bonferroni correction were conducted to follow-up on this finding. These tests revealed that the scores from the study 2 posttest ($M = 44.46$, $SE = .73$) were

significantly higher than the scores of the study 2 pretest (*M* = 41.97, *SE* = .73). There were no significant differences between the scores from Study 2 Pretest/Posttest or the scores from Study 1 (*M* = 41.88, *SE* = 1.00).

This result does not necessarily imply that the participants in Study 2 learned nothing about derivational morphology from the treatment. Development in one particular area of derivational morphology may go undetected in an analysis that combines scores from all of the different conditions within the grammaticality judgment task into one composite score. In order to more fully understand how instruction may have influenced development in particular areas of derivational knowledge an additional analysis was performed on scores within the four conditions within the grammaticality judgment task. Descriptive statistics from each condition of the grammaticality judgment task are reported in Table 28.

Table 28. Scores on GJ conditions as a function of time and proficiency (Max score = 15)

Condition	Proficiency	Study 1 (non-native)		Study 2 (pretest)		Study 2 (posttest)	
		M	*SD*	*M*	*SD*	*M*	*SD*
Real Words (1-affix)	Low	13.38	1.50	13.04	1.71	12.87	1.78
	High	13.62	1.43	13.71	1.54	14.07	1.06
Semantic Blocking	Low	7.85	3.72	8.42	3.28	8.54	3.80
	High	9.52	2.65	8.68	3.64	8.51	3.36
Correct Affix Ordering	Low	9.85	3.83	8.42	3.62	10.63	3.09
	High	9.71	3.62	10.15	2.89	12.88	1.90
Wrong Affix Ordering	Low	8.31	4.80	10.29	3.63	10.33	4.24
	High	11.52	3.53	11.24	2.82	11.97	3.64

A three-way mixed-effects ANOVA was conducted as a function of time (study 1, study 2 (pretest), study 2 (posttest)), proficiency (low vs. high), and condition (semantic blocking, correct affix ordering, and wrong affix ordering). The real words condition was not included in this analysis since participants performed at ceiling on this task across all experiments. The

three-way interaction between condition, time, and proficiency was not significant, $F(4, 316) = 1.57$, $p = .199$, $\eta_p^2 = .020$. The interaction between condition and proficiency was not significant, $F(2, 316) = .745$, $p = .432$, $\eta_p^2 = .005$, nor was the interaction between time and proficiency, $F(2, 158) = .344$, $p = .709$, $\eta_p^2 = .004$. There was a significant interaction between condition and time, $F(4, 316) = 2.95$, $p = .037$, $\eta_p^2 = .036$. The main effect of condition was significant, $F(2, 316) = 12.39$, $p < .001$, $\eta_p^2 = .073$, as were the main effects of time, $F(2, 158) = 3.69$, $p = .027$, $\eta_p^2 = .045$, and proficiency, $F(1, 158) = 14.75$, $p < .001$, $\eta_p^2 = .085$. The high-intermediate learners ($M = 10.37$, $SE = .189$) scored significantly higher than the low-intermediate learners ($M = 9.18$, $SE = .244$).

In order to further investigate the interaction between time and condition simple main effects were conducted on grammaticality judgment scores for each condition for each level of time. The significant differences on conditions among the levels of time are followed by simple comparisons of Study 1 to Study 2 (Pretest), Study 1 to Study 2 (Posttest), and Study 2 (Pretest) to Study 2 (Posttest). A Bonferroni correction was applied when determining statistical significance. There were no significant differences between the scores on the blocked condition between the Study 1 ($M = 8.69$, $SE = .61$), Study 2 Pretest ($M = 8.55$, $SE = .44$), or Study 2 Posttest ($M = 8.53$, $SE = .44$) groups, $F(2, 158) = .024$, $p = .977$, $\eta_p^2 < .001$. There were no significant differences on scores on the wrong affix ordering condition between the Study 1 ($M = 9.92$, $SE = .642$), Study 2 Pretest ($M = 10.77$, $SE = .47$), or Study 2 Posttest (M = 10.70, $SE = .467$) groups, $F(2, 158) = .523$, $p = .523$, $\eta_p^2 = .008$. There was a significant difference on the scores of words with correct affix ordering between the Study 1 ($M = 9.78$, $SE = .53$), Study 2 Pretest ($M = 9.28$, $SE = .39$), or Study 2 Posttest ($M = 11.75$, $SE = .38$) groups, $F(2, 158) = 10.91$, $p < .001$, $\eta_p^2 = .121$. The scores on words with correct affix ordering among the Study 2

Posttest group were significantly higher ($p \leq .01$) than the scores on words with correct affix ordering among the Study 2 Pretest and Study 1 groups.[33] This effect is displayed graphically in Figure 35.

[33] This effect was maintained when using non-parametric statistics which do not assume normality or homogeneity of variance. A Kruskal-Wallis test was performed on scores on Correct Affix Ordering as a function of time. Scores on correct affix ordering were significantly affected by time, $H(2) = 22.24$, $p < .001$. Mann-Whitney test were used to follow up on this finding. A Bonferroni correction was applied so all effects are reported at a .0167 level of significance. There was no significant difference on Correct Affix Ordering scores between the Study 1 and Study 2 Pretest group, $U = 1052.00$, $p = .675$, $r = -.039$. There were significant differences on Correct Affix Ordering scores between Study 1 and Study 2 Posttest, $U = 696.00$, $p = .002$, $r = -.305$. There were also significant differences on Correct Affix Ordering scores between Study 2 Pretest and Study 2 Posttest, $U = 1135.00$, $p < .001$, $r = -.40$.

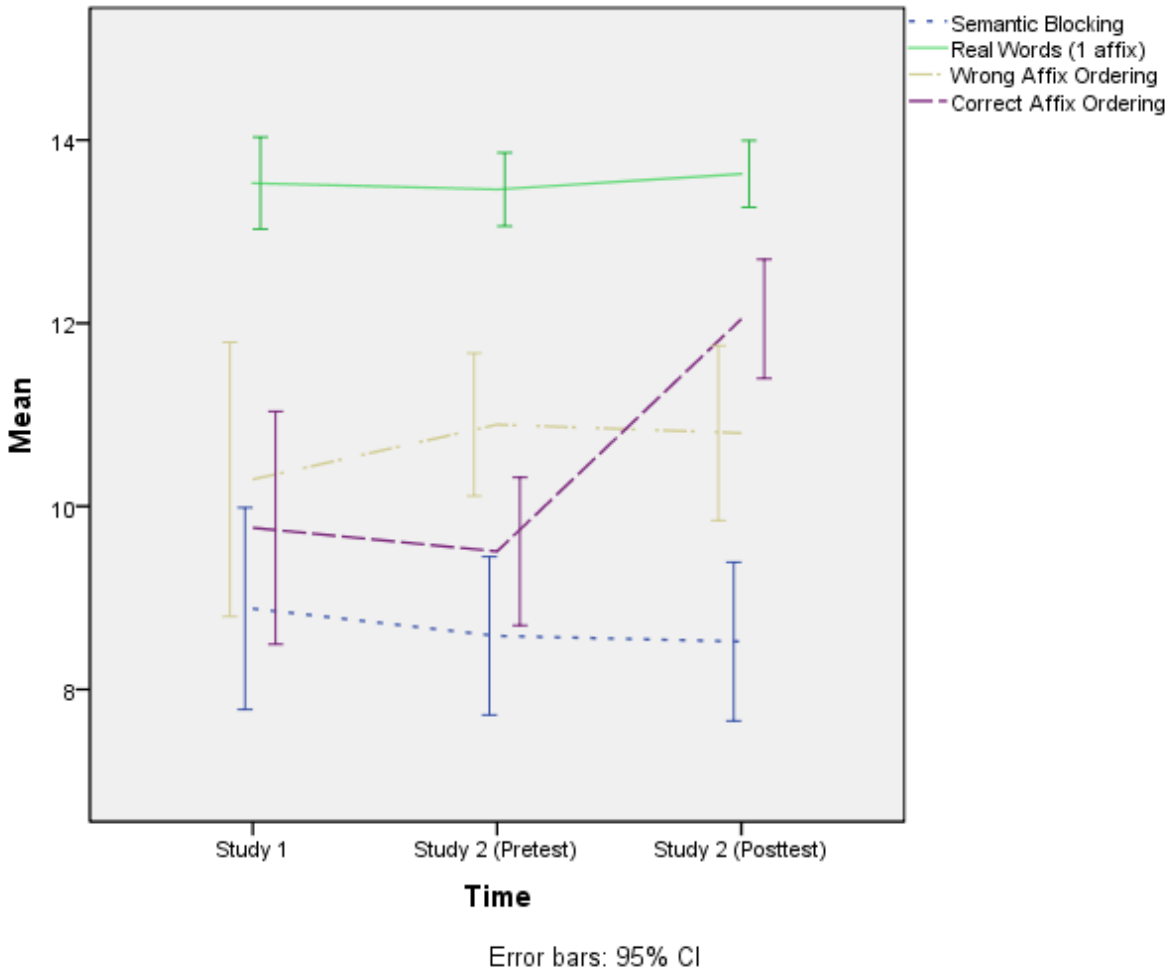

Figure 35. Scores on grammaticality judgment conditions as a function of time

Simple comparisons were performed to follow up on the main effects of condition and time and a Bonferroni adjustment was applied to the results. Simple comparisons across the levels of condition indicate that the scores on the Semantic Blocking condition (M = 8.59, SE = .29) were significantly lower ($ps < .01$) than the scores on the Wrong Affix Ordering condition (M = 10.46, SE = .31) and the Correct Affix Ordering condition (M = 10.27, SE = .26). There were no significant differences between scores on the Wrong Affix Ordering Condition and the Correct Affix Ordering condition. Simple comparisons across the levels of time revealed no

significant differences (*p*s > .05) among the levels of time: Study 1 (*M* = 9.46, *SE* = .32), Study 2 Pretest (*M* = 9.53, *SE* = .235), Study 2 Posttest (*M* = 10.33, *SE* = .235), although the difference between scores on Study 2 Pretest and Study 2 Posttest, *p* = .054, and the difference between scores on Study 1 and Study 2 Posttest, *p* = .094, were significant at a *p* = .10 level of significance.

Results for the condition by affix interaction are reported in Table 29. These results include the mean, SD, and the F-statistic comparing performance across time on each affix*condition pair. According to these results, students become significantly better at judging words with the correct affix combination of *ful+ness* after receiving the morphology training (see also Figure 36). There are no other significant differences between scores on affix*condition pairs at any time when this test was conducted.

Table 29. Grammaticality judgment scores on each condition*affix combination (Max score = 5)

Condition*Affix	Study 1		Study 2 (Pretest)		Study 2 (Posttest)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*df*
Block (al)	3.82	1.47	3.95	1.26	3.95	1.34	.129*ns*	2,161
Block (able)	2.56	1.56	1.97	1.53	2.14	1.58	1.61*ns*	2,161
Block (ness)	2.50	1.46	2.66	1.58	2.43	1.50	.384*ns*	2,161
Real (ness)	4.59	.70	4.66	.59	4.78	.48	1.47*ns*	2,161
Real (able)	4.12	.84	4.14	.92	4.22	.86	.186*ns*	2,161
Real (al)	4.82	.46	4.66	.67	4.63	.60	1.21*ns*	2,161
C.order (able+ity)	3.32	1.63	3.28	1.58	3.68	1.39	1.27*ns*	2,161
C.order (ful+ness)	2.35[a]	1.74	2.14[b]	1.71	4.11[ab]	1.20	30.10***	2,161
C.order (tion+al)	4.09	1.00	4.09	1.04	4.26	.89	.602*ns*	2,161
W.order (al+tion)	3.71	1.53	3.98	1.36	4.00	1.44	.544*ns*	2,161
W.order (ity+able)	3.85	1.50	3.63	1.41	3.26	1.59	1.97*ns*	2,161
W.order (ness+ful)	3.15	1.60	3.28	1.24	3.54	1.61	.934*ns*	2,161

Note. In each row, means that are reliably different according to the Bonferroni procedure are co-superscripted alphabetically. *$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

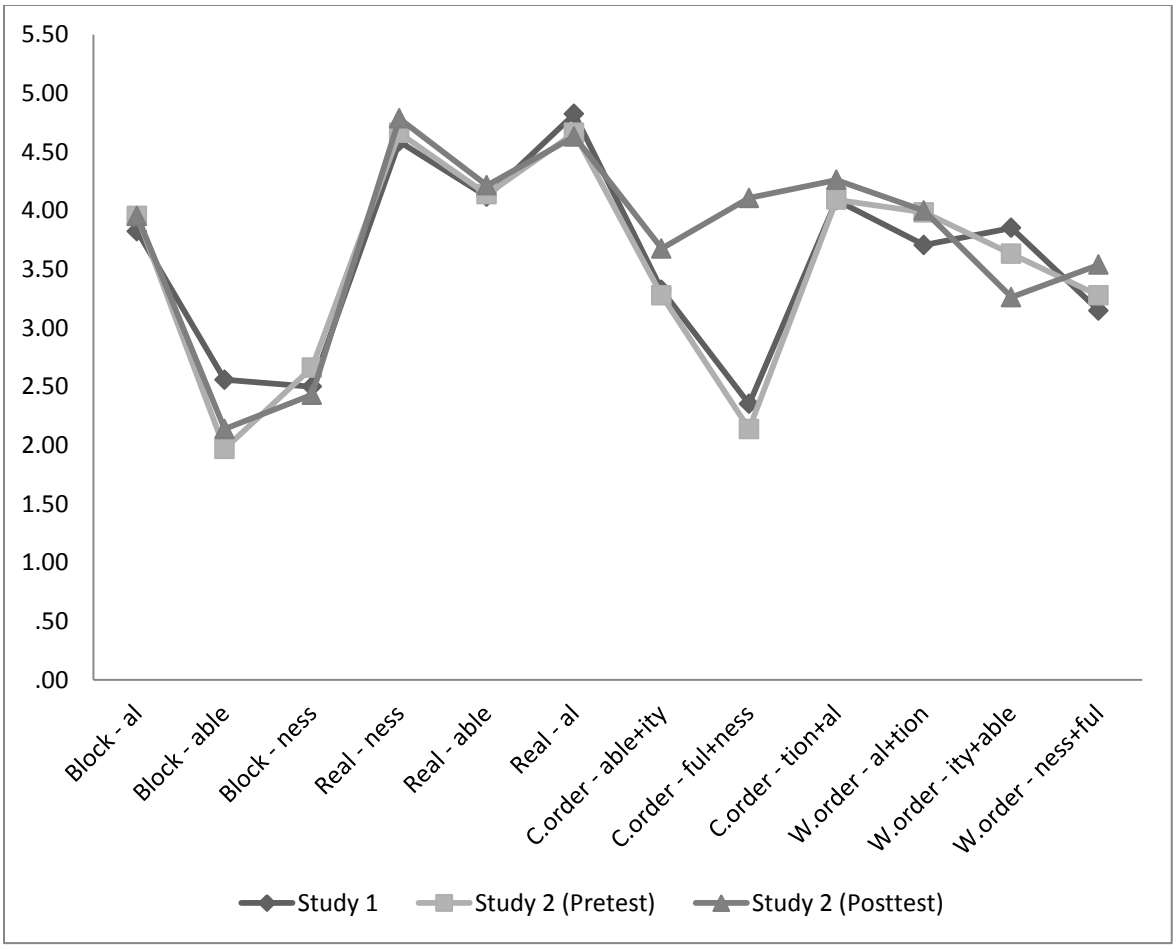

Figure 36. Grammaticality judgment scores as a function of condition*affix

A further issue that must be addressed within this experiment is whether or not the specific treatments in Study 2 differentially influenced aspects of derivational knowledge. One problem with the analysis so far is that data from both of the Study 2 treatment groups (input and output) is compiled into the Study 2 Pretest and the Study 2 Posttest categories. These categories are useful for comparing how the instructed learners from Study 2 compare with the learners in Study 1, but any treatment-specific effect on derivational knowledge is lost as a result of this compilation. Hence, the goal of the next analysis is to compare the effectiveness of the input treatment versus the output treatment in the learning of constraints on affix attachment (condition

variable) and the interactions between the conditions and individual affixes. This section begins by looking at students' pretest and posttest performance on the four conditions within the grammaticality judgment task and concludes with a more in-depth analysis of students' performance on individual affixes within each condition in order to investigate the effect of instruction on individual affixes.

A summary of the pretest and posttest scores for each condition on the grammaticality judgment test as a function of treatment and proficiency is provided in Table 30. Descriptive results mirror the findings in Study 1 in that highly-frequent derived words with one affix cause little difficulty for L2 learners. There also appears to be an effect of proficiency in that high-intermediate learners typically score higher than low-intermediate learners on judgments involving affix ordering. One unexpected finding is that high-intermediate learners from the input group get worse on judging words with semantic blocking from pretest to posttest. Statistical analyses are used to explore the effect of the treatment on each of these conditions (except Real word with one affix[34]).

[34] Statistical analyses are not performed on this condition since learners performed at ceiling on this condition across proficiency levels, treatment groups, and times.

Table 30. Scores on GJ conditions as a function of proficiency and treatment (Max score = 15/condition)

	Proficiency	Output		Input	
		M	*SD*	*M*	*SD*
Semantic Blocking					
Pretest	Low	7.38	1.85	8.94	3.75
	High	9.12	3.82	7.93	3.31
Posttest	Low	6.50	2.56	9.56	3.97
	High	9.35	3.21	7.07	3.20
Real words (1-affix)					
Pretest	Low	13.25	2.05	12.94	1.57
	High	13.42	1.68	14.20	1.15
Posttest	Low	13.63	1.14	12.50	1.55
	High	13.88	1.14	14.40	.83
Wrong affix ordering					
Pretest	Low	8.75	3.58	11.06	3.51
	High	11.27	2.43	11.20	3.50
Posttest	Low	8.75	4.59	11.12	3.96
	High	11.62	2.77	10.13	4.75
Correct affix ordering					
Pretest	Low	9.13	2.48	8.06	4.11
	High	9.77	3.20	10.80	2.18
Posttest	Low	11.88	1.64	10.00	3.48
	High	12.54	1.94	13.47	1.73

A three way mixed-effects ANOVA was performed on scores on the semantic blocking condition as a function of time (pretest vs. posttest), proficiency (low vs. high), and treatment. The three-way interaction between time, proficiency, and treatment was not significant, $F(1, 61) = 1.39$, $p = .244$, $\eta_p^2 = .022$. There were no significant interactions between time and proficiency, $F(1,61) = .031$, $p = .862$, $\eta_p^2 = .001$, or time and treatment, $F(1,61) = .033$, $p = .856$. However, the interaction between proficiency and treatment was significant, $F(1,61) = 7.35$, $p = .009$, $\eta_p^2 = .107$. There were no significant main effects among time, $F(1,61) = .161$, $p = .689$, $\eta_p^2 = .003$, proficiency, $F(1,61) = .133$, $p = .717$, $\eta_p^2 = .002$, or treatment, $F(1,61) = .152$, $p = .698$, $\eta_p^2 = .002$.

In order to investigate the interaction between proficiency and treatment, simple main effects were performed on scores on the semantic blocking condition at each level of treatment as a function of proficiency. There were no significant differences between the high-intermediate (M = 7.50, SE = .712) and low-intermediate (M = 9.25, SE = .69) learners within the input group, $F(1,61) = 3.12$, $p = .082$, $\eta_p^2 = .049$; however, the scores on the semantic blocking condition among the high-intermediate learners (M = 9.23, SE = .54) in the output group were significantly higher than the scores of low-intermediate learners (M = 6.94, SE = .98), $F(1,61) = 4.23$, $p = .044$, $\eta_p^2 = .065$.

A three-way mixed-effects ANOVA was performed on scores on the wrong affix ordering condition as a function of time (pretest vs. posttest), proficiency (low vs. high), and treatment. The three-way interaction between time, proficiency, and treatment was not significant, $F(1,61) = .158$, $p = .692$, $\eta_p^2 = .013$. There were no significant interactions between time and proficiency, $F(1,61) = .224$, $p = .637$, $\eta_p^2 = .004$, between time and treatment, $F(1,61) = .667$, $p = .417$, $\eta_p^2 = .011$, or between proficiency and treatment, $F(1,61) = 3.39$, $p = .071$, $\eta_p^2 = .053$. There were no significant differences between the scores on low-intermediate (M = 9.92, SE = .679) and high-intermediate (M = 11.05, SE = .51) learners, $F(1,61) = 1.78$, $p = .186$, $\eta_p^2 = .028$, or between scores of the input (M = 10.88, SE = .56) and output (M = 10.10, SE = .63) treatment groups, $F(1,61) = .856$, $p = .359$, $\eta_p^2 = .014$. There were no significant differences between scores on the pretest (M = 10.57, SE = .42) and scores on the posttest (M = 10.41, SE = .52), $F(1,61) = .158$, $p = .69$, $\eta_p^2 = .003$.

A three-way mixed-effects ANOVA was performed on scores on the correct affix ordering condition as a function of time (pretest vs. posttest), proficiency (low vs. high), and treatment. The three-way interaction between time, proficiency, and treatment was not

significant, $F(1,61) = .203$, $p = .654$, $\eta_p^2 = .003$. There were no significant interactions among time and proficiency, $F(1,61) = .226$, $p = .636$, $\eta_p^2 = .004$, time and treatment, $F(1,61) = .338$, $p = .563$, $\eta_p^2 = .006$. There was no significant difference between the scores of the input group ($M = 10.58$, $SE = .43$) and the scores of the output group ($M = 10.83$, $SE = .48$). The main effect of time was significant, $F(1,61) = 41.37$, $p < .001$, $\eta_p^2 = .404$; posttest scores ($M = 11.97$, $SE = .32$) on words with correct affix ordering were significantly higher than pretest scores ($M = 9.44$, $SE = .43$) (See Figure 37). The high-intermediate group ($M = 11.64$, $SE = .39$) scored significantly higher than the low-intermediate group ($M = 9.77$, $SE = .52$), $F(1,61) = 8.43$, $p = .005$, $\eta_p^2 = .121$.

Descriptively, the output group appears to improve reliably from pretest to posttest on words with correct affix ordering as depicted in Figure 37; however, the results from the overall ANOVA indicate that the time by treatment interaction was not significant, so no further post-hoc analyses were conducted.

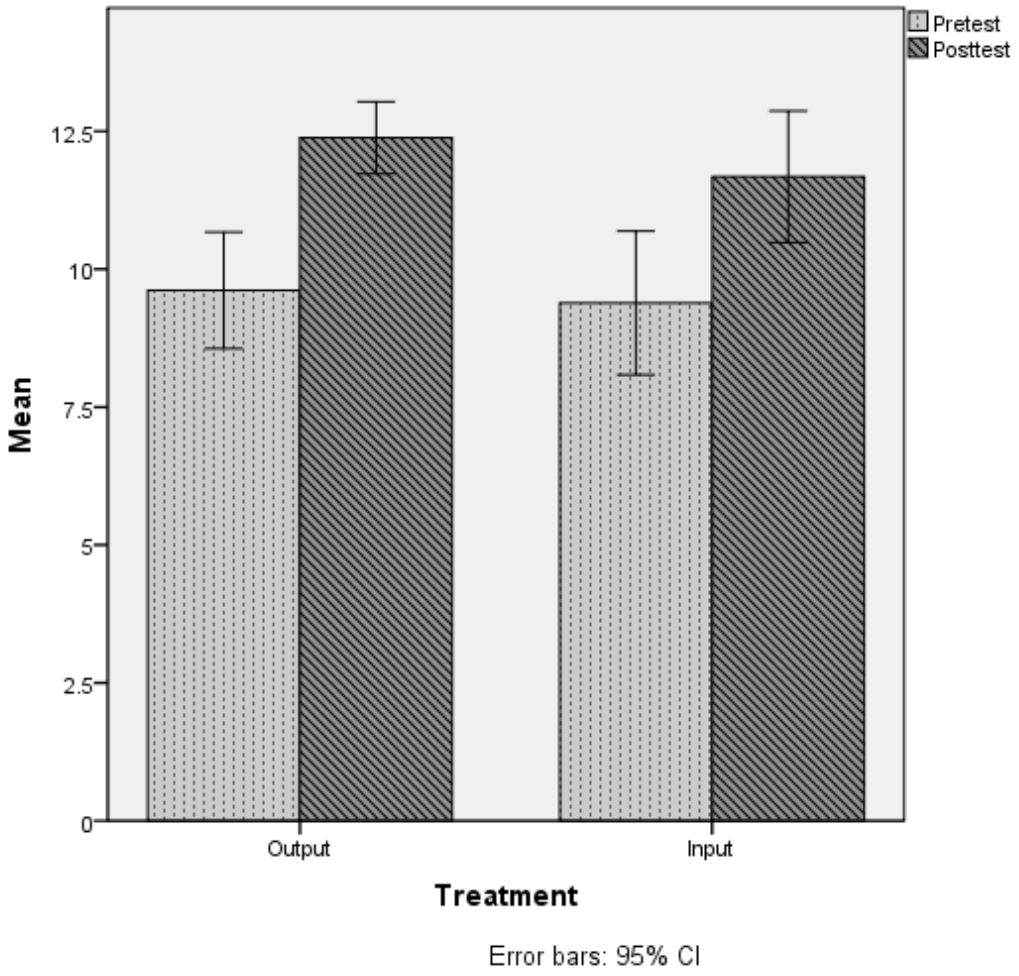

Figure 37. Scores on the correct affix ordering condition as a function of time and treatment

The final analysis in this section looks specifically at performance on individual affix combinations within the treatment conditions in order to explore if the treatments had any measurable effect on specific affix combinations. Table 31 displays pretest scores and Table 32 displays posttest scores for each affix*condition among the output and the input groups as well as the results of an independent t-test comparing the mean scores from each group. According to results at the time of the pretest, there was only one difference on affix knowledge; students in the input group (M = 3.61, SE = .244) scored significantly higher than students in the output group (M = 2.97, SE = .182) on identifying words with incorrect affix ordering with the *ness* +

ful affix combination, $t(1,63) = -2.14$, $p = .037$. Interestingly, this difference disappears when students take the posttest and there is no significant difference between the input group (M = 3.68, SE = 1.62) and the output group (M = 3.41, SE = 1.62) on identifying words with incorrect affix ordering with the *ness* + *ful* affix combination, $t(1,63) = -.661$, $p = .511$. This suggests that the output treatment helped students in the output group to "catch up" to the students in the input group on this particular component of derivational knowledge.

Table 31. Grammaticality judgment pretest scores on each condition*affix combination as a function of treatment (Max score = 5)

Condition*Affix	Output		Input			
	M	*SD*	*M*	*SD*	*t*	*df*
S.Block (al)	3.97	1.24	3.94	1.29	.112*ns*	(1,63)
S.Block (able)	2.03	1.50	1.90	1.47	.330*ns*	(1,63)
S.Block (ness)	2.71	1.49	2.61	1.71	.24*ns*	(1,63)
Real (ness)	4.71	.63	4.61	.56	.63*ns*	(1,63)
Real (able)	4.03	.97	4.26	.86	-1.00*ns*	(1,63)
Real (al)	4.65	.734	4.68	.60	-.18*ns*	(1,63)
C.order (able+ity)	3.35	1.45	3.19	1.72	.41*ns*	(1,63)
C.order (ful+ness)	2.18	1.66	2.10	1.80	.19*ns*	(1,63)
C.order (tion+al)	4.09	1.03	4.10	1.08	-.03*ns*	(1,63)
W.order (al+tion)	4.00	1.35	3.97	1.40	.10*ns*	(1,63)
W.order (ity+able)	3.71	1.38	3.55	1.46	.45*ns*	(1,63)
W.order (ness+ful)	2.97	1.06	3.61	1.36	-2.14*	(1,63)

Note. *$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 32. Grammaticality judgment posttest scores on each condition*affix combination as a function of treatment (Max score = 5)

Condition*Affix	Output		Input			
	M	*SD*	*M*	*SD*	*t*	*df*
Block (al)	4.12	1.20	3.77	1.48	1.03*ns*	(1,63)
Block (able)	2.29	1.55	1.97	1.62	.83*ns*	(1,63)
Block (ness)	2.26	1.33	2.61	1.67	-.93*ns*	(1,63)
Real (ness)	4.85	.36	4.71	.59	1.17*ns*	(1,48.8)
Real (able)	4.35	.81	4.06	.89	1.37*ns*	(1,63)
Real (al)	4.62	.65	4.65	.55	-.183*ns*	(1,63)
C.order (able+ity)	3.65	1.32	3.71	1.49	-.180*ns*	(1,63)
C.order (ful+ness)	4.32	.77	3.87	1.52	1.49*ns*	(1,43.4)
C.order (tion+al)	4.41	.78	4.10	.98	1.44*ns*	(1,63)
W.order (al+tion)	4.24	1.21	3.74	1.63	1.37*ns*	(1,55)
W.order (ity+able)	3.29	1.47	3.23	1.75	.171*ns*	(1,63)
W.order (ness+ful)	3.41	1.62	3.68	1.62	.674*ns*	(1,63)

Note. Degrees of freedom are adjusted for violations in homogeneity of variance.
*$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

8.4.4.2 Fill-in-the-blank

So far, the results from the fill-in-the-blank task have been examined by comparing the overall mean scores on the fill-in-the-blank task between the input and the output group. These results reveal little in terms of benefits for using one type of instruction over another. However, in order to more fully investigate treatment effects, one can also compare performance between trained and untrained word conditions and between the seven different affix conditions to explore whether performance on any of specific conditions within the task was influenced by the

type of training students received during the morphology training. These issues are taken up in this section of the dissertation.

Trained vs. untrained

Table 33 reports descriptive results for scores on trained and untrained items as a function of treatment, time, and proficiency. Scores are presented as percentages (.10 = 10%) to provide a more concise measurement (than the raw score) of students' performance on each condition. Descriptive results clearly show that scores for both the input and the output groups are higher on the posttest than on the pretest and that high-intermediate learners outperform low-intermediate learners on the pretest and the posttest. However, Table 33 displays that there appear to be few differences between the pretest and posttest scores that can be attributed to the type of treatment.

Table 33. Scores on trained and untrained words as a function of time, treatment, and proficiency

		Output				Input			
	Proficiency	Pretest		Posttest		Pretest		Posttest	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Trained	Low	.06	.05	.19	.13	.14	.11	.26	.17
	High	.23	.13	.46	.17	.27	.16	.46	.21
	Total	.19	.14	.40	.19	.20	.15	.35	.21
Untrained	Low	.12	.04	.22	.13	.16	.11	.29	.13
	High	.32	.14	.42	.15	.34	.17	.46	.21
	Total	.28	.15	.38	.17	.24	.17	.37	.19

A four-way mixed effects ANOVA was performed on test scores as a function of time (pretest vs. posttest), treatment (input vs. output), proficiency (low-intermediate vs. high-intermediate), and word condition (trained vs. untrained). There were no significant three-way interactions between time, condition, and treatment, $F(1,152) = 1.98$, $p = .162$, $\eta_p^2 = .013$, condition, proficiency, and treatment, $F(1,152) = .075$, $p = .785$, $\eta_p^2 < .001$, or time, proficiency, and treatment, $F(1,152) = .265$, $p = .607$, $\eta_p^2 = .002$; however, the three-way interaction between

time, condition, and proficiency was significant, $F(1,152) = 4.56$, $p = .034$, $\eta_p^2 = .029$. There were no significant two-way interactions between time and proficiency, $F(1,152) = 3.73$, $p = .055$, $\eta_p^2 = .024$, time and treatment, $F(1,152) = .052$, $p = .819$, $\eta_p^2 < .001$, condition and proficiency, $F(1,152) = .001$, $p = .982$, $\eta_p^2 = < .001$, condition and treatment, $F(1,152) = .02$, $p = .889$, $\eta_p^2 < .001$, or proficiency and treatment, $F(1, 152) = .582$, $p = 447$, $\eta_p^2 = .004$; however, the two-way interaction between time and condition was significant, $F(1,152) = 7.63$, $p = .006$, $\eta_p^2 = .048$ (Figure 38). Scores on the posttest ($M = .345$, $SE = .015$) were significantly higher than scores on the pretest ($M = .204$, $SE = .012$), $F(1,152) = 198.98$, $p < .001$, $\eta_p^2 = .567$ (Figure 39). There were no significant differences between words on the taught condition ($M = .257$, $SE = .015$) and words on the untaught condition ($M = .292$, $SE = .017$). The scores of the high proficiency group ($M = .269$, $SE = .015$) were significantly higher than the scores of the low proficiency group ($M = .18$, $SE = .019$), $F(1,152) = 59.88$, $p < .001$, $\eta_p^2 = .283$. The scores of the input group ($M = .30$, $SE = .016$) were significantly higher than the scores of the output group ($M = .25$, $SE = .019$), $F(1,152) = 4.10$, $p = .045$, $\eta_p^2 = .026$).

In order to investigate the three-way interaction between time, condition, and proficiency two-way mixed effects ANOVAs were conducted for each level of condition as a function of time and proficiency.

For taught words, there was a significant interaction between time and proficiency, $F(1,78) = 9.13$, $p = .003$, $\eta_p^2 = .105$ Posttest scores ($M = .349$, $SE = .02$) were significantly higher than pretest scores ($M = .179$, $SE = .015$), $F(1,78) = 135.47$, $p < .001$, $\eta_p^2 = .635$. In addition, the scores of the high-intermediate group ($M = .348$, $SE = .020$) were significantly higher than the scores of the low-intermediate group ($M = .179$, $SE = .025$), $F(1,78) = 27.61$, $p < .001$, $\eta_p^2 = .261$. The significant interaction between time and proficiency was investigated

further by conducting a within-subjects ANOVA at each level of proficiency to explore how each group performed from pretest to posttest. For the low-proficiency group, posttest (M = .242, SE = .028) scores were significantly higher than pretest (M = .116, SE = .019) scores, $F(1,31)$ = 38.08, $p < .001$, η_p^2 = .551. The same effect was observed among the high-proficiency group in that the posttest scores (M = .456, SE = .027) were significantly higher than the pretest scores (M = .241, SE = .021), $F(1,38)$ = 119.55, $p < .001$, η_p^2 = .718 (see Figure 41).

For untaught words, the interaction between time and proficiency was not significant, $F(1,78)$ = .508, p = .478, η_p^2 = .006. Scores on the posttest (M = .355, SE = .018) were significantly higher than scores on the pretest (M = .238. SE = .015), $F(1.78)$ = 107.12, $p < .001$, η_p^2 = .579. The scores of the high-intermediate group were significantly higher than the scores of the low-intermediate group, $F(1,78)$ = 29.11, $p < .001$, η_p^2 = .272.

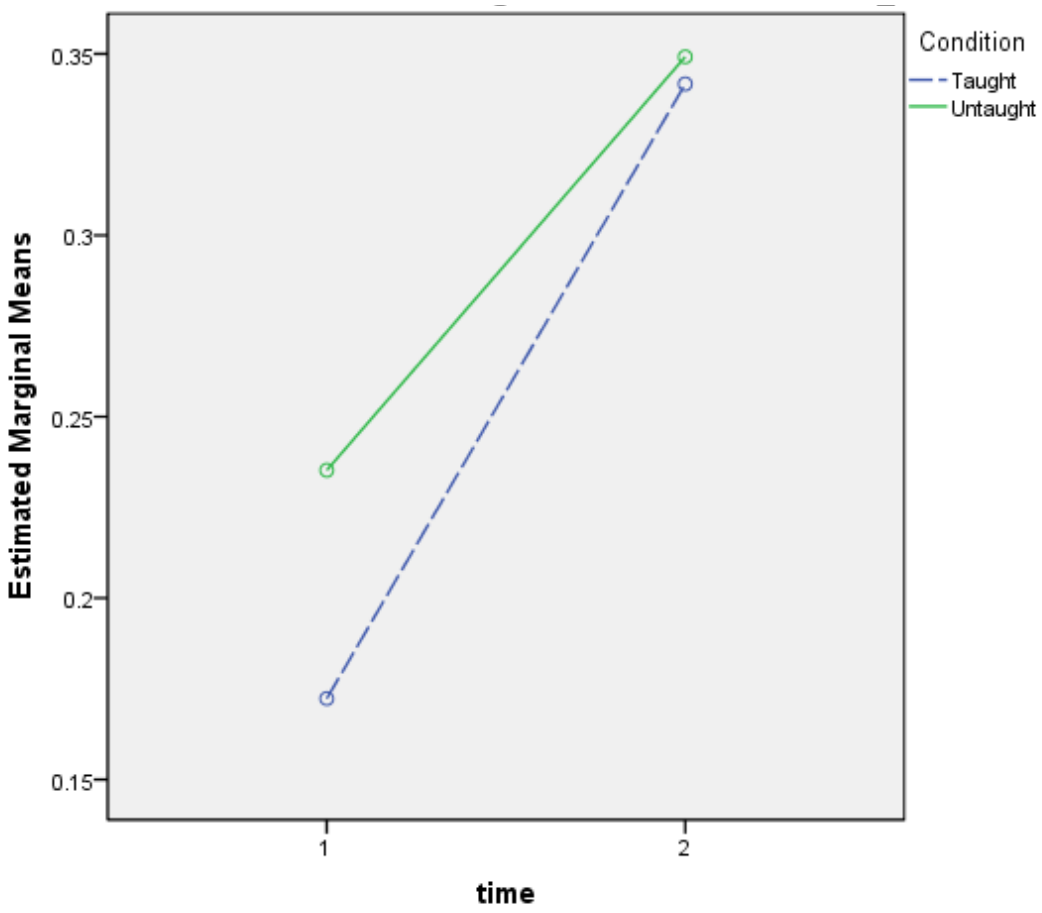

Figure 38. Scores as a function of time and condition

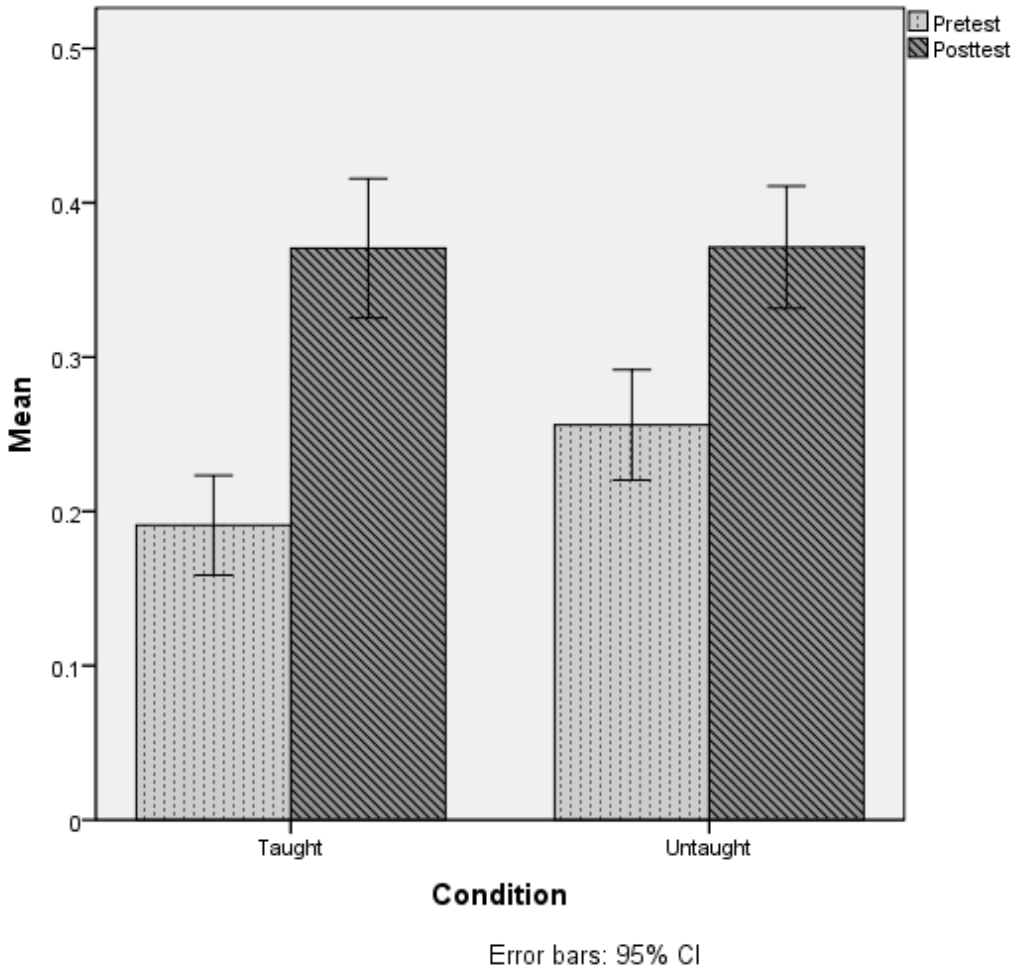

Figure 39. Scores as a function of condition and time

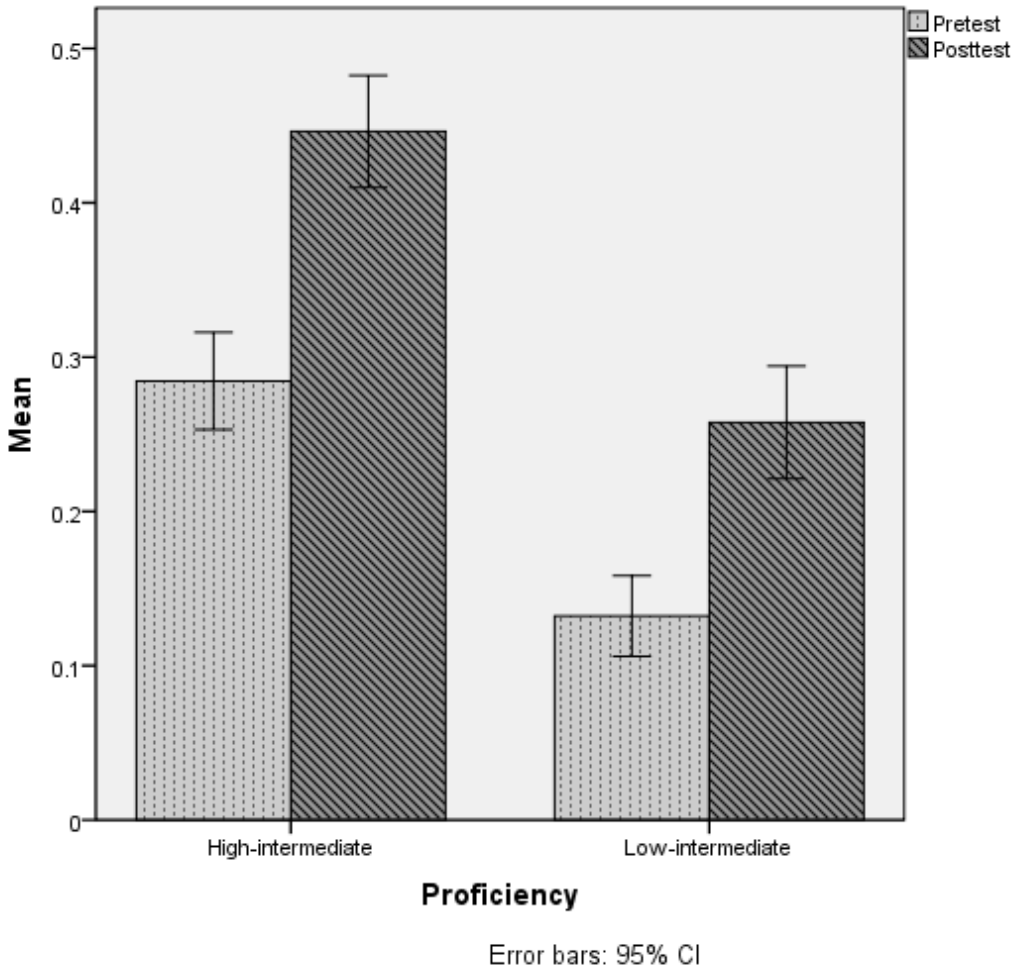

Figure 40. Scores as a function of proficiency and time

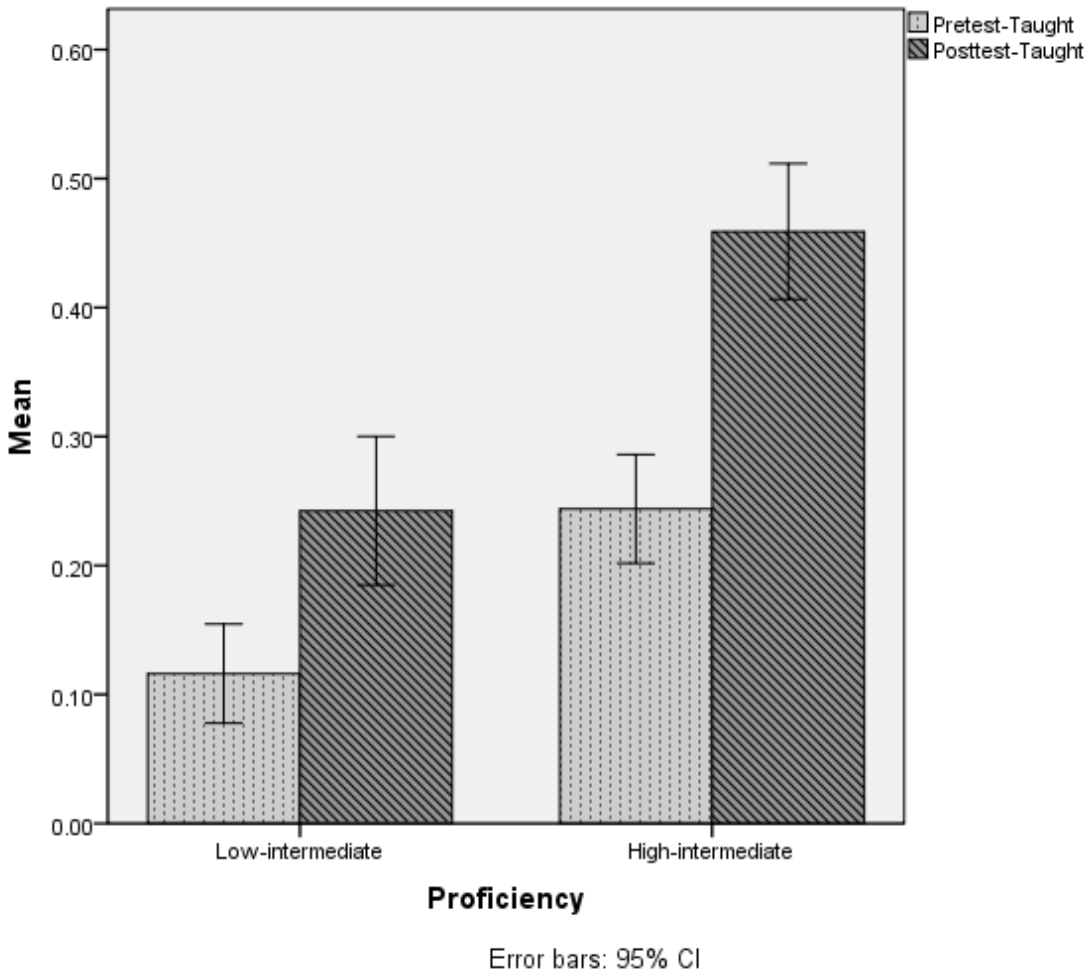

Figure 41. Scores on trained words as a function of time and proficiency

Pre-post comparison of individual affixes

Table 34 displays descriptive results for each affix type on the fill-in-the-blank section of the pretest/posttest. The scores on each affix are subdivided by treatment, proficiency, and time. These results become somewhat easier to interpret from Figure 42 which displays results for each affix as a function of time and treatment averaged across the levels of proficiency. According to this figure, the treatments lead to increased performance from pretest to posttest on

most of the affixes; however, there does not appear to be any difference on posttest scores between the input and the output group except for on words with the *ful+ness* affix combination. Performance on the *tion+al* affix combination does not change much as a result of the treatment. Given these results, a three-way mixed ANOVA was conducted only on scores on the *ful+ness* affix.

Table 34. Descriptive results by affix as a function of proficiency, treatment, and time

		Output				Input			
Affix	Proficiency	Pretest		Posttest		Pretest		Posttest	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
ful+ness	Low	.00	.00	.46	.36	.05	.18	.41	.37
	High	.09	.15	.74	.32	.09	.15	.56	.37
	Total	.07	.14	.68	.34	.07	.21	.48	.38
ness	Low	.09	.15	.24	.28	.12	.16	.28	.24
	High	.30	.29	.43	.26	.39	.32	.56	.31
	Total	.26	.27	.39	.28	.24	.27	.40	.30
ity	Low	.02	.05	.06	.12	.07	.11	.20	.20
	High	.23	.21	.40	.25	.22	.24	.31	.21
	Total	.18	.20	.32	.27	.14	.19	.25	.21
able+ity	Low	.02	.06	.02	.06	.00	.00	.07	.12
	High	.08	.15	.22	.20	.11	.19	.27	.30
	Total	.07	.14	.18	.20	.05	.13	.16	.24
tion+al	Low	.00	.00	.00	.00	.01	.05	.03	.06
	High	.03	.06	.07	.13	.05	.11	.14	.22
	Total	.02	.06	.06	.12	.03	.09	.08	.16
able	Low	.00	.00	.24	.24	.10	.20	.20	.19
	High	.33	.29	.44	.29	.34	.26	.54	.21
	Total	.25	.29	.39	.29	.21	.26	.35	.26
ful	Low	.19	.25	.35	.32	.28	.25	.46	.27
	High	.43	.27	.53	.26	.47	.29	.56	.28
	Total	.38	.28	.49	.28	.37	.28	.50	.27

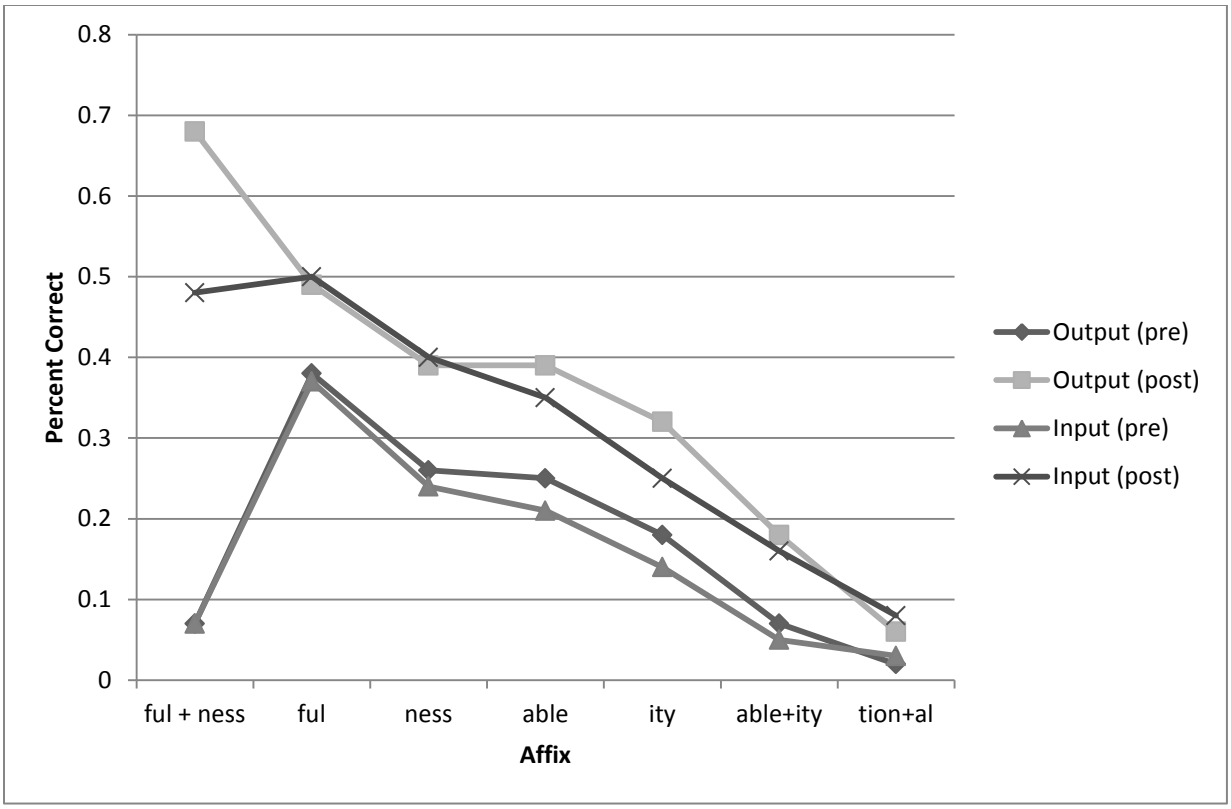

Figure 42. Scores on affixes as a function of time and treatment averaged across proficiency

A three-way mixed-effect ANOVA was conducted on scores on *ful+ness* as a function of time (pretest vs. posttest), treatment (input vs. output), and proficiency (high-intermediate vs. low-intermediate). The three-way interaction effect between time, proficiency, and treatment was not significant, $F(1,77) = .204$, $p = .653$, $\eta_p^2 = .003$. There were no significant interactions between time and proficiency, $F(1,77) = 2.99$, $p = .09$, $\eta_p^2 = .037$, time and treatment, $F(1,77) = 2.63$, $p = .109$, $\eta_p^2 = .03$ (see Figure 43), or proficiency and treatment, $F(1,77) = .695$, $p = .41$, $\eta_p^2 = .009$. The scores of the input group ($M = .28$, $SE = .03$) were not significantly different than the scores of the output group ($M = .32$, $SE = .04$), $F(1,77) = .695$, $p = .411$, $\eta_p^2 = .009$. Posttest scores ($M = .55$, $SE = .04$) were significantly higher than pretest scores ($M = .06$, $SE = .02$), $F(1, 77) = 128.35$, $p < .001$, $\eta_p^2 = .625$. The scores of the high proficiency group ($M = .37$, $SE = .03$)

were significantly higher than the scores of the low proficiency group (M = .23, SE = .04), $F(1,77) = 7.07$, $p = .01$, $\eta_p^2 = .08$.

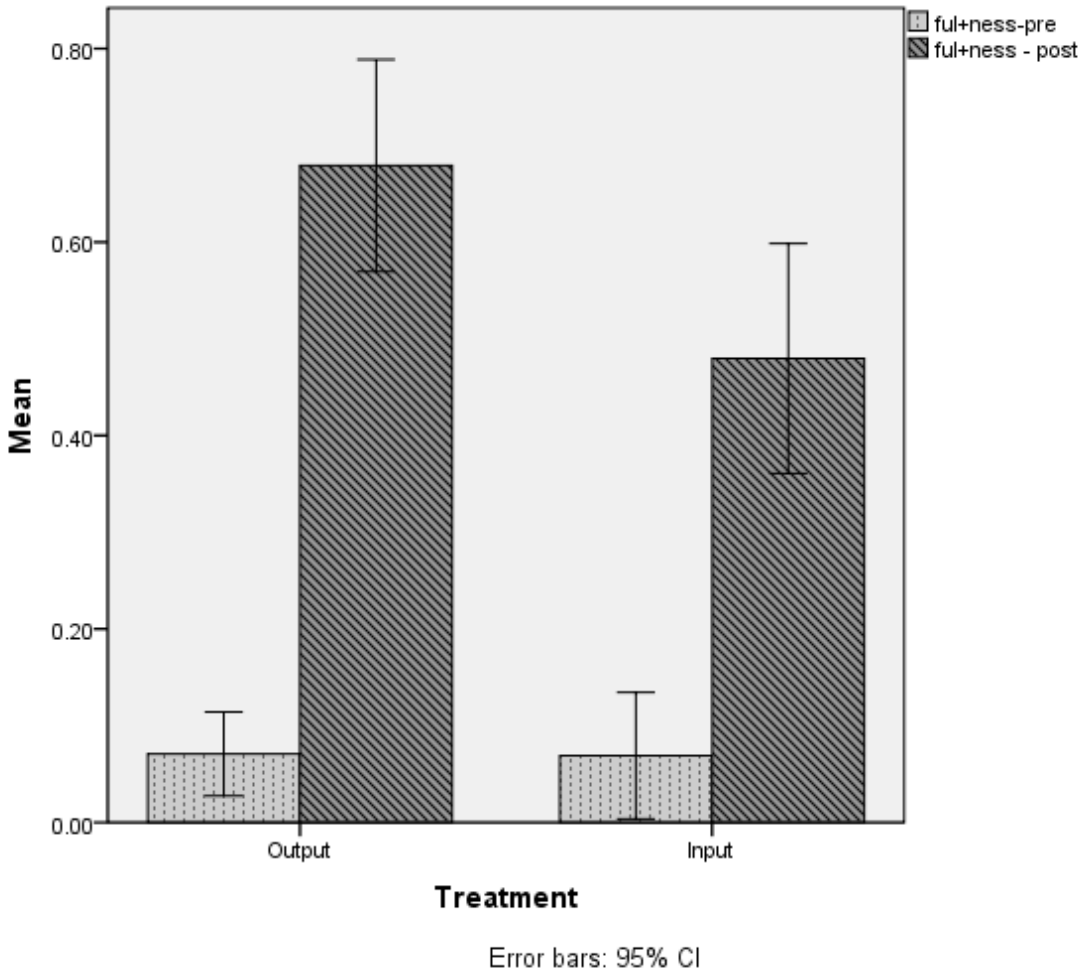

Figure 43. Scores on *ful+ness* as a function of time and treatment

8.5 DISCUSSION

8.5.1 Knowledge of derivational morphology

The L2 learners in this study had limited knowledge of derivational morphology before participating in this training. Receptive knowledge (Interpretation task = 70% accuracy, Listening Task = 60% accuracy) was generally more fully developed than productive knowledge (Fill-in-the-blank = 19% accuracy), although there were certain areas of receptive knowledge such as affix ordering and semantic blocking within the grammaticality judgment task that caused persistent problems for L2 learners. In addition, despite the fact that students' self-reports on the WKT show that they knew the meaning of the base words on the fill-in-the-blank (scores of approximately 3.00/4.00 on the WKT) prior to participating in this experiment, knowledge of the base words clearly did not denote that students had mastered the full set of words from the same word family to the extent that they could be spontaneously accessed during language production. This is not to say that there was no relationship between word knowledge and performance on measures of derivational knowledge since correlational analyses revealed that there were strong correlations ($r \geq .60$) between students' WKT scores and their scores on the fill-in-the-blank (derivation) section. In other words, the better students knew the base words, the higher they tended to score on the fill-in-the-blank (derivation) test; however, strong knowledge of a particular base word did guarantee that the related derivates had been acquired. These results are consistent with previous research on L2 derivational morphology (Schmitt & Meara, 1997; Schmitt & Zimmerman, 2002).

L2 knowledge of derivational morphology varied as function of language proficiency with high-intermediate learners scoring significantly higher than low-intermediate learners on pretest measures of derivational knowledge. A spearman correlation also indicated that reading ability (MTELP reading score) was related to receptive (grammaticality judgment and interpretation) and productive (fill-in-the-blank) performance, but only among the high-intermediate learners. These results show that knowledge of derived words improves gradually as students acquire more experience with the language and suggest that this improvement may be related to the development of reading abilities in the second language. (The relationship between word knowledge and reading ability is likely to be bi-directional in that word knowledge also leads to better reading ability.) Although it is impossible to say whether or not reading ability predicts derivational knowledge from these results, the relationship between reading ability and derivational knowledge has been demonstrated across L1 and L2 studies on morphological awareness. Within L1 studies, Carlisle et al. (2001) show that poor readers have more difficulties reading words that involve phonological shifts than age-matched average readers (See also Tyler & Nagy, 1989). Along a similar vein, Koda (2000) found that print processing experience was a significant predictor of morphological awareness among L2 learners. Given these results, the relationship between derivational knowledge and reading ability among the more proficient L2 learners is not surprising and would be expected given previous studies on L1 and L2 morphological processing.

The lack of significant correlations between tests of derivational knowledge and vocabulary (MTELP vocabulary) and grammar skills (MTELP grammar) also deserves mention since grammar and vocabulary skills are typically the foci of L2 classroom instruction. Moreover, research has established that the development of derivational abilities correlates with

L1 and L2 vocabulary abilities. For instance, Anglin (1993) argues that knowledge of derivation may account for 16% of vocabulary recognition in grade 1 and 40% of vocabulary recognition in grade 5 (p. 122). In addition, Schmitt and Meara (1997) found that L2 vocabulary size was positively correlated with receptive and productive knowledge of derivational suffixes. Hence, the results of the present study are inconsistent with previous research on L1 and L2 derivational knowledge and its relationship to vocabulary size. Despite this inconsistency, Jiang's (2000) work on vocabulary acquisition provides a good explanation for why vocabulary knowledge and knowledge of derivational suffixes might be unrelated within the L2 lexicon. In this work, Jiang explains that L2 classroom instruction may inhibit L2 acquisition of morphological forms in that learners typically acquire L2 vocabulary by associating an L2 form (a default form) with an L2 meaning (i.e., lemma mediation). As such, L2 learners initially acquire the default form of a vocabulary item and only later on learn about morphological rules through explicit grammar teaching. These grammar rules are never fully integrated into the lexicon (as in L1 acquisition), but are applied after accessing the lexical entry through the application of explicit knowledge if sufficient processing resources are available. Hence, given the present findings, L2 learners may have extensive item-based vocabularies (as measured by the MTELP vocabulary section), but this does not mean that they have reached the L2 integration stage (Jiang, 2000; see pages 19-21 of the literature review) or, for that matter, that they even have explicit knowledge of derivational rules. The fact that there is no relationship between grammatical knowledge (MTELP grammar) and performance on derivational tasks is indicative that grammar abilities do not matter for performance on derivational morphology.

The findings presented so far need to be interpreted with a degree of caution. On one hand, the MTELP test provides a limited measure of the construct of derivational knowledge.

The grammar section focuses primarily on inflectional morphology (subject-verb agreement, progressive marking, phrasal verbs, etc.) while the vocabulary section centers on global vocabulary knowledge. In short, an L2 learner's knowledge of derivational morphology may not matter for the completion of these test sections. On the other hand, it is important to point out that vocabulary and grammar instruction typically ignore derivational morphology, so students may not have explicit grammatical knowledge in this domain. I will not reiterate Jiang's (2000) point here about vocabulary instruction since it has been discussed in the previous paragraph; however, I will point out that grammar textbooks do not address derivational morphology. For instance, *Focus on Grammar 4* (Fuchs, Bonner, & Curtis, 2005), which is a popular grammar textbook for high-intermediate language learners, contains sections on grammatical concepts such as (1) simple present tense, (2) present progressive, (3) gerunds and infinitives, and (4) passive constructions, but does not contain any sections that specifically emphasize derivational morphology. Given the results of this study, there is clearly a need to integrate the teaching of derivational suffixes more fully into the design of ESL textbooks and curricula. This issue is addressed more fully in connection with the Study 2 research hypotheses in the conclusion section.

8.5.2 The effect of instruction (Hypothesis 1)

The results from study 2 provide strong support for the hypothesis that instruction makes a difference in receptive and productive L2 knowledge of derivational morphology. Posttest results revealed a strong effect of instruction (*partial eta squared* $> .50$ in some cases) across derivational tasks from pretest to posttest, suggesting that instruction on derivational morphology

strongly affected L2 learners' abilities to comprehend and produce derived words across multiple measures of derivational knowledge. The effect of instruction appeared not only on trained items, but also on untrained items that students never practiced during the morphology training sessions. Gains in productive knowledge remained stable over a five to six week period, indicating that the effect of instruction leads to long-term retention of knowledge gained from the treatment. In fact, the results suggest that the morphology treatment led to nearly perfect retention of derivational knowledge from immediate to delayed posttest among both of the instructed groups. Previous SLA research has demonstrated that training on morphological analysis was beneficial for the L2 learning of Spanish derivational morphology (Morin, 2003, 2006); however, this effect has not been previously been demonstrated within the domain of ESL research. In effect, this study illustrates that the benefits of language instruction on derivational morphology also extend to the second language acquisition of English.

Although the aims of the present study and previous research have been similar (i.e., investigate the effectiveness of derivational morphology training on vocabulary learning), there are several key differences between these studies. First, Morin's (2003, 2006) studies compared experimental groups to control groups that received no training on derivational strategies, whereas the present study utilized a quasi-experimental design with *a priori* hypotheses about which group would benefit more from the training. A control condition was not part of the present experiments. Hence, one limitation of the present study is that it cannot demonstrate the degree of derivational knowledge that would have developed naturally in the course of L2 classroom instruction without any instruction. Second, this study contrasts with Morin's in that she used very explicit forms of strategy training, whereas the treatments in this study were designed to teach derivation implicitly. Together, these studies show that explicit and implicit

instruction are both effective methods for teaching awareness of derivational morphology. This is consistent with previous research on the effects of implicit and explicit language instruction (see Norris & Ortega, 2000 for full review). Finally, the present study contrasts with previous research in that it investigates the effect of instruction among learners with higher language proficiency. Morin (2003), for instance, found that training on derivational morphology effectively promoted productive derivational knowledge among second semester learners of Spanish, but had little effect on first semester learners' abilities to produce derived words in Spanish. No such effect was present within the current study in that the low-intermediate and high-intermediate learners both benefitted from the derivational morphology treatment. The effectiveness of the treatment among both groups of learners is likely due to the fact that both groups were much more proficient (in English) than the L2 learners of Spanish in Morin's research. Nonetheless, future research should consider whether low-proficiency (novice) learners might derive some benefit from the more implicit type of training on derivational morphology that is represented in the present study than they did in Morin's explicit treatments that involved a high degree of metalinguistic knowledge. It may be the case that the explicit, metalinguistic-focused training in Morin's study was simply too difficult for low-level learners who may need a more implicit, context-based treatment as in the present study. The question that remains for future research is: Which learning conditions provide the best learning opportunities for teaching derivational morphology to learners from different levels of language proficiency?

8.5.3 Input vs. output in SLA (Hypothesis 2)

The second hypothesis predicted that the output group would outperform the input group from pretest to posttest on measures of derivational knowledge. This hypothesis was not supported by the results of this study in that the statistical analyses revealed no significant interactions between treatment and time of test or treatment and language proficiency within any of the statistical analyses. This result is unexpected in light of theories related to the generation effect in cognitive science (Burns, 1990; Crutcher & Healy, 1989; DeWinstanley & Bjork, 2004; Hirshman & Bjork, 1988; Slamecka & Graf, 1978) and the output hypothesis in SLA (deBot, 1996; Izumi, 2002; Kormos, 1999; Swain, 1985, 1998; Swain & Lapkin, 2003), which predict that pushed output instruction leads to better learning than an input condition because it forces deeper, more elaborate information retention and encoding. On this account, the output group should have developed more knowledge of derivational morphology than the input group from pretest to posttest; however, the results do not support this conclusion. Instead, both the input group and the output group demonstrated equivalent learning of derivational morphology from pretest to posttest, which is consistent with research by Shintani and Ellis (2010) who found that incidental learning gains among a group of Japanese children acquiring plural *-s* were similar between a group receiving comprehension-based instruction and a group receiving production-based instruction. As an alternative to output-based theories, the results of this experiment are consistent with research on input-processing theory, which shows that groups receiving input processing instruction typically perform the same as groups receiving output practice on output tasks (Benati, 2001, Cadierno, 1995; VanPatten & Cadierno, 1993). The results from the fill-in-the-blank task (i.e., a productive task) support this research in that there were no significant

differences between the output group and the input group on a productive task at the time of the posttest. This finding is important because even though the input group has not produced derivational morphology at any point during the morphology training, they are able to effectively generate derived words at the time of the pretest to the same degree as the output group. Within the framework of input-processing theory, structured input is crucial for L2 acquisition because it pushes L2 learners to effectively convert input into intake during language processing, which makes the input available to the developing system (Figure 4). Since the acquisition process is linear, knowledge contained within the developing system is immediately available for productive use. Hence, the fact that the input group is able to produce derived words as accurately as the output group suggests that the input treatment helped L2 learners to develop competence with derived words well beyond passively recognizing derived forms from language input. In other words, the benefits of input-processing extend to the production of derived words even though production was never in focus during the input-processing trainings. Importantly, these results do not suggest that output has no role in language learning. The results from this study clearly show that the output group reliably improves across all measures of derivational knowledge, and, furthermore, that there are no reliable differences between the input and output group on any measures of derivational knowledge. The question that remains, however, is whether or not surface performance on derivational morphology among the two conditions reflects underlying competence and not just explicit learning of linguistic rules (i.e., Krashen's distinction between competence and learning). According to current models of input-processing theory, output has a very different function than input in that it does not directly affect an L2 learner's developing system (Figure 3). VanPatten (2002) explains:

> ... it is important to point out that a focus on IP in acquisition does not suggest there is no role for output (in or out of the classroom). Output may play a number of important roles in language development...Output may play a role as a focusing device that draws learners' attention to something in the input as mismatches are noted, and it may play a role in the development of fluency and accuracy (p. 762).

In line with this view, the output group's performance on derivational morphology may not be driven by any real changes to the L2 developing system, but may instead be driven by enhanced fluency and accuracy with derivational rules, which are a byproduct of language output. It is not possible to say whether this hypothesis is correct given the design of this study; however, the hypothesis that input instruction develops competence in derivational morphology, whereas output instruction promotes learning of derived words deserves further attention in future research. In particular, laboratory experiments using a masked-priming paradigm might provide a better measure of how the two types of treatment affect underlying derivational knowledge.

8.5.4 Long-term effects (Hypothesis 3)

The third hypothesis stated that the output treatment would lead to more robust long-term retention of derivational knowledge than the output treatment since it theoretically involves deeper processing (e.g., grammatical encoding and monitoring) (Burns, 1990; Crutcher & Healy, 1989; deBot, 1996; DeWinstanley & Bjork, 2004; Hirshman & Bjork, 1988; Hulstijn and Laufer, 2001; Izumi, 2002, 2003; Slamecka & Graf, 1978). This hypothesis was not supported by the results of this study. At the time of the delayed posttest, the scores on the production task of the input group were not reliably different from the scores of the output group. In fact, the output

group's scores on the delayed test suggest that there is a slight decrease in the scores of the output group, whereas there is slight increase in the scores of the input group from posttest to delayed posttest (see Figure 34). These differences are not significant, but we are left wondering if these findings are indicative of treatment-induced trends in learning behavior: the input group continues to learn about derivational morphology, whereas the output group starts to forget what they learned through the treatment after a five to six week delay. Further research with longer delays between the posttest and delayed posttest is needed to address this issue.

8.5.5 What are students learning from each training?

The results of this experiment clearly show that students from both treatment groups learned about derivational morphology from the trainings they received. Despite this improvement, there is no evidence that the type of training students received led to differences in improved performance on individual affixes or on trained/untrained words. Nonetheless, there is evidence that certain affix characteristics and individual affixes are easier to acquire than other affixes both in terms of receptive and productive knowledge. In terms of receptive knowledge, students developed more precise awareness of words with correct affix ordering. In particular, derived words ending in the *ful+ness* combination seemed to be recognized significantly more often on the posttest than they were on the pretest or when Study 1 was initially conducted in 2010. The *ful+ness* pattern was also learned productively in that students performance on this affix combination jumped from under 10% correct on the pretest to over 65% correct on the posttest. This pattern was learned quite robustly when compared to other affix combinations such as *tion+al* since performance on this affix combination barely changes from pretest to posttest.

The ease with which L2 learners acquire receptive and productive knowledge of the *ful+ness* combination may be a function of affix complexity. For one, the *ful+ness* (neutral) affix combination is highly regular and does not affect the phonological or orthographic structure of the base word, whereas combinations such as *tion+al* (non-neutral) often result in changes to the primary stress and the orthography of a base word (e.g., *'ed•u•cate --> ed•u•'ca•tion --> ed•u•'ca•tion•al*). In a word like *educational*, the stress shifts from the first syllable to the third syllable and the final /e/ is dropped from the base word. There are no such changes in orthography and phonology in words with the *ful+ness* affix such as *painfulness*, which may account for the ease of its acquisition. This result also fits with research on L1 acquisition in that non-neutral affixes are typically more difficult to acquire than neutral affixes. Carlisle et al. (2001), for instance, found that poor readers had fewer difficulties reading stable words (words with neutral affixes) than shift words (words with non-neutral affixes) than age-matched average readers. They suggest that these difficulties are due to the fact that poor readers have difficulties learning the complex phonological representations of derived words.

Besides linguistic characteristics, the simplicity of the underlying rule behind words with the *ful+ness* combination is also likely to contribute to the ease of acquisition. The rule is simple: take a noun, add *ful* to derive an adjective, and then add *ness* to derive another noun. In connection with work on explicit and implicit learning, this rule is relatively straightforward and is potentially a good candidate to be learned as explicit knowledge (see R. Ellis, 2006). Evidence from Tyler and Nagy's (1989) research on children's acquisition of neutral and non-neutral affixes would also support the notion that *ful + ness* could be learned as a combinatorial rule more easily than affix combinations such as *tion +al.* In their research, Tyler and Nagy show that children overgeneralize rules for neutral affixes, but tend not to overgeneralize rules for non-

neutral affixes. They suggest that consistencies in the application of rule-like processes for neutral affixes promote the learning of neutral affixes as combinatorial processes, whereas the inconsistencies in the application of non-neutral affixes force language learners to acquire them through anological processes (e.g., *decision* is related to *decide* through analogy).

There were also characteristics of derivational knowledge that did not change as a result of the training. By and large, these characteristics pertained to receptive knowledge of semantic blocking (e.g., **arrivable*) and incorrect affix ordering (e.g., **truthnessful*). Although students received abundant positive evidence regarding correct affix patterns during the training, they were unable to improve their performance in correctly rejecting morphological violations on the grammaticality judgment test. These findings are consistent with Rutherford's (1989) work on preemption in L2 acquisition in that L2 learners appear to develop productive rules such as "add *-able* to ANY verb" or "add *-ful* + *-ness* in ANY order," which are largely unaffected by input that is contrary to the productive rule. In this case, L2 acquisition does not mirror L1 acquisition in that L2 learners do not appear to obey the Subset Principle (Berwick, 1985) as it applies to the learning of derivational rules. In effect, the evidence presented here may suggest that L2 learners postulate superset "rules" for the application of each derivational affix that are largely unaffected by positive evidence that contradicts the superset "rules." In plain terms, children's initial hypotheses about derivational rules are highly conservative and gradually broaden through exposure to positive input, whereas adults L2 learners' initial hypotheses about derivational rules are highly generalized (often to the point that rules are applied incorrectly) and may never become restricted enough to generate the subset of native-like derived words. Perhaps this finding means that future research should consider the effects of provide negative evidence (what is not possible) in addition to positive evidence (what is possible) in the learning of L2

derivational morphology. White (1991), for instance, shows that negative evidence within form-focused instruction on adverb placement plays an important role in getting francophone learners of L2 English to correctly reject SVAO word order in L2 English. A question for future research is: Does explicit negative evidence develop L2 competency in the detection of morphological violations?

8.5.6 Summary and Conclusion

The purpose of this experiment was to investigate the effects of two different types of instruction on L2 derivational knowledge. The main hypotheses were that (1) instruction would be beneficial and (2) that the output group would outperform the input group from pretest to posttest/delayed posttest. Although there is support for an overall effect of instruction, there is no evidence that output-based instruction improves learning any more than input-based instruction over the course of a five-week training on derivational morphology. These findings are not consistent with the predictions of output-based theories such as the generation effect (Burns, 1990; Crutcher & Healy, 1989; DeWinstanley & Bjork, 2004; Hirshman & Bjork, 1988; Slamecka & Graf, 1978) and pushed-output in SLA (deBot, 1996; Izumi, 2002; Kormos, 1999; Swain, 1985, 1998; Swain & Lapkin, 2003); however, they were consistent with the predictions of VanPatten's (1996, 2002) input-processing theory since the input group performed the same as the output group on a productive task despite the fact that the input group never produced output during the training sessions on derivational morphology.

Within the broader context of the input versus output debate in SLA, the results of this study suggest that output practice is not necessarily the best way to help students learn

derivational morphology. As Folse (2006) notes, output practice such as having students generate their own sentences to learn vocabulary is highly inefficient within an ESL classroom context and the time may be better spent doing fill-in-the-blank activities, which are more efficient and yield much the same results in terms of vocabulary retention as sentence-writing. The wisdom in Folse's argument also applies to the L2 learning of derivational morphology in that educators should consider using input-processing methods for teaching derivational morphology instead of more time consuming output methods since both methods appear to lead to the same amount of learning.

On a final note, this study provides an important link between theoretical linguistics and the practical concerns of classroom ESL teachers and learners. It shows, on one hand, that instruction on derivational morphology may be a very beneficial for the development of L2 morphological competence. The learners in this study clearly improve from pretest to posttest on all tests of derivational knowledge, which gives hope to the idea that the development of L2 morphological competence is, in fact, possible after the critical period if learners receive the right type of instruction. This view would be incompatible with theories of morphological processing which propose some type of global impairment to L2 morphological processing (Bowden et al., 2010; Clahsen et al., 2010; Jiang, 2004; Silva & Clahsen, 2008). On the other hand, it is premature to make this leap since we do not know what learners are actually learning about derivational morphology from the treatment. It is clear that they improve, but it is definitely not clear (especially given the lack of improvement on the semantic blocking and incorrect affix ordering conditions on the grammaticality judgment task) that their underlying morphological competence improves as a result of this training. That is, they may just be using a form of enhanced morphological awareness to memorize more vocabulary items or they may memorize

derivational rules as explicit knowledge. Although these strategies still speak to the benefits of training L2 learners on derivational morphology, they do not reveal the effect of the training on underlying morphological competence. Hence, a question that must be addressed in future research is: Does training on derivational morphology influence underlying morphological competence? No previous studies have addressed this issue in relation to derivational morphology, yet an answer to this question is crucial to bridging linguistic theory and pedagogical practice within the domain of L2 morphological learning.

9.0 STUDY 3

9.1 PURPOSE

Study 3 utilizes qualitative methods to evaluate morphological learning during the classroom intervention study. The purpose of study 3 was to understand how factors such as participants' English-learning backgrounds, beliefs about language learning, and goals for language learning influenced morphological learning over the course of the morphology training. More specifically, the following research questions will be addressed:

9.2 RESEARCH QUESTIONS

The following research questions will be addressed through this study:

(1) What are ESL learners' goals for learning English? (goals)

(2) How have ESL learners studied morphology in the past? (background)

(3) Is morphological knowledge important for success in English? (motive)

(4) How effective was the training for learning derived words? (motive)

(5) How did the training influence L2 learners' vocabulary learning strategies? (long term actions)

(6) How do teachers present the morphology training within their classrooms? (external motive)

(7) How do students engage in the activities within their ESL classrooms? (actions)

9.3 METHOD

9.3.1 Participants

Apart from the classroom study, qualitative data were also collected from students via qualitative interviews and a short opinion survey. Nine students volunteered to participate in interviews: 5 from the input-processing group and 4 from the pushed-output group. Table 35 details the characteristics of the interview participants. In addition to these interviews, 86 students responded to an opinion survey about the morphology training; however, the exact make-up of the survey participants is not known since surveys were anonymized.[35]

[35] The *n*-size for surveys is larger here than the *n*-size of the experiment since several participants completed the survey even though they did not participate in both the pretest and the posttest. Since the survey was anonymous, it was not possible to exclude participants who had not completed both tests from the survey data.

Table 35. Characteristics of interview participants

ID	NL	Proficiency	Treatment
Student A	Spanish	High-intermediate	Output
Student B	Arabic	High-intermediate	Input
Student C	Arabic	High-intermediate	Output
Student D	Chinese	Low-intermediate	Input
Student E	Arabic	Low-intermediate	Input
Student F	Arabic	High-intermediate	Output
Student G	Spanish	High-intermediate	Output
Student H	Arabic	Low-intermediate	Input
Student J	Chinese	High-intermediate	Input

9.3.2 Procedure

Twenty-one lessons out of 40 were observed by the researcher or a research assistant (Appendix J). Each class was observed at least once during the five week training session and several classes were observed multiple times. Students and teachers alike were observed during the morphology training and notes were taken on the observations to record how the lessons were presented and how students interacted with the lessons. As such, the observations reported in this section are not value judgments of individual teachers' teaching styles or of what students did or did not learn from the training sessions, but instead observations of how teachers and students approached the activity of morphological learning through their own individual actions. In addition to these observations, students completed a short opinion questionnaire (Appendix K) that was meant to gauge how much students knew about morphology before and after the training as well as their opinions of the training. The opinion survey included six likert scale questions that asked students to rate their agreement (a score of 5) or disagreement (a score of 1)

with these questions. Students completed this survey immediately after the fifth (and final) training session.

In order to collect more detailed information about students' backgrounds and beliefs about derived word learning and the morphology training, nine students were recruited to participate in a one-on-one interview with the researcher. These interviews lasted for approximately 20-30 minutes and were recorded using a digital recording device. Participants were paid $10 upon completing the interview.

9.3.3 Materials

The materials for this study include an observation form (Appendix J), an interview protocol (Appendix I), and a short opinion survey (Appendix K).

9.3.4 Data analysis

Qualitative data analysis will be used in conjunction with the Activity Theory framework (Figure 6) in order to interpret results. Summaries of classroom observations (Appendix L), student interviews (Appendix M), and interview transcripts (Appendix N) are included in the appendices.

9.3.5 What are ESL learners' goals for learning English?

Nine students volunteered to participate in qualitative interview sessions. Five of these participants were native speakers of Arabic, two were native speakers of Chinese, and two were native speakers of Spanish. Eight out of nine participants reported that their motivation for

studying English was so that they could enroll in an academic program in the United States.[36] In order to be able to enroll in an academic institution in the U.S.A., students knew that they needed to work on language skills such as speaking and writing, and learning to communicate through speech and writing were among their top English learning goals (Transcripts 1 and 2). Data were not obtained from one student regarding specific language learning goals; however, eight students responded to this question. Five respondents specifically mentioned that learning to write and speak better were among their top English-learning goals (Transcripts 1 and 2). Student B goes as far as to say that "I have big trouble in writing, especially in spelling and connecting the idea to each other." Listening (1 student) and reading (2 students) were typically not mentioned as important English-learning goals.

Transcript 1: Student B (Arabic)

Interviewer: What skills are you hoping to learn or to work on in Pittsburgh?
Student B: I want to improve my speaking and writing. First speaking, especially, and pronunciation and speaking fluently and writing just to – I have big trouble in writing, especially in spelling and connect the idea to each other.

Transcript 2: Student D (Chinese)

Interviewer: What English skills do you want to work on when you study in Pittsburgh?
Student D: Speaking, listening and writing. I think writing is important. Also, listening is good I can understand, I can have a good communicate with person.

[36] The one participant who did not mention wanting to enroll in an academic program in the U.S.A. needed to learn English for international business.

9.3.6 How have ESL learners studied morphology in the past?

All participants had previously studied English for a minimum of six years prior to enrolling in the intensive English program at the University of Pittsburgh. When asked to reflect on their previous experiences learning English in their home countries, most students (7 of 9) mentioned that they primarily studied grammar in their English classes and rarely practiced speaking or listening as in transcripts 3-5. The focus on grammar extended across cultures in that Arabic-speakers, Spanish-speakers, and Chinese-speakers typically mentioned grammar as the primary skill that they studied in their home countries.

Transcript 3: Student A (Spanish)

Interviewer: In grade school, what did they teach, what skills did they focus on?
Student B: Grammar, I think it's only grammar. Just a little pronunciation and a little writing. Not like this. If I can compare here to my school, only grammar.

Transcript 4: Student F (Arabic)

Interviewer: About six years of English in school and then plus, in the U.K. And then how did they teach you?
Student F: They have a very very good curriculum, but very bad methods.
Interviewer: What kind of skills did they work on?
Student F: They work on grammar more than vocab. This is the bad thing about it. And they start with grammar and reading.

Transcript 5: Student J (Chinese)

Interviewer: Could you describe, just a little bit, how you learned English in your home country. What were the classes like?
Student J: I think very few speaking part in my classes. We … I think most of the class is for the test. We have many test and so I think many Asian students are good in grammar. Writing and speaking are not so good because many teachers in our country are – were not good at speaking, I think.

Despite the focus on grammar that these students had received in their home countries, the concept of derivational morphology was new to many of these students. Seven out of the nine

participants reported that they had never studied derivational morphology before in their English classes. In fact, Student G reported that this study made him aware of morphology in his native language (Transcript 6). He had always wondered why you could make a little change to a word and get another word, but it was this study that had made the process of derivation clear to him.

Transcript 6: Student G (Spanish)

> **Interviewer:** Have you ever studied this kind of thing, the morphology, besides this?
> **Student G:** I've never known 'what is morphology'. I realized the meaning of morphology, even in my language, with this study. Always, when you see, it's curious, at least, that you want to know: "what is that? Why that word we can use with a little change in another form?" I think that is my problem, that is my real problem. When I arrived here and I started with a ELI course I realized that "wow, what is a noun? And what is an adjective?" it's very hard for me. Verbs, maybe, it's easier but if you have to choose if a word is a noun and an adjective, hmm… it's not easy for me.

Three students had knowledge of morphology in English prior to this study. Student F, for instance, knew that derivation existed in Arabic and was waiting to learn about derivation in English (Transcript 7). Student F was also aware that he had never studied the rules in English and he noted that Arabic speakers were unable to use derivation because they had never studied the rules.

Transcript 7: Student F (Arabic)

> **Interviewer:** Have you ever studied morphology, the words and the parts, besides this study. I guess you said that before…. So a little bit but not –
> **Student F:** A little bit but we didn't extend the knowledge and know the rules. We know there is something called morphology, we have the same in Arabic, so we was waiting for this part of language because it gives you more variety of words, so you can use just an origin to have many vocabulary. But we didn't study the rules. We can't use it.

9.3.7 Is morphological knowledge important for success in English?

Students were also asked whether they believed that learning about word parts was important for learning English. After receiving the training, all nine participants responded affirmatively to

this question, stating that they believed that learning about word parts was important for learning English. As a follow up to this question, the researcher asked students to reflect on why they thought morphology was important. Several students mentioned that morphology was important because it was an efficient way to learn new vocabulary. Multiple students shared this view. According to Student J, "If we learn words with parts, we don't have to memorize more words." Similarly, Student G reported, "You can learn multiple words at the same time if you study word families." One student in particular mentioned that learning about word parts was so important that the English Language Institute should have an entire class on morphology and dictionary usage (Transcript 8).

Transcript 8: Student F (Arabic)

> **Interviewer:** Do you think this study helped you meet your goals for learning English?
> **Student F:** Not really because … yeah, I know already the importance of morphology. I need you to address this and to tell the schools about it and create a new class for it. I think to merge listening with speaking together and have a new class with morphology and dictionary using is much better than just stay with listening and – individually, listening and speaking. Because they goes together. So instead we should study listening and speaking together and have a new class of morphology and dictionary usage.

For this student, learning about different word forms (and dictionary usage) was a crucial component of language learning and he was not satisfied with the morphology training sessions (approximately 1 ½ hours of training) because they did not provide enough exposure to morphological processes.

9.3.8 How effective was the training for learning derived words?

9.3.8.1 Interview data

Eight out of nine students expressed satisfaction with the morphology study and believed that it helped them meet their English learning goals. Several students explicitly mentioned that knowing about derivational affixes helped them when they were trying to figure out the meaning of a word because they could use affix information to help them figure out a word's part of speech when reading new words (Transcripts 9 and 10).

Transcript 9: Student H (Arabic)

Interviewer: Do you think you would recommend this type of morphology practice to a friend?
Student H: Yes. Very helpful.
Interviewer: Are there any improvements that can be made? Any suggestions you have for the way that it is taught?
Student H: It's a good way to teach morphology because the teacher shows the part of the word, if end in 'i-t-y' it's become noun or 'l-y' becomes adverb. This very helpful. I didn't know this structure before.

Transcript 10: Student D (Chinese)

Interviewer: Do you think that learning about word parts is important?
Student D: Yeah, right now I think …
Interviewer: Why?
Student D: Because we can use these word correct, we need it for writing or speaking or guess its meaning or we can use it … I think we need – for reading, I think it's better for reading if I, maybe know these words' basic form, we need a guess some situation, guess a meaning. Can help my reading.

Other students valued the morphology training because it provided them with an easy way to learn multiple vocabulary words at the same time. Student B, for instance, views morphology as a useful tool for building vocabulary and thinks that, "this [is a] way that increase[s] my vocabulary very quickly and with easy way" (Transcript 11). Student B knows that if he learns

root words and masters the suffixes and prefixes he will better able to memorize vocabulary words and understand new morphologically complex words in context through morphological decomposition. He clearly believes that the study helped him meet his English learning goals (learn vocabulary so that he can enroll in a university program), and he advocates for additional training on derivational morphology within his ELI classes.

Transcript 11: Student B (Arabic)

Interviewer: Do you think that this study, the morphology study, helped your meet your goals for learning English?
Student B: I feel yes, yeah. Because I believe that the most important thing to learning English to build the vocabularies. So this way that increase my vocabulary very quickly and with easy way. So I just know the root and after that if I master that the suffix and prefix and this kind of other parts, it's gonna be easy for me to memorize the words and even if I face a new words at least I will know is it, or know that the similar meaning.
Interviewer: Would you recommend this kind of practice to a friend?
Student B: Yeah. I would like if the ELI would incorporate this kind of way to their courses.
Interviewer: You suggested that the ELI should use it in their courses –
Student B: Yeah because we have already core vocabulary, the five core vocabulary so we know it with the different part of speech so if they can incorporate the morphology, I think it gonna be useful … at least to letting people get used to these kind of words.

Students also commented on the specific activities within the morphology training. Students in the input processing condition (3 of 5) generally liked the interpretation task (picture task) the best because it helped them remember the word by providing a rich context (Transcript 12).

Transcript 12: Student D (Chinese)

D: Which part of the study helped you the most? Which kind of exercise?
I: I think for picture. We can first – I think I can remember these words in situations, we can remember long, maybe, interesting picture can help me memorize good.
D: It helped you connect the word to the meaning through the picture?
I: Yeah.

Another student pointed out that the enhanced text (Part 2) was helpful, whereas the multiple choice section was not very helpful for learning about morphology (Transcript 13). For this student, the multiple choice section was too easy because it contained the same sentences that he had already seen in the first and second parts of the training. He believed that this section involved little actual thinking since it only involved recognizing the correct form (from sentences he had already seen) and required little cognitive effort on his part. He recommended changing the sentences in the final section to make them different than the sentences in the reading passage or, possibly, having students write their own sentences using the derived words (although he mentioned that this might be stressful).

Transcript 13: Student J (Chinese)

Interviewer: Thinking back to the training that you received – and if you were in XXXX class you saw a – first you heard sentences with pictures, then you read a short story with these words and word parts in them, and then you just had to remember the word. Do you think that that helped you, in your goals, in learning English?
Student J: I think it's helpful but the question behind the picture, the questions, I think the question are the same sentence as in the picture. So I don't have to think, I just select the correct one.
Interviewer: You think – what you're saying is that it's easy to pick the picture, you don't really have to think about the word within it. Is that what you're saying.
Student J: Not select the picture. I mean, the question at the back of the sheet, because the sentence are the same so I don't have to think the form. I just select what the word I saw in the (?).
Interviewer: What about the first part, listening and reading. Was that easy? It's okay if it was or it wasn't, I just want to know.
Student J: Not really. If I didn't know the word, maybe I would choose the wrong answer.
Interviewer: Let's think about – which section do you think was the most helpful? Part 1, part 2, part 3.
Student J: Part 2.
Interviewer: That was the reading, where you really got to see the meaning. If you had to make a change to – or change something about the way that things were presented, is there anything that you'd like to change or that you'd like to see added? Anything that you'd do differently, is the question I'm asking. What would you like to see in – so when you're learning about words and word parts, what would you like to see in the future in the ELI?

Student J: The part 3. We can change the question, not the same as the part 2.
Interviewer: What about something like writing sentences or something harder? You think that would be useful? Having to write your own sentences.
Student J: Maybe, but stressful.

Students from the output group also demonstrated preferences towards specific types of activities within the training. Two out of four students in the output group noted that the fill-in-the-blank questions were particularly helpful for learning about morphology.

9.3.8.2 Results from opinion survey

Results from the opinion survey further indicate that students believed that the training was helpful for learning about morphology. The mean scores and standard deviations are reported for each survey question in Table 36 and the results are depicted graphically in Figure 44. At the onset of the training, only 37% of students said that they knew a lot about morphology before the training and 26% said that they consciously tried to use morphology before the training. Conscious use of morphology rose drastically after the training in that 58% of students agreed that they consciously tried to use morphology after receiving the training. Students' comments also reflect a generally favorable attitude towards learning morphology from this training. Eighty-one percent of students agreed that the training was helpful for learning about morphology and 80% said that they liked learning about morphology through this training. Finally, results suggest that students think that additional training on morphology would be helpful since 74% of students reported that they would like to receive additional training on morphology.

Table 36. Results from the opinion survey

Question	*N*	*M*	*SD*
(1) I knew a lot about morphology (making words from word parts) before this training.	86	3.06	1.10
(2) I consciously tried to use different word forms before this training.	85	3.02	1.00
(3) This training helped me learn more about morphology.	85	4.27	.86
(4) I consciously try to use different word forms now because of this training.	86	3.69	1.01
(5) I liked learning about morphology through this training.	84	4.17	.83
(6) I would like to receive additional training on morphology in my ELI class.	85	4.20	.97

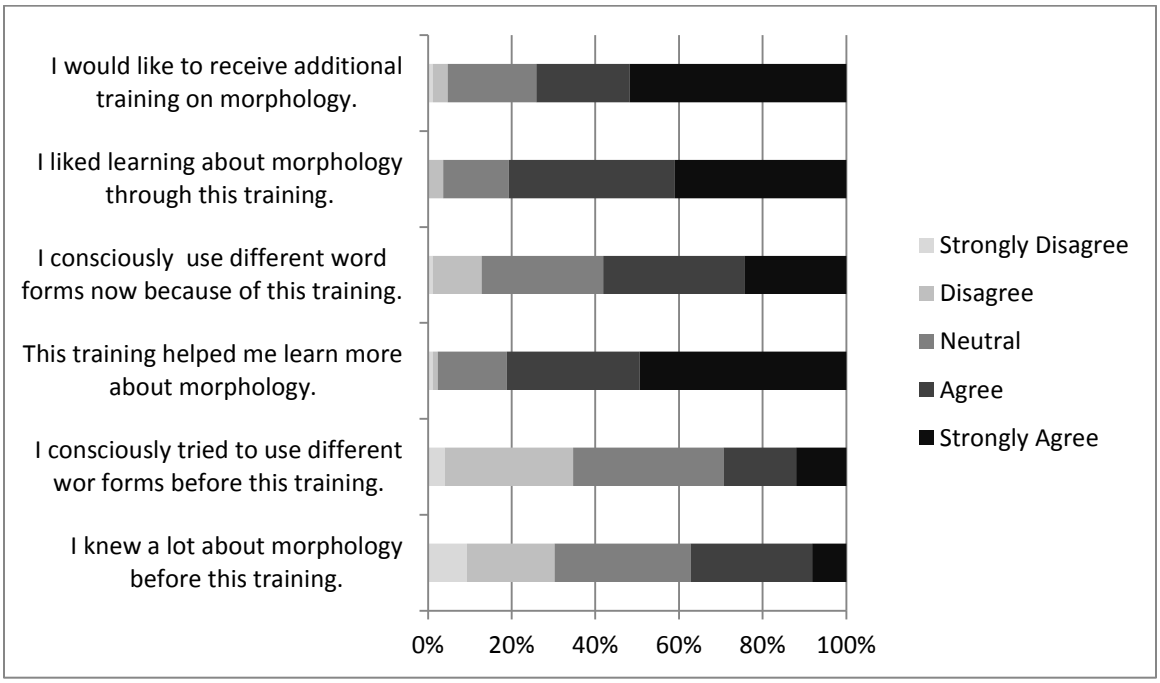

Figure 44. Results from the opinion survey

9.3.9 How did the training influence L2 learners' vocabulary learning strategies?

Students were asked to reflect on what they considered to be good and bad vocabulary learning strategies. According to four students (C, D, F, and H), the worst way to learn

vocabulary was by learning words without any meaningful context. According to Student C, trying to learn a word by repeating it over and over without understanding the part of speech or how the word is used in context is not a good way to learn vocabulary

Transcript 15: Student C (Arabic)

Interviewer: What do you think is the worst way to learn vocabulary, or the least helpful way?
Student C: I think the worst way is just writing the word and try to revise this word without understanding the part of speech, without trying to figure out the right context of this word. Just trying to mention this word again and again, repeating.

In addition, two students (B and J) believed that translating vocabulary from their native language was a bad way to learn vocabulary. Student J reports that he has used this strategy for a long time and "it's not effective."

Transcript 16: Student J (Chinese)

Interviewer: What is the worst way, then, to learn vocabulary?
Student J: Just memorize the word and the meaning in my language. I think it's the worst because I did it for long time and it's not effective.

Besides these answers, bad ways to learn vocabulary included: (1) memorizing one word at a time without morphology (Student G) and (2) learning vocabulary by watching movies and TV (Student A).

In terms of good vocabulary learning strategies five students explicitly mentioned that learning about word parts was a good way to learn vocabulary. For some, using morphology to learn vocabulary is the best way to learn vocabulary because you can learn multiple words at the same time (Transcript 14).

Transcript 14: Student G (Spanish)

Interviewer: What do you think the best way to learn vocabulary is?

Student G: I think morphology is a good way, is a very very good way and a very important way. Yes.
Interviewer: Why do you think it's so good?
Student G: Because in that way you can learn not the one – maybe two or three or four words in the same moment. If you attach the verb and the noun and the adjective it's easier than if you just learn, today, the verb and in two weeks the noun form of that verb. It's better if you can attach them.

Four of these students noted specific ways that they used morphology when learning vocabulary. Student B, for instance, keeps track of vocabulary words by using an Excel spreadsheet (Transcript 15). When making these spreadsheets, Student B looks up five words a day and tries to think about how the words can be used with different parts of speech.

Transcript 15: Student B (Arabic)

Interviewer: The next section is on some – how you think about learning. What do you think is the best way to learn vocabulary?
Student B: I think this way that I do it now, that every day I try to look up a new five words and looking for their definitions in English and their synonyms and looking for some sentences to know how can I use it with different part of speech. And from (?) I review it, and I try to incorporate it with my speaking, daily speaking.
Interviewer: You do five words a day?
Student B: Yeah and I put it in an Excel spreadsheet to track it, something like this.

Other students mentioned similar strategies involving morphology such as keeping a vocabulary notebook with lists of base forms and related words (Student C), writing down a base word and trying to come up with all of the morphologically related forms (Students F and G), or practicing using new forms of the word when writing or speaking (Student H).

These strategies extend well beyond the requirements of the morphology training and classroom homework expectations. In other words, students opted to adopt morphological strategies on their own without being forced to do so by their teachers through classroom requirements. Furthermore, it did not matter which training group they belonged to; students from both groups took what they had studied through the training and found ways to integrate it

into their own personal vocabulary strategies. Given the fact that only two of these students knew about morphology prior to the training, this is a positive sign that students "buy into" the goals of the morphology training and believe that it is a useful strategy for expanding L2 vocabulary.

9.3.10 How do teachers present the morphology training within their classrooms?

Teachers were enthusiastic about the study and many recognized that their students had poor knowledge of derivational morphology. Although there was some individual variation in how teachers presented the lessons, many of the lessons shared similar features. For one, teachers from both the input group and the output group typically started the lessons by asking students something akin to, "What is morphology?" After students answered this basic question, teachers then moved on to present their respective morphology lesson. Since the two lessons (input vs. output) were derived from two completely different approaches to language teaching, they are discussed separately here, beginning with the input processing lessons.

Recall that the input processing lessons began with an interpretation task in which students were asked to identify the picture that best represented the sentence they heard. In order to help students identify the correct picture, teachers (Teachers A, B, C, and D) typically discussed the pictures before students listened in order to help prepare students for listening to the sentences. The picture pairs were discussed one at a time and the recordings were played immediately after these discussions. Teachers then provided feedback on students' answers. The type of feedback varied slightly among each teacher, but the following characteristics typify teachers' feedback strategies. The most common method of providing feedback was to elicit answers and explanations from students before revealing the answers on the Power Point slides.

For instance, students were shown Picture A and Picture B in Figure 45 for the sentence *The pair had to show great **adaptability** for the next few years, but they made it work.* The sentence was only provided visually on the slide after students had heard the sentence two times. After eliciting students' answer to the question (A or B), feedback focused on drawing students attention to the derived word and its meaning within the sentence. Teachers elicited explanations from students and had them describe why they chose a picture before showing students the feedback slides. These discussions often centered on the meaning and form of the derived word. Specifically, teachers had students explain which words they used to make their decisions (one teacher referred to these as cues) and how these words were constructed (roots and affixes).

After providing feedback on the interpretation task, teachers directed students to read the enhanced text and then answer the multiple-choice questions containing derived words. These final two tasks were not as engaging as the interpretation task. Teachers typically allowed students to work quietly on the reading passage and then checked to make sure that students understood the vocabulary within the passage. Finally, the teacher directed students to complete the multiple-choice section. Feedback was provided by eliciting answers from students (asking for the answer plus an explanation) or by explicitly providing the answer along with a grammatical explanation.

The pair had to show great adaptability for the next few years but they made it work.

Picture A Picture B

Figure 45. Example of a feedback slide for *adaptability*

The teacher had a somewhat different role in the pushed output lessons in that these activities focused more on getting students to produce output rather than having the teacher provide input on derivational morphology. Teachers initiated the first activity (reading) by instructing students to read an unenhanced passage. Feedback was only provided on this section if students had questions on vocabulary words or had trouble understanding individual sentences (e.g., Teacher G). After completing this section, teachers handed out the worksheet and explained the directions for the generation task. The teacher provided immediate feedback on this task by reviewing the answers from the slides and sometimes verbally drawing students' attention to changes in the changes in spelling that accompanied derivational processes (see Teacher F, Session 5). Finally, teachers explained the directions for the dehydrated sentence

activity and gave students several minutes to write sentences using the correct form of a derived word. Some teachers (Teacher F) monitored students' progress by circulating around the classroom and providing help as needed, whereas other teachers (Teacher E) waited for students to ask questions while they were working. After students completed the sentence writing activity, feedback was provided by eliciting answers/explanations from students and reviewing model answers from the PowerPoint slides.

On a final note, teachers from both groups differed somewhat in how the morphology project was introduced during the training sessions. Some teachers presented the activities as a morphology research project or "the morphology study," whereas other teachers referred to the study as "morphology practice" or "morphology project." The difference in presentation is noted here because it may have an impact on how students perceive the activities according to the Activity Theory framework.

9.3.11 How do students engage in the activities within their ESL classrooms?

At the beginning of the morphology training, students seemed to be confused about why they were learning about morphology and what they were supposed to do during the training (Session 1). Students completed the activities as directed by their teacher, but they were very quiet during the sessions and their questions were directed at figuring out what exactly they were supposed to do to complete the activities. Students responded to their teacher's questions when the teacher elicited answers or explanations, but they did not actively ask questions about morphology. After the first training session, a noticeable difference was observed in how students engaged with the activity in that students started to actively ask the teacher questions

about “patterns” or “cues” that they could use to figure out morphology. Although some classes were still quiet in terms of questions about morphology, students seemed to enjoy the activities and actively seek to answer questions about morphology. This interest in the morphology project was highlighted by the comments of students in one of the reading classes during the final training session. When students heard that the project was coming to a close, they responded by asking why the project was ending and they stated that they would like to receive additional lessons about morphology. In addition, many students approached the researcher during and after the training sessions were completed in order to express that they thought that the project was important and that they would like to learn more about morphology.

9.4 DISCUSSION AND CONCLUSIONS

The purpose of study 3 was to understand how factors such as participants’ English-learning backgrounds, beliefs about language learning, and goals for language learning influenced morphological learning over the course of the morphology training. In connection with the activity theory framework presented in Figure 6, the activity was the morphology training that students received in study 2. On one hand, the researchers intent when designing this training was to expose L2 learners to derivational morphology so that they would be better able to (1) recognize derived words in speech and written texts and (2) produce derivational morphology in their own speech and writing (external motive). On the other hand, students had their own motive when participating in the morphology training which was to learn English in order to enroll in college (motive) through the development of language proficiency in speaking, writing,

reading, and listening (object). Section 9.5.1 explores the interactions between teachers, students, and researchers in the co-construction of a morphological learning activity. Section 9.5.2 discusses the implications from this study on the failure to obtain a generation advantage in study 2. Section 9.5.3 concludes with a few suggestions for future research.

9.4.1 The co-construction of actions, attitudes, and goals within the activity of morphological learning

It is clear from the classroom observation data that students did not initially perceive the training to be aligned with their English-learning goals. At the onset of the study, many students had questions about the purpose of the study such as “Why are we doing this?” or “What is the purpose of this study?” The initial observations also reflected confusion among students about what they were supposed to be doing as well as minimal engagement with the activities other than answering questions posed by the teacher. Students’ hesitation at the beginning of the study is not necessary surprising given the fact that most of the students had limited to no prior knowledge derivational morphology. Although a handful of students had studied derivational morphology in their native language, the concept of combining base words with derivational affixes to derive new words was novel for almost all of the students who were interviewed as well as most of the students in the opinion survey. In terms of the activity theory framework, students' actions at this point (fill out worksheets, answer questions posed by the teacher) were not directed at morphological learning (most students were not even aware of this concept), but were instead directed at completing a task assigned by the teacher/researchers without really understanding how it helped them meet their long-term English learning goals. These initial

results are similar to those reported in Juffs et al. (2010) in that students' actions did not align with their long-term learning objectives because they were not convinced that learning about 'morphology' through this study would help them meet their learning objective (object of learning) which was to learn to speak, read, and write effectively in English so that they could attend an English-speaking college (motive). Hence, their initial actions were directed towards the short-term goal of completing the task (object) and were disassociated from the goal that the researcher had in mind when implementing this project (learn morphology).

Students' attitudes towards the activity shifted over the course of the study as the true object of the study (learn morphology) came into focus and students began to see the connection between the activity and their language learning goals. In part, this shift occurred spontaneously as students began to realize the word-building (and word-deconstructing) potential that is inherent in derivational processes. Student G, for instance, was not consciously aware of derivational morphology prior to this study (Transcript 6); however, after learning about it he mentioned that it was the best way to learn new vocabulary words because he could learn, "not [just] one, maybe two or three or four words in the same moment" (Transcript 14). At the same time, the shift in students' attitudes is likely to have been influenced by changes in the way that the study was presented and explained to students after the first week. One of the most obvious changes was that students were told that the study was about morphology and the introductory slide from the pretest with the word *govern* was shown at the beginning of each lesson (input and output) to remind students what the study was about. Other changes were more indirect and occurred in the background through teacher training. Although teachers knew that their students had problems with the use of derivational morphology, they were not always prepared to provide students with an explanation for why the study was important. Recognizing this need, the

primary investigator sent an e-mail to teachers that explained why the study was important so that they could be better prepared to answer questions from students such as "Why are we doing this?" and "What is the purpose of this study?" This e-mail explained: (1) that morphology was difficult for ESL learners, (2) how morphology could be used to build vocabulary (3) and that the project was not only for research purposes, but was also connected to a real need among ESL learners. In addition to these e-mails, the primary investigator met with teachers informally in a common teachers' area to discuss the study and how its objectives could be communicated clearly to students.

In the weeks following these changes, students realigned their actions in accordance with the redefined goal of the study. In the classroom, students engaged in the activities by asking follow-up questions about the words that they saw in the study and by asking for more information about morphology. These actions display engagement with the activity because students were no longer passive recipients of information from their teachers, but were instead active agents in their own learning. At this point, they no longer asked the question "Why are we doing this?," but instead started to ask questions like, "Why haven't we been doing this?" (Student F). Further evidence for this engagement comes from the fact that students integrated what they had learned from the study into their own vocabulary learning strategies. These strategies included keeping track of word families in a vocabulary notebook (Student C) or excel worksheet (Student B), making lists of base words and trying to come up with alternate forms of the words (Students F and G), and practicing new forms of a word in speaking and writing (Student H). The diversity in how students integrate morphology into their vocabulary learning strategies is also reminiscent of Donato and McCormick's (1994) point that, "different actions or strategies may be taken to achieve the same goal, such as guessing meaning from context,

reading foreign language newspapers, or using a bilingual dictionary to improve reading comprehension" (p. 455). Moreover, the fact that students devise their own ways to integrate morphology practice into their own learning strategies evinces that they intrinsically value the concepts from the morphology training to the degree that they find ways to incorporate them into their own learning strategies without receiving any direction from their teachers.

This process of connecting the goals of the research with the learning goals of students depicts the complex dynamics within an activity between teachers, researchers, students, and the learning objective and illustrates that all participants are stakeholders in an activity, not just the language learners (Engestrőm, 1999; Juffs et al., 2010; Lantolf & Thorne, 2006; Leont'ev, 1981). The results also reveal that students' actions do not necessarily remain static within an activity (Donato & McCormick, 1994; Vygotsky, 1981). As the activity evolves and participants become more invested in the object of the activity, students actions change from lower-order "do this because the teacher tell me to" actions to higher-order "I need to learn this in order to succeed in English" actions. This is an important point given previous Activity Theory research in SLA since it shows that students attitudes and actions within an experiment can change in response to efforts from teachers and researchers to make learning objectives transparent to students within a pedagogical activity (see Lantolf & Thorne, 2006, p. 245). As such, these results contrast with the results from the Juffs et al. (2010) study in that students' attitudes and actions remain stable and disconnected from the *true* objectives of the REAP study throughout the course of the experiment. This stability among students' actions was perhaps caused by the fact that social forces within this experiment remained relatively constant over the course of the experiment. Teachers and researchers remained at a distance in this study and learners were left largely, for better or for worse, to their own devices as they worked with the REAP program.

9.4.2 Connecting quantitative and qualitative outcomes

Beyond describing what happened during the course of this experiment, Activity Theory is also important for understanding why the predictions regarding the effectiveness of the output treatment over the input treatment were not realized in Study 2. First, the results from this study suggest that this study helped students to notice derivational morphology for the first time. This is significant point since SLA research has shown that noticing, or bringing a linguistic feature into a learner's focal attention, may have a strong influence on the degree to which learners are able to convert input into intake during language processing (Schmidt, 1990, 1994, 2001). Hence, the fact that both treatment sessions brought the features of derivational morphology into focus (noticing) for learners for the very first time may go a long way to explain why the treatment groups developed in tandem. In this case, the "novelty effect" (Tulving & Kroll, 1995) of noticing derivational morphology may have overridden any inherent benefit of the generation effect. Put another way, five 15-20 minute treatment sessions were sufficient to induce a general awareness of derivational morphology among both groups, but were not sufficient to see any real advantage for the output group.

Second, students' awareness of the ineffectiveness of certain activities may have driven them to adopt more effective strategies. Student J, for instance, knew that the multiple choice was "too easy" and wanted something more challenging that went beyond repeating the same sentences that he had already seen in the previous sections. Moreover, several students from both treatment groups integrated morphology into their vocabulary learning strategies, which often involved output. In connection with work on the generation effect, DeWinstanley and Bjork (2004) have shown that an awareness of the ineffectiveness of certain learning strategies may

override the generation advantage. Therefore, it may be the case that students in the input group knew that certain aspects of the input treatment were ineffective for learning derivational morphology, which prompted them to pay more attention to the to-be-read items than they otherwise would have.

9.4.3 Conclusions

Activity theory has been crucial to understanding the interactions between teachers, students, and researchers in the course of a morphology training study. Without recourse to this theory, we would not know about students' previous experiences with learning about derivational morphology and how these experiences influenced their initial attitudes towards the training, nor would it have been possible to view the transformation in students' attitudes towards morphological learning after being fully informed of the purpose of the research. At the same time, the use of a mixed-methods study shed additional light on why the generation advantage was not observed in Study 2. It was argued that the novelty of noticing derivational morphology for the first time as well as an awareness of the ineffectiveness of the input treatment among members of the input group contributed to the failure to observe a generation advantage.

Clearly, more research is needed to investigate the role of noticing in the development of derivational knowledge. A potential research question might be: What features of derivational morphology do students notice over the course of a morphology training (beginning, middle, end)? This research could also compare an input group and an output group, but would need to extend the length and duration of the training in order to better gauge the effect of generation on derivational learning. Research in this area would also benefit from more laboratory-type studies

that control for many of the factors that could not be controlled in this study. For one, the teachers perceptions of the study may have a major influence on how students perceive the study (see Juffs et al., 2010). The fact that some teachers presented the study as a "research project," whereas others presented it as "morphology practice" demonstrates that teachers themselves had different views on the role of the project in the classroom.

10.0 GENERAL DISCUSSION AND CONCLUSION

10.1 LINKING THEORY AND PRACTICE IN SLA

Given that theoretical research on L2 morphosyntax has often been disassociated from the practice of language teaching, this dissertation makes an important step in linking the claims of theoretical linguistics with the practical concerns of language teachers and language learners. Theoretical accounts such as the Shallow Structure Hypothesis (Clahsen et al., 2010) and the Missing Surface Inflection Hypothesis (Haznedar & Schwartz, 1997; Prévost & White, 2000; White, 2003) make bold claims regarding L2 abilities to master (or fail to master) underlying morphosyntactic rules and features without any consideration of how classroom learning might influence such knowledge. These theoretical accounts are useful for advancing theories of language learning, but they have little practical application for classroom language learning and teaching. In fact, these accounts paint a bleak picture of L2 morphological learning, and teachers and learners may be left wondering if there is any point in teaching or learning about derivational morphology. Therefore, the studies presented in this dissertation are significant because they provide an important first step in bridging theory and practice within the domain of L2 learning of derivational morphology.

The three studies presented in this dissertation showed that L2 receptive and productive knowledge of derivational morphology was not well developed among low-intermediate, high-

intermediate, and advanced L2 learners (advanced learners were in Study 1 only). Not only were these learners unable to produce and recognize words with derivational suffixes, but also most were unaware of the word-building potential underlying knowledge of derivation despite their L1 background or their L2 proficiency. Despite the lack of knowledge of derivation at the onset of this training, the combined results from studies two and three suggest that training on derivational morphology was an effective means for developing receptive and productive morphological abilities as well as a general awareness of derivational suffixes among low-intermediate and high-intermediate ESL learners.

10.2 RECOMMENDATIONS FOR CLASSROOM INSTRUCTION

The teaching of inflectional morphology and other syntactic phenomena has been the *status quo* within ESL textbooks and ESL curricula. As such, learners know morphological rules for plural *-s*, progressive *-ing*, and past tense *-ed*, but they generally have no concept of derivational morphology and its potential as a vocabulary-learning tool. Hence, the results of the present study are encouraging from the standpoint of applied classroom research because they indicate that L2 learners have much to gain from learning about derivational morphology within an ESL classroom.

Going forward, ESL materials developers and teaching professionals should be aware of the importance of derivational morphology in the development of L2 vocabulary knowledge. On one hand, materials developers need to consider integrating information on derivational morphology more fully into ESL textbooks. Based on the results of this study, this could be

accomplished simply by providing input enhancement and breaking words down into their respective parts within texts. Ideally, this input enhancement would initially be accompanied by an explanation about the purpose of the enhanced words and a description of the function of derivational morphology so that students knew from the start the significance of the enhancement. On the other hand, ESL teaching professionals need to more fully integrate the teaching of derivational morphology into their ESL classrooms. The results of this study reveal that this can be accomplished without using much class time (the entire treatment was approximately 1.5 hours) and without making students generate complete sentences in order to learn one derived word. Given the results of this study, I would recommend that the best way to teach derivational morphology would be a combination of (1) clearly explaining why derivational morphology is important for vocabulary learning (see Study 3) and (2) consistently drawing learners' attention to the function of derivational morphemes in the context of meaningful language (see Study 2).

10.3 DIRECTIONS FOR FUTURE RESEARCH

This study is the first of its kind in SLA research. As such, there are many more questions that remain to be answered within the domain of the L2 learning of derivational morphology.

1. Does training on derivational morphology influence underlying morphological competence? The present study demonstrates that L2 morphological performance improves as a result of treatment on derivational morphology; however, it is not clear what exactly changes as result of this training. Future research must consider the interactions between explicit knowledge,

implicit knowledge, and general awareness of morphological phenomena within the context of a treatment on derivational morphology. Distinguishing between development in underlying competence and development in metalinguistic knowledge is key for testing the relevance of theoretical models of L2 development (e.g., Clahsen et al., 2010) for applied classroom SLA.

2. Does explicit negative evidence develop L2 competency in the detection of morphological violations? The results of these studies show that the learners who received training did not improve in their abilities to detect morphological violations. The question was raised whether or not explicit negative evidence would have any effect on L2 detection of morphological violations.

3. Which learning conditions provide the best learning opportunities for teaching derivational morphology to learners from different levels of language proficiency? The treatments in this study were largely implicit without much emphasis on explicit grammar rules underlying derivation, whereas previous studies on the L2 learning of Spanish derivational morphology have used more explicit metalinguistic techniques (e.g., Morin, 2003). Morin's (2003) study revealed that explicit metalinguistic training did not affect first-semester novice learners' abilities to produce derivational morphology; however, the questions remains as to whether first-semester novice learners' abilities to produce derivational morphology might be improved if a more implicit, meaning-based treatment such as the input-processing treatment used in the present study were used.

4. What features of derivational morphology do students notice over the course of a morphology training (beginning, middle, end)? This question could be explored by using qualitative interview techniques and asking students to decompose or produce morphological complex words at varying intervals over the course of the experiment. Research into this

question could also explore how factors such as L1 background and prior experience with English influence morphological awareness.

5. Would results change if this experiment were conducted strictly in a laboratory setting? The choice to conduct this study as an i*n-vivo* classroom study introduced a range of variables into this study that would not be present in a controlled laboratory experiment. For instance, the classroom teachers were a variable in this experiment since they came equipped with their own teaching styles and attitudes towards the training. Replicating the results of Study 2 within a laboratory setting would strengthen their validity.

APPENDIX A

WORD LISTS FROM EXPERIMENT 1

A.1 Words from the lexical decision task

Semantic blocking (1 deriv. affix)	**Incorrect affix ordering**	**Real words (1 deriv. affix)**	**Correct affix ordering**
regularness (8, 580)	hopenessful	darkness	playfulness
neutralness (3,920)	sinnessful	awareness	truthfulness
ethnicness (1,650)	thanknessful	illness	forgetfulness
legalness (28,000)	forcenessful	fitness	mindfulness
rapidness (37,700)	wastenessful	goodness	cheerfulness
Jokeable (3630)	affordítiable	workable	usability
Smileable (3160)	suititiable	eatable	respectability
Arrivable (1600 on google)	readitiable	reliable	predictability
Departable (4790 on google)	dependitiable	acceptable	applicability
Leavable (14600)	repeatitiable	comfortable	adaptability
smartal (21,600)	correctaltion	traditional	intentional
largeal (19,400)	operatealtion	functional	additional
coldal (6,580)	opposealtion	national	educational
darkal (81,100)	distributealtion	personal	institutional
slowal (2,660)	relatealtion	optional	situational

A.2 Words from the word relatedness task by condition

A.2.1 Base is related in semantics and orthography, not affix

Word 1: Adjective	Word class: Noun
productive	production
protective	protection
progressive	progression
competitive	competition
associative	association
suggestive	suggestion
destructive	destruction
selective	selection
descriptive	description
decorative	decoration
reflective	reflection

A.2.2 Base is related in orthography, but semantically unrelated

Word 1:	Word 2:
personality (k1)	persuasive (k2)
Permanence (k2)	permission (k2)
constantly (k2)	conservative (k4)
conviction (k4)	convenience (k3)
competition (k2)	completely (k1)
continuous (k1)	contextual (k2)
presidency (k4)	preservative (k4)
Explanation (k1)	Exploratory (k4)
institution (k2)	instrumental (k3)
conditional (k1)	conducive(k4)
distinctive (k2)	distribution (k2)
formalize (k2)	formulation (k4)
instinctive (k4)	instructive (k2)

A.2.3 Base is semantically unrelated, orthographic overlap in affix only

Note. The bases and the complex forms in this condition are k1-k3 in the BNC.

Word 1:	**Word 2:**
Majority	Activity
Reality	Curiosity
Responsibility	Probability
Personality	Modernity
Electricity	Visibility
Mobility	Humanity
Popularity	Similarity
Flexibility	Generosity
Disability	Availability
Sensitivity	Complexity
Mortality	Publicity

A.2.4 Simple semantic relatedness, not morphologically complex, and no orthographic overlap

Note. Words are k1-k3 in BNC frequency

Word 1:	**Word 2:**
page	book
farm	cow
school	class
fire	smoke
cup	water
pencil	tablet
desert	camel
bed	blanket
house	door
bank	money

A.2.5 No semantic relationship, not morphologically complex, no orthographic overlap

Note. The words in this condition were k1-k2 in frequency

Word 1:	**Word 2:**
dog	wall
car	food
sun	cup
cat	bus
shoe	door
road	tree
ring	bed
desk	boy
nose	bag

A.3 Words from the word analysis task

A.3.1 Decomposable list

Note. This list is random in terms of final suffix (all words and bases are k1-k3)

Decomposable (-er)	**Base**
reduction	reduce
extension	extend
decision	decide
introduction	introduce
worker	work
librarian	library
teacher	teach
central	center
historian	history
musician	music
spacious	space
monstrous	monster
critical	critic
strategic	strategy
economic	economy

A.3.2 Non-decomposable list

Note. All words in the non-decomposable list are k1-k2

Non-decomposable	**possible ungrammatical base**
window	wind*
corner	corn*
carpet	carp*
manner	man*
soldier	sold*
culture	cult*
flower	flow*
dollar	doll*
metal	met*
shower	show*
ribbon	rib*
butter	butt*
butcher	butch*
jacket	jack*
question	quest*

APPENDIX B

PAPER AND PENCIL VERSION OF THE TEST FROM STUDY 1

B.1 Lexical Decision

Directions: In Task 1, you are asked to rate whether or not words are real English words. If you are absolutely sure that the word you see in Column A is an actual word in English, you should circle "6" (definitely a word), as in example (Ex1) below. If you don't think the word is an actual English word, you should circle "1" (not a word) as in example (Ex2) below.

Examples:

Column A	**Column B**					
Is this a real English word?	(not a word)					(definitely a word)
(Ex1) computer	1	2	3	4	5	6
(Ex2) xjibrax	1	2	3	4	5	6

Exercises:

Column A	**Column B**					
Is this a real English word?	(not a word)					(definitely a word)
(1) hopenessful	1	2	3	4	5	6
(2) relatealtion	1	2	3	4	5	6
(3) smartal	1	2	3	4	5	6
(4) darkness	1	2	3	4	5	6
(5) acceptable	1	2	3	4	5	6
(6) smileable	1	2	3	4	5	6
(7) traditional	1	2	3	4	5	6
(8) eatable	1	2	3	4	5	6

(9) goodness	1	2	3	4	5	6
(10) thanknessful	1	2	3	4	5	6
(11) fitness	1	2	3	4	5	6
(12) additional	1	2	3	4	5	6
(13) regularness	1	2	3	4	5	6
(14) forcenessful	1	2	3	4	5	6
(15) regional	1	2	3	4	5	6
(16) slowal	1	2	3	4	5	6
(17) applicability	1	2	3	4	5	6
(18) ethnicness	1	2	3	4	5	6
(19) leavable	1	2	3	4	5	6
(20) legalness	1	2	3	4	5	6
(21) suititiable	1	2	3	4	5	6
(22) usability	1	2	3	4	5	6
(23) opposealtion	1	2	3	4	5	6
(24) truthfulness	1	2	3	4	5	6
(25) predictability	1	2	3	4	5	6
(26) awareness	1	2	3	4	5	6
(27) playfulness	1	2	3	4	5	6
(28) repeatitiable	1	2	3	4	5	6
(29) neutralness	1	2	3	4	5	6
(30) respectability	1	2	3	4	5	6
(31) adaptability	1	2	3	4	5	6
(32) national	1	2	3	4	5	6
(33) departable	1	2	3	4	5	6
(34) intentional	1	2	3	4	5	6
(35) situational	1	2	3	4	5	6
(36) personal	1	2	3	4	5	6
(37) coldal	1	2	3	4	5	6
(38) wastenessful	1	2	3	4	5	6
(39) operatealtion	1	2	3	4	5	6
(40) jokeable	1	2	3	4	5	6
(41) readitiable	1	2	3	4	5	6
(42) mindfulness	1	2	3	4	5	6
(43) arrivable	1	2	3	4	5	6
(44) dependitiable	1	2	3	4	5	6
(45) rapidness	1	2	3	4	5	6
(46) functional	1	2	3	4	5	6
(47) reliable	1	2	3	4	5	6
(48) illness	1	2	3	4	5	6
(49) affordi tiable	1	2	3	4	5	6
(50) cheerfulness	1	2	3	4	5	6
(51) forgetfulness	1	2	3	4	5	6

(52) distributealtion	1	2	3	4	5	6
(53) institutional	1	2	3	4	5	6
(54) sinnessful	1	2	3	4	5	6
(55) educational	1	2	3	4	5	6
(56) comfortable	1	2	3	4	5	6
(57) darkal	1	2	3	4	5	6
(58) largeal	1	2	3	4	5	6
(59) workable	1	2	3	4	5	6
(60) correctaltion	1	2	3	4	5	6

B.2 Word Relatedness

Directions: Task 2 tests knowledge of word relationships. You will see two words in Column A that are being compared in meaning. In Column B, you should rate whether the words are related in meaning on a scale of 1 (not related) to 6 (definitely related). In example (Ex1), *answer* and *response* are being compared. You probably know that these words are synonyms, so you might select "6" that these two words are definitely related in meaning. In Example (Ex2), *table* and *grass* are being compared. There is no meaningful relationship between *table* and *grass* (at least none that I can think of), so you may want to select "1" (not related) for *table* and *grass*.

Examples:

Column A	**Column B**					
Are these words related in meaning?	(not related)					(definitely related)
(Ex1) answer ---------- response	1	2	3	4	5	6
(Ex2) table ---------- grass	1	2	3	4	5	6

Exercises:

Column A	**Column B**					
Are these words related in meaning?	(not related)					(definitely related)
(1) institution---------- instrumental	1	2	3	4	5	6
(2) responsibility -------probability	1	2	3	4	5	6
(3) sun---------- cup	1	2	3	4	5	6
(4) competition ---------- completely	1	2	3	4	5	6
(5) bed ---------- blanket	1	2	3	4	5	6
(6) decorative ---------- decoration	1	2	3	4	5	6
(7) fire ---------- smoke	1	2	3	4	5	6

(8) dog ---------- wall	1	2	3	4	5	6
(9) farm ----------cow	1	2	3	4	5	6
(10) constantly ---------- conservative	1	2	3	4	5	6
(11) bank ---------- money	1	2	3	4	5	6
(12) electricity --------- visibility	1	2	3	4	5	6
(13) protective ---------- protection	1	2	3	4	5	6
(14) page ---------- book	1	2	3	4	5	6
(15) desert ---------- camel	1	2	3	4	5	6
(16) conviction ---------- convenience	1	2	3	4	5	6
(17) cup ---------- water	1	2	3	4	5	6
(18) nose ---------- shirt	1	2	3	4	5	6
(19) continuous ---------- contextual	1	2	3	4	5	6
(20) sensitivity ---------- complexity	1	2	3	4	5	6
(21) ring ---------- bed	1	2	3	4	5	6
(22) popularity ---------- similarity	1	2	3	4	5	6
(23) conditional ---------- conducive	1	2	3	4	5	6
(24) shoe ---------- door	1	2	3	4	5	6
(25) school ---------- class	1	2	3	4	5	6
(26) productive ---------- production	1	2	3	4	5	6
(27) descriptive ---------- description	1	2	3	4	5	6
(28) associative ---------- association	1	2	3	4	5	6
(29) disability ---------- availability	1	2	3	4	5	6
(30) majority ---------- activity	1	2	3	4	5	6
(31) competitive ---------- competition	1	2	3	4	5	6
(32) explanation ---------- exploratory	1	2	3	4	5	6
(33) desk ---------- boy	1	2	3	4	5	6
(34) distinctive ---------- distribution	1	2	3	4	5	6
(35) personality ---------- modernity	1	2	3	4	5	6
(36) house ---------- door	1	2	3	4	5	6
(37) pencil ---------- paper	1	2	3	4	5	6
(38) road ---------- tree	1	2	3	4	5	6
(39) reality ---------- curiosity	1	2	3	4	5	6
(40) mobility ---------- humanity	1	2	3	4	5	6
(41) selective ---------- selection	1	2	3	4	5	6
(42) destructive ---------- destruction	1	2	3	4	5	6
(43) permanence ---------- permission	1	2	3	4	5	6
(44) presidency ---------- preservative	1	2	3	4	5	6
(45) car ---------- food	1	2	3	4	5	6
(46) progressive ---------- progression	1	2	3	4	5	6
(47) suggestive ---------- suggestion	1	2	3	4	5	6
(48) cat ---------- bus	1	2	3	4	5	6
(49) personality ---------- persuasive	1	2	3	4	5	6
(50) flexibility ---------- generosity	1	2	3	4	5	6

B.3 Word Analysis

Directions: Please provide the base form of the word in Column A in the space provided in Column B as illustrated in Examples (Ex1) and (Ex2). The base form is the smaller word (e.g., govern) within a larger word (e.g., government) before any endings are added. In (Ex1) *govern* is the base form of *government*, and both words have something to do with the base *govern.* You must be careful, however, for some words do not have a base form. In (Ex2), *cancer* does not have a base form, although it may appear that *can* is a smaller word within *cancer. Cancer* cannot be broken down into a base and an ending, nor does *can* have anything to do with *cancer.* Therefore, in (Ex2), *cancer* should be provided as the base form.

Examples:

Column A	**Column B**
Word	What is the base form?
(Ex1) government	(1) govern
(Ex2) cancer	(2) cancer

Exercises:

Column A	**Column B**
Word	What is the base form?
(1) carpet	(1)
(2) central	(2)
(3) ribbon	(3)
(4) metal	(4)
(5) musician	(5)
(6) strategic	(6)
(7) butter	(7)
(8) critical	(8)
(9) manner	(9)
(10) window	(10)
(11) historian	(11)
(12) spacious	(12)
(13) jacket	(13)
(14) introduction	(14)
(15) reduction	(15)
(16) question	(16)
(17) corner	(17)
(18) teacher	(18)
(19) decision	(19)
(20) million	(20)
(21) extension	(21)
(22) monstrous	(22)

(23) flower	(23)
(24) dollar	(24)
(25) soldier	(25)
(26) butcher	(26)
(27) worker	(27)
(28) shower	(28)
(29) librarian	(29)
(30) economic	(30)

APPENDIX C

WORD LISTS FROM STUDY 2

Table 37. List of training words from Study 2 with lexical characteristics

Derived word	morpheme(s)	Base	AWL?	log frequency (derivation)	log frequency (base)	Tested	BNC Frequency (derived)	BNC Frequency (base word)
reliability	able + ity	rely	yes	8.82	9.03	x	k2	k2
adaptability	able + ity	adapt	yes	5.43	8.13	x	k3	k3
predictability	able + ity	predict	yes	5.71	8.71	x	k3	k3
excitability	able + ity	excite	no	5.6	9.25		off	k2
accountability	able + ity	account	no	7.3	11.02		k4	k1
accessibility	able + ity	access	yes	6.7	12.06		k2	k2
cheerfulness	ful + ness	cheer	no	3.76	7.55	x	k4	k2
forgetfulness	ful + ness	forget	no	4.7	10.68	x	k1	k1
painfulness	ful + ness	pain	no	1.1	10.51	x	off	k2
hopefulness	ful + ness	hope	no	3.04	11.92		k1	k1
playfulness	ful + ness	play	no	4.34	11.92		k1	k1
wastefulness	ful + ness	waste	no	3.37	10.21		off	k1
sensational	tion + al	sense	no	6.61	11.26	x	k5	k1

inspirational	tion + al	inspire	no	6.37	7.27	x	k3	k3
relational	tion + al	relate	no	8.51	8.92	x	k1	k1
oppositional	tion + al	oppose	no	N/A	8.77		k1	k1
correctional	tion + al	correct	no	N/A	11.26		off	k1
educational	tion + al	educate	yes	9.95	8.41		k1	k1
perception	tion	perceive	yes	8.88	8.13	x	k3	k4
absorption	tion	absorb	no	7.46	7.9	x	k4	k4
acquisition	tion	acquire	yes	8.52	8.78	x	k4	k4
expansion	tion	expand	yes	9.68	9.45		k5	k2
erosion	tion	erode	yes	8.07	9.38		k7	k5
conversion	tion	convert	yes	9.86	9.96		k4	k3
rigidity	ity	rigid	yes	5.72	8.05	x	k4	k4
similarity	ity	similar	yes	7.88	11.55	x	k1	k1
brevity	ity	brief	yes	7.15	9.88	x	k8	k1
security	ity	secure	yes	11.04	9.56		k1	k1
ethnicity	ity	ethnic	yes	N/A	9.29		k4	k4
maturity	ity	mature	yes	8.03	8.74		k3	k3

Note: The column "AWL?" refers to whether or not the word is on the Academic Word List. The column labeled "tested" refers to whether the item was included on the pretest and posttest; items with an "x" were on the pre/posttest.

Table 38. List of words from the interpretation task with lexical characteristics

Derived word	Morpheme	AWL?	log frequency (derivation)	log frequency (base)	base	BNC Frequency (derivation)	BNC Frequency (base)
reliability	able + ity	yes	8.82	9.03	rely	k2	k2
complexity	ity	yes	8.67	10.3	complex	k2	k2
desirable	able	no	9.29	10.05	desire	k2	k2
predictable	able	yes	7.87	8.71	predict	k3	k3
trainability	able+ity	no	N/A	10.06	train	N/A	k1
bikeable	able	no	N/A	10.02	bike	N/A	k2
animality	ity	no	N/A	10.12	animal	N/A	k2
sustainability	able+ity	yes	N/A	8.04	sustain	k4	k4
accessible	ible	yes	9.28	12.06	access	k2	k2
validity	ity	yes	8.51	10.13	valid	k2	k2

Table 39. List of words from the fill-in-the-blank task with lexical characteristics

Derived word	Morpheme	AWL?	log frequency (derivation)	log frequency (base)	base	BNC Frequency (derivation)	BNC Frequency (base)
reliability	able + ity	yes	8.82	9.03	rely	k2	k2
adaptability	able + ity	yes	5.43	8.13	adapt	k3	k3
predictability	able + ity	yes	5.71	8.71	predict	k3	k3
dependability	able + ity	no	5.6	9.25	depend	off	k1
variability	able + ity	yes	6.52	9.39	vary	k2	k2
sustainability	able + ity	yes	N/A	8.04	sustain	k4	k4
cheerfulness	ful + ness	no	3.76	7.55	cheer	k4	k2
forcefulness	ful + ness	no	3.22	11.23	force	off	k1
forgetfulness	ful + ness	no	4.7	10.68	forget	k1	k1
painfulness	ful + ness	no	1.1	10.51	pain	off	k2
thankfulness	ful + ness	no	5.1	11.5	thank	off	k1
truthfulness	ful + ness	no	5.57	10.87	truth	k1	k1
sensational	tion + al	no	6.61	11.26	sense	k5	k1
inspirational	tion + al	no	6.37	7.27	inspire	k3	k3
institutional	tion + al	no	7.84	10.66	institute	k2	k2
intentional	tion + al	no	7.85	9.31	intend	k2	k2
operational	tion + al	no	8.52	9.45	operate	k1	k1
relational	tion + al	no	8.51	8.92	relate	k1	k1
acquisition	tion	yes	8.52	8.78	acquire	k4	k4
exclusion	tion	yes	7.77	8.26	exclude	k2	k2
perception	tion	yes	8.88	8.13	perceive	k3	k4
retention	tion	yes	7.23	8.61	retain	k6	k4
revelation	tion	yes	8.7	8.95	reveal	k3	k3
absorption	tion	no	7.46	7.9	absorb	k4	k4
ambiguity	ity	yes	7.15	7.84	ambiguous	k6	k5

legality	ity	yes	7.4	11.05	legal	k2	k2
neutrality	ity	yes	6.56	9	neutral	k3	k3
rigidity	ity	yes	5.72	8.05	rigid	k4	k4
similarity	ity	yes	7.88	11.55	similar	k1	k1
brevity	ity	yes	7.15	9.88	brief	k8	k1
reliable	able	yes	9.74	9.03	rely	k2	k2
adaptable	able	yes	6.69	8.13	adapt	k3	k3
predictable	able	yes	7.87	8.71	predict	k3	k3
dependable	able	no	6.93	9.25	depend	k1	k1
variable	able	yes	9.94	9.39	vary	k2	k2
sustainable	able	yes	N/A	8.04	sustain	k4	k4
cheerful	ful	no	6.55	7.55	cheer	k4	k2
forceful	ful	no	6.52	11.23	force	k1	k1
forgetful	ful	no	5.21	10.68	forget	k1	k1
painful	ful	no	8.91	10.51	pain	k2	k2
thankful	ful	no	7.73	11.5	thank	k1	k1
truthful	ful	no	7.1	10.87	truth	k1	k1
closeness	ness	no	6.45	11.35	close	k1	k1
sickness	ness	no	7.48	10	sick	k1	k1
richness	ness	no	6.31	10.5	rich	k2	k2
toughness	ness	no	6.93	9.76	tough	k2	k2
slowness	ness	no	6.81	10.69	slow	k1	k1
soreness	ness	no	6.02	8.12	sore	k1	k3
inspiration	tion	no	8.06	7.27	inspire	k3	k3
operation	tion	no	10.26	9.45	operate	k1	k1
institution	tion	no	9.1	10.66	institute	k2	k2
sensation	tion	no	8.36	11.26	sense	k5	k1
intention	tion	no	9.07	9.31	intend	k2	k2
relation	tion	no	9	8.92	relate	k1	k1

INFLECTION							
retains	infl	yes	7.21	8.61	retain	k4	k4
absorbs	infl	no	6.43	7.9	absorb	k4	k4
acquires	infl	yes	6.13	8.78	acquire	k4	k4
perceives	infl	yes	6.5	8.13	perceive	k4	k4
excludes	infl	yes	6.97	8.26	exclude	k2	k2
reveals	infl	yes	8.17	8.95	reveal	k3	k3

APPENDIX D

PRETEST/POSTTEST FOR STUDY 2

D.1 Version A

VOCABULARY STUDY

PITT USER ID: _____ DATE: _____

READING TEACHER: _____ NATIVE LANGUAGE: _____

PART 1: WORD KNOWLEDGE TEST

Directions: Indicate how well you know each word from 1 (I do not know this word) to 4 (I can use this word in a sentence) for each of the words listed below:

Note: 1 = I do not know this word, 2 = I recognize this word, but do not know the meaning, 3 = I know what this word means, 4 = I can use this word in a sentence.

Word	How well do you know the word?			
rich	1	2	3	4
ambiguous	1	2	3	4
thank	1	2	3	4
absorb	1	2	3	4
institute	1	2	3	4
forget	1	2	3	4
operate	1	2	3	4
legal	1	2	3	4
sore	1	2	3	4
rely	1	2	3	4

depend	1	2	3	4
acquire	1	2	3	4
truth	1	2	3	4
pain	1	2	3	4
intend	1	2	3	4
cheer	1	2	3	4
exclude	1	2	3	4
relate	1	2	3	4
vary	1	2	3	4
retain	1	2	3	4
close (adj.)	1	2	3	4
inspire	1	2	3	4
perceive	1	2	3	4
sense	1	2	3	4
sustain	1	2	3	4
brief	1	2	3	4
adapt	1	2	3	4
rigid	1	2	3	4
similar	1	2	3	4
force	1	2	3	4
reveal	1	2	3	4
predict	1	2	3	4
neutral	1	2	3	4
sick	1	2	3	4
tough	1	2	3	4
slow	1	2	3	4

PART 2: LISTENING

Directions: Listen to each sentence and choose the picture that best represents the meaning of the sentence. Circle Picture A, Picture B, or Picture C. You will do the EXAMPLE as a class.

EXAMPLE: Picture A Picture B Picture C

Question (#1) Picture A Picture B Picture C

Question (#2) Picture A Picture B Picture C

Question (#3) Picture A Picture B Picture C

Question (#4) Picture A Picture B Picture C

Question (#5) Picture A Picture B Picture C

Question (#6)	Picture A	Picture B	Picture C
Question (#7)	Picture A	Picture B	Picture C
Question (#8)	Picture A	Picture B	Picture C
Question (#9)	Picture A	Picture B	Picture C
Question (#10)	Picture A	Picture B	Picture C

PART 3: FILL IN THE BLANK

Directions: Fill in the blank with the appropriate form of the word provided before each sentence. All words require a change. In Example A, *govern* requires an /s/ in order to agree with the subject *president.* In Example B, *govern* (verb) is changed to a noun by adding /*ment*/ to form *government*.

Example A: Govern: The president *govern*s_____the country.

Example B: Govern. The *govern*ment ____ makes the country's laws.

1) Depend: Toyota cars are well known for their _____ since they last for over 10 years.

2) Retain: Water _____ heat longer than land.

3) Predict: Because Ben was so _____, his friends made a map of his schedule.

4) Forceful: The counselor told us that _____ was not a good way to solve problems.

5) Operate: Once the robot was working, the project was _____.

6) Vary: The weather is so _____ it is hard to know how to dress!

7) Inspire: The band draws their _____ from many different sources.

8) Neutral: Canada is known for its _____ in times of war.

9) Force: The man has a very _____ personality and it is hard to get along with him.

10) Pain: The _____ injury made it impossible for her to play.

11) Close: The two brothers were known for the _____ of their relationship.

12) Adapt: Humans are _____ and can live in many different environments.

13) Truth: The statement was thrown out for not being _____.

14) Forget: The student's _____ causes her lots of problems.

15) Operate: Organizing the team was a complex _____.

16) Absorb: The Earth's atmosphere _____ harmful radiation from the sun.

17) Truthful: The judge doubted the _____ of the prisoner's statement.

18) Predict: The woman considered Ben to be boring because of his _____.

19) Rely. The boy thinks that his father is _____.

20) Relate: The two friends' emotions were _____ to each other.

21) Exclude: The movie star was angry about her _____ from the guest list.

22) Brief: The speech's _____ was refreshing.

23) Sustain: The government did not consider environmental _____ when they cut down the forest.

24) Acquire: The thief _____ money by robbing banks.

25) Painful: The child cried a lot because of the _____ of her memories.

26) Depend: The mother wanted a _____ baby-sitter to watch her children while she worked.

27) Rigid: The material's _____ made it difficult to work with.

28) Sense: The new car was _____ and had everything that the man wanted.

29) Vary: Pittsburgh's weather is known for its _____.

30) Institute: The lawyer could not respect an _____ that would condone violence.

31) Adapt: Animals that show great _____ will survive.

32) Absorb: Sponges with good _____ work the best.

33) Reveal: The map _____ the location of the treasure.

34) Similar: The _____ between the twin sisters was remarkable.

35) Rich: The island has a lot of _____ in plant and animal life.

36) Cheer: The teacher tries to be _____ at work, even when he is sad.

37) Acquire: The _____ of a second language takes many years of study.

38) Sore: After several days of rest, the man no longer felt _____ in his back.

39) Sick: The _____ spread quickly among the town's citizens.

40) Sustain: Only the best singers considered the note _____.

41) Legal: The _____ of the man's actions was questioned during his trial.

42) Thankful: During holidays, it is good to express your _____.

43) Sense: The monster crept up behind the woman and she felt a strange _____ on her neck.

44) Perceive: The teacher _____ when students have difficulties in class.

45) Forget: The notebook helps the student remember when she is _____.

46) Retain: The assistant coach has bad _____ of information and never remembers the names of the players on his team.

47) Slow: The professor complained about the _____ of the computer program.

48) Inspire: The artist found the band's second album _____.

49) Institute: The _____ rules gave the lawyer a headache.

50) Perceive: The student's trip to the war zone changed her _____ of the war.

51) Intend: The police thought that the damage to the car was _____.

52) Cheerful: The teacher's _____ came through in everything he did.

53) Relate: The teacher didn't know of any _____ between the two of them.

54) Tough: The athlete's _____ came from his intense training.

55) Rely. The boy did not question his father's _____.

56) Exclude: The restaurant bill _____ a tip for the waiter.

57) Thank: The man was _____ that he did not have to worry about food.

58) Reveal: The _____ that he was getting married surprised everyone.

59) Ambiguous: The thief's _____ made him difficult to understand.

60) Intend: The boy's _____ was to make people laugh.

PART 4: GRAMMATICALITY JUDGMENT TASK

Directions: Rate whether the words in Column B are real words in English. If you are sure that the word you see in Column A is an actual word in English, you should circle "6" (definitely a word), as in

example (Ex1) below. If you don't think the word is an actual English word, you should circle "1" (not a word) as in example (Ex2) below.

Examples:

Column A	**Column B**					
Is this a real English word?	**(not a word)**					**(definitely a word)**
(Ex1) computer	1	2	3	4	5	6
(Ex2) xjibrax	1	2	3	4	5	6

Exercises:

Column A	**Column B**					
Is this a real English word?	**(not a word)**					**(definitely a word)**
(1) hopenessful	1	2	3	4	5	6
(2) relatealtion	1	2	3	4	5	6
(3) smartal	1	2	3	4	5	6
(4) darkness	1	2	3	4	5	6
(5) acceptable	1	2	3	4	5	6
(6) smileable	1	2	3	4	5	6
(7) traditional	1	2	3	4	5	6
(8) eatable	1	2	3	4	5	6
(9) goodness	1	2	3	4	5	6
(10) thanknessful	1	2	3	4	5	6
(11) fitness	1	2	3	4	5	6
(12) additional	1	2	3	4	5	6
(13) regularness	1	2	3	4	5	6
(14) forcenessful	1	2	3	4	5	6
(15) regional	1	2	3	4	5	6
(16) slowal	1	2	3	4	5	6
(17) applicability	1	2	3	4	5	6
(18) ethnicness	1	2	3	4	5	6
(19) leavable	1	2	3	4	5	6
(20) legalness	1	2	3	4	5	6
(21) suititiable	1	2	3	4	5	6
(22) usability	1	2	3	4	5	6
(23) opposealtion	1	2	3	4	5	6
(24) truthfulness	1	2	3	4	5	6
(25) predictability	1	2	3	4	5	6
(26) awareness	1	2	3	4	5	6
(27) playfulness	1	2	3	4	5	6
(28) repeatitiable	1	2	3	4	5	6
(29) neutralness	1	2	3	4	5	6

(30) respectability	1	2	3	4	5	6
(31) adaptability	1	2	3	4	5	6
(32) national	1	2	3	4	5	6
(33) departable	1	2	3	4	5	6
(34) intentional	1	2	3	4	5	6
(35) situational	1	2	3	4	5	6
(36) personal	1	2	3	4	5	6
(37) coldal	1	2	3	4	5	6
(38) wastenessful	1	2	3	4	5	6
(39) operatealtion	1	2	3	4	5	6
(40) jokeable	1	2	3	4	5	6
(41) readitiable	1	2	3	4	5	6
(42) mindfulness	1	2	3	4	5	6
(43) arrivable	1	2	3	4	5	6
(44) dependitiable	1	2	3	4	5	6
(45) rapidness	1	2	3	4	5	6
(46) functional	1	2	3	4	5	6
(47) reliable	1	2	3	4	5	6
(48) illness	1	2	3	4	5	6
(49) affordidiable	1	2	3	4	5	6
(50) cheerfulness	1	2	3	4	5	6
(51) forgetfulness	1	2	3	4	5	6
(52) distributealtion	1	2	3	4	5	6
(53) institutional	1	2	3	4	5	6
(54) sinnessful	1	2	3	4	5	6
(55) educational	1	2	3	4	5	6
(56) comfortable	1	2	3	4	5	6
(57) darkal	1	2	3	4	5	6
(58) largeal	1	2	3	4	5	6
(59) workable	1	2	3	4	5	6
(60) correctaltion	1	2	3	4	5	6

D.2 Version B

VOCABULARY STUDY

PITT USER ID: _____ DATE: _____

READING TEACHER: _____ NATIVE LANGUAGE: _____

PART 1: WORD KNOWLEDGE TEST

Directions: Indicate how well you know each word from 1 (not known) to 4 (I can use this word in a sentence) for each of the words listed below:

Note: 1 = I do not know this word, 2 = I recognize this word, but do not know the meaning, 3 = I know what this word means, 4 = I can use this word in a sentence.

Word	**How well do you know the word?**			
rich	1	2	3	4
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forget	1	2	3	4
operate	1	2	3	4
legal	1	2	3	4
sore	1	2	3	4
rely	1	2	3	4
depend	1	2	3	4
acquire	1	2	3	4
truth	1	2	3	4
pain	1	2	3	4
intend	1	2	3	4
cheer	1	2	3	4
exclude	1	2	3	4
relate	1	2	3	4
vary	1	2	3	4
retain	1	2	3	4
close (adj.)	1	2	3	4
inspire	1	2	3	4
perceive	1	2	3	4
sense	1	2	3	4

sustain	1	2	3	4
brief	1	2	3	4
adapt	1	2	3	4
rigid	1	2	3	4
similar	1	2	3	4
force	1	2	3	4
reveal	1	2	3	4
predict	1	2	3	4
neutral	1	2	3	4
sick	1	2	3	4
tough	1	2	3	4
slow	1	2	3	4

PART 2: LISTENING

Directions: Listen to each sentence and choose the picture that best represents the meaning of the sentence. Circle Picture A, Picture B, or Picture C. You will do the EXAMPLE as a class.

EXAMPLE: Picture A Picture B Picture C

Question (#1) Picture A Picture B Picture C

Question (#2) Picture A Picture B Picture C

Question (#3) Picture A Picture B Picture C

Question (#4) Picture A Picture B Picture C

Question (#5) Picture A Picture B Picture C

Question (#6) Picture A Picture B Picture C

Question (#7) Picture A Picture B Picture C

Question (#8) Picture A Picture B Picture C

Question (#9) Picture A Picture B Picture C

Question (#10) Picture A Picture B Picture C

PART 3: FILL IN THE BLANK

Directions: Fill in the blank with the appropriate form of the word provided before each sentence. All words require a change. In Example A, *govern* requires an /s/ in order to agree with the subject *president.* In Example B, *govern* (verb) is changed to a noun by adding /*ment*/ to form *government*.

Example A: Govern: The president *govern*s_____the country.

Example B: Govern. The *govern*ment____ makes the country's laws.

1) Intend: The boy's _____ was to make people laugh.

2) Ambiguous: The thief's _____ made him difficult to understand.

3) Reveal: The _____ that he was getting married surprised everyone.

4) Thank: The man was _____ that he did not have to worry about food.

5) Exclude: The restaurant bill _____ a tip for the waiter.

6) Rely. The boy did not question his father's _____.

7) Tough: The athlete's _____ came from his intense training.

8) Relate: The teacher didn't know of any _____ between the two of them.

9) Cheerful: The teacher's _____ came through in everything he did.

10) Intend: The police thought that the damage to the car was _____.

11) Perceive: The student's trip to the war zone changed her _____ of the war.

12) Institute: The _____ rules gave the lawyer a headache.

13) Inspire: The artist found the band's second album _____.

14) Slow: The professor complained about the _____ of the computer program.

15) Retain: The assistant coach has bad _____of information and never remembers
the names of the players on his team.

16) Forget: The notebook helps the student remember when she is _____.

17) Perceive: The teacher _____ when students have difficulties in class.

18) Sense: The monster crept up behind the woman and she felt a strange
_____

on her neck.

19) Thankful: During holidays, it is good to express your _____.

20) Legal: The _____ of the man's actions was questioned during his trial.

21) Sustain: Only the best singers considered the note _____.

22) Sick: The _____ spread quickly among the town's citizens.

23) Sore: After several days of rest, the man no longer felt _____ in his back.

24) Acquire: The _____ of a second language takes many years of study.

25) Cheer: The teacher tries to be _____ at work, even when he is sad.

26) Rich: The island has a lot of _____ in plant and animal life.

27) Similar: The _____ between the twin sisters was remarkable.

28) Reveal: The map _____ the location of the treasure.

29) Absorb: Sponges with good _____ work the best.

30) Adapt: Animals that show great _____ will survive.

31) Institute: The lawyer could not respect an _____ that would condone violence.

32) Vary: Pittsburgh's weather is known for its _____.

33) Sense: The new car was _____ and had everything that the man wanted.

34) Rigid: The material's _____ made it difficult to work with.

35) Depend: The mother wanted a _____ baby-sitter to watch her children while she worked.

36) Painful: The child cried a lot because of the _____ of her memories.

37) Acquire: The thief _____ money by robbing banks.

38) Sustain: The government did not consider environmental _____ when they cut down the forest.

39) Brief: The speech's _____ was refreshing.

40) Exclude: The movie star was angry about her _____ from the guest list.

41) Relate: The two friends' emotions were _____ to each other.

42) Rely. The boy thinks that his father is _____.

43) Predict: The woman considered Ben to be boring because of his _____.

44) Truthful: The judge doubted the _____ of the prisoner's statement.

45) Absorb: The Earth's atmosphere _____ harmful radiation from the sun.

46) Operate: Organizing the team was a complex _____.

47) Forget: The student's _____ causes her lots of problems.

48) Truth: The statement was thrown out for not being _____.

49) Adapt: Humans are _____ and can live in many different environments.

50) Close: The two brothers were known for the _____ of their relationship.

51) Pain: The _____ injury made it impossible for her to play.

52) Force: The man has a very _____ personality and it is hard to get along
with him.

53) Neutral: Canada is known for its _____ in times of war.

54) Inspire: The band draws their _____ from many different sources.

55) Vary: The weather is so _____ it is hard to know how to dress!

56) Operate: Once the robot was working, the project was _____.

57) Forceful: The counselor told us that _____ was not a good way to solve problems.

58) Predict: Because Ben was so _____, his friends made a map of his schedule.

59) Retain: Water _____ heat longer than land.

60) Depend: Toyota cars are well known for their _____ since they last for over 10 years.

PART 4: GRAMMATICALITY JUDGMENT TASK

Directions: Rate whether the words in Column B are real words in English. If you are sure that the word you see in Column A is an actual word in English, you should circle "6" (definitely a word), as in example (Ex1) below. If you don't think the word is an actual English word, you should circle "1" (not a word) as in example (Ex2) below.

Examples:

Column A	Column B					
Is this a real English word?	**(not a word)**					**(definitely a word)**
(Ex1) computer	1	2	3	4	5	6
(Ex2) xjibrax	1	2	3	4	5	6

Exercises:

Column A	Column B					
Is this a real English word?	**(not a word)**					**(definitely a word)**
(1) hopenessful	1	2	3	4	5	6
(2) relatealtion	1	2	3	4	5	6
(3) smartal	1	2	3	4	5	6
(4) darkness	1	2	3	4	5	6
(5) acceptable	1	2	3	4	5	6
(6) smileable	1	2	3	4	5	6
(7) traditional	1	2	3	4	5	6
(8) eatable	1	2	3	4	5	6
(9) goodness	1	2	3	4	5	6
(10) thanknessful	1	2	3	4	5	6
(11) fitness	1	2	3	4	5	6
(12) additional	1	2	3	4	5	6
(13) regularness	1	2	3	4	5	6
(14) forcenessful	1	2	3	4	5	6
(15) regional	1	2	3	4	5	6
(16) slowal	1	2	3	4	5	6
(17) applicability	1	2	3	4	5	6
(18) ethnicness	1	2	3	4	5	6
(19) leavable	1	2	3	4	5	6
(20) legalness	1	2	3	4	5	6
(21) suititiable	1	2	3	4	5	6
(22) usability	1	2	3	4	5	6
(23) opposealtion	1	2	3	4	5	6
(24) truthfulness	1	2	3	4	5	6
(25) predictability	1	2	3	4	5	6
(26) awareness	1	2	3	4	5	6
(27) playfulness	1	2	3	4	5	6
(28) repeatitiable	1	2	3	4	5	6
(29) neutralness	1	2	3	4	5	6
(30) respectability	1	2	3	4	5	6
(31) adaptability	1	2	3	4	5	6
(32) national	1	2	3	4	5	6
(33) departable	1	2	3	4	5	6

(34) intentional	1	2	3	4	5	6
(35) situational	1	2	3	4	5	6
(36) personal	1	2	3	4	5	6
(37) coldal	1	2	3	4	5	6
(38) wastenessful	1	2	3	4	5	6
(39) operatealtion	1	2	3	4	5	6
(40) jokeable	1	2	3	4	5	6
(41) readitiable	1	2	3	4	5	6
(42) mindfulness	1	2	3	4	5	6
(43) arrivable	1	2	3	4	5	6
(44) dependitiable	1	2	3	4	5	6
(45) rapidness	1	2	3	4	5	6
(46) functional	1	2	3	4	5	6
(47) reliable	1	2	3	4	5	6
(48) illness	1	2	3	4	5	6
(49) affordidiable	1	2	3	4	5	6
(50) cheerfulness	1	2	3	4	5	6
(51) forgetfulness	1	2	3	4	5	6
(52) distributealtion	1	2	3	4	5	6
(53) institutional	1	2	3	4	5	6
(54) sinnessful	1	2	3	4	5	6
(55) educational	1	2	3	4	5	6
(56) comfortable	1	2	3	4	5	6
(57) darkal	1	2	3	4	5	6
(58) largeal	1	2	3	4	5	6
(59) workable	1	2	3	4	5	6
(60) correctaltion	1	2	3	4	5	6

APPENDIX E

MORPHOLOGY WORKSHEETS FROM STUDY 2

E.1 Input-processing worksheets

Session #1: Cinema

Username: _____ **Date: _____**

Part 1: Listen to the following sentences and choose the picture that goes with the sentence you hear. Circle Picture A or Picture B.

---

1) Picture A Picture B

2) Picture A Picture B

3) Picture A Picture B

4) Picture A Picture B

5) Picture A Picture B

Part 2: Read the story carefully. Pay special attention to the highlighted words. After you have read the story, STOP until your teacher tells you to go to the next section.

Part 3: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

1) People believe that *Choice* is a _____ science fiction movie.

a. sense b. sensation c. sensational

2) The film follows a group of people who are tired of the government's lack of _____ and decide to do something about it.

a. account b. accountable c. accountability

3) They form an alliance, or friendship, with (*) _____ groups to threaten the (**) _____of the state.

* a. oppose b. opposition c. oppositional

** a. secure b. security c. securable

4) The public's _____ of trust in the government gives more power to the rebellion.

a. erode b. erosion c. erodable

5) Just when it seems like the government forces will be destroyed the rebel army starts to break down and all of the previous _____ is gone.

a. hopeness b. hopeful c. hopefulness

Session #2: Love and Dating

Username: _____ **Date: _____**

Part 1: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

---

1) Picture A Picture B

2) Picture A Picture B

3) Picture A Picture B

4) Picture A Picture B

5) Picture A Picture B

6) Picture A Picture B

Part 2: Read the story carefully. Pay special attention to the highlighted words. After you have read the story, STOP until your teacher tells you to go to the next section.

Part 3: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

1) Some people think that dating is about the _____ of gifts.

a. acquisition b. acquire c. acquisitional

2) Others take a more _____ view on love.

a. relate b. relation c. relational

3) That is, love is about finding someone you enjoy being with, even when the relationship enters into routines and _____.

a. predictable b. predictability c. predict

4) It's about finding someone that brings out your sense of _____.

a. playful b. play c. playfulness

5) You need to find someone you trust, someone on whose _____ you can count.

a. reliability b. rely c. reliable

6) Their _____, their age, the amount of money they make – all of that stuff doesn't matter.

a. ethnic b. ethnicity c. ethnicable

Session #3: Strange Phenomena

Student ID #: _____ **Date: _____**

Part 1: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

Score: __ / 5

---

1) Picture A Picture B

2) Picture A Picture B

3) Picture A Picture B

4) Picture A Picture B

5) Picture A Picture B

Part 2: Read the story carefully. Pay special attention to the highlighted words. After you have read the story, STOP until your teacher tells you to go to the next section.

Part 3: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

Score: _____ / 6

1) It started when Micah found a strange book in the library titled *The* _____ *of the Mind*.

a. expansive b. expand c. expansion

2) Soon, he began to talk about his _____ to a new way of thinking.

a. conversion b. convert c. convertible

3) Before reading the book, Micah had been known for his (*) _____; however, after reading the book, Micah began to express more (**)_____.

(*) a. excitable b. excite c. excitability

(**) a. mature b. maturity c. matureful

4) What was troubling was that he began to experience periods of _____.

a. forgetfulness b. forgetful c. forget

5) When his friends brought up the changes in his behavior, he complained about the _____ of their minds and left.

a. rigidable b. rigid c. rigidity

Session #4: Love in an unlikely place

Student ID #: _____ **Date: _____**

Part 1: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

Score: __ / 6

---

1) Picture A Picture B

2) Picture A Picture B

3) Picture A Picture B

4) Picture A Picture B

5) Picture A Picture B

6) Picture A Picture B

Part 2: Read the story carefully. Pay special attention to the highlighted words. After you have read the story, STOP until your teacher tells you to go to the next section.

Part 3: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

Score: __ / 6

1) Oscar and Louanne's relationship is an _____ tale of love beginning in an unlikely place.

a. inspire b. inspiration c. inspirational

2) They met online and discovered many _____ between them.

a. similar(s) b. simliariti(es) c. similarness(es)

3) The problem was that Oscar was in a _____ institution!

a. correct b. correction c. correctional

4) He realized that his past actions had caused others a sense of great _____.

a. painness b. painful c. painfulness

5) The pair had to show great _____ for the next few years, but they made it work.

a. adapt b. adaptability c. adaptitiable

6) They have to battle negative _____ of their relationship, but they still love each other.

a. perception(s) b. perceptible(s) c. perceive(s)

Session #5: The Gaia Hypothesis

Student ID #: _____ **Date: _____**

Part 1: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

Score: __ / 4

---

1) Picture A Picture B

2) Picture A Picture B

3) Picture A Picture B

4) Picture A Picture B

Part 2: Read the story carefully. Pay special attention to the highlighted words. After you have read the story, STOP until your teacher tells you to go to the next section.

Part 3: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

Score: _____ / 6

1) People who believe in the Gaia Hypothesis say that no amount of (*) _____ about the future will heal the effects of society's (**) _____.

(*) a. cheerfulness b. cheer c. cheerful

(**) a. waste b. wastefulness c. wasteful

2) Nature can only do so much _____ of poison before it reaches a critical point.

a. absorb b. absorption c. absorbable

3) The details are complicated and because it cannot be covered with any (*) _____ it does not have much (**) _____to the common person.

(*) a. brief b. brevity c. briefness

(**) a. accessible b. access c. accessibility

4) Scientists are currently developing _____programs to teach people how to take care of the planet.

a. educational b. education c. educate

Session #1: Cinema

Name: _____ **Date: _____**

Part 1: Read the story carefully. After you have read the story, STOP until your teacher tells you to go to the next section.

Part 2: Complete the words by filling in the missing letters.

---

1) People believe that *Choice* is a (base: sense) sensat __ __ n __ __ science fiction movie.

2) The film follows a group of people who are tired of the government's lack of (base: account) account__ b__ l__ __ __ and decide to do something about it.

3) They form an alliance or friendship, with other (base: oppose) opposit __ __ n __ __ groups to threaten the (base: secure) secur__ __ __of the state.

4) The public's (base: erode) ero__ __ __ __ of trust in the government gives more power to the rebellion.

5) Just when it seems like the government forces will be destroyed the rebel army starts to break down and all of the previous (base: hope) hopef__l __ __ __ __ is gone.

Part 3: Use the words provided below to write a sentence. You will have to add suffixes to some of the words in order to make them fit in the sentence. Follow the directions in parentheses for specific instructions for each sentence.

1) Man / think / concert / be / sensation. (Use sensation as an adjective.)

2) Politicians / lack / accountable / when /use / government money. (Use accountable as a noun.)

3) People /hold/ oppose / views / that are not the same as the views of their leaders. (Use oppose as an adjective.)

4) Airport / x-ray machines / provide / secure. (Use secure as a noun.)

5) Food / cause / soil / erode / (Use erode as a noun.)

6) New factory / bring / hopeful / unemployed people / Pittsburgh. (Use hopeful as a noun.)

Session #2: Love and Dating

Name: _____ **Date: _____**

Part 1: Read the story carefully. After you have read the story, answer the questions that follow.

Part 2: Complete the words by filling in the missing letters.

1) Some people think that love is about the (base: acquire) acquisi __ __ __ n of gifts.

2) Others take a more (base: relate) relat __ __ n __ l view on love.

3) That is, love is about finding someone you enjoy being with, even when the relationship enters into routines and (base: predict) predict __ b __ l __ __ __.

4) It's about finding someone that brings out your sense of (base: play) playf __ l __ __ __ __

5) You need to find someone you trust, someone on whose (base: rely) reli__b __ l __ __ __ you can count.

6) Their (base: ethnic) ethnic __ __ __, their age, the amount of money they make – all of that stuff doesn't matter.

Part 3: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parentheses for specific instructions for each sentence.

1) The / acquire / of a foreign language/ take / years of study. (Use acquire as a noun.)

2) The schedule / lack / predict / and / be / confusing / for students. (Use predict as a noun.)

3) According to a / relate / view of human society, /human/ like to live near other /human/. (Use relate as an adjective.)

4) Man / show / degree of / playful / although / he/ be / 100 years old. (Use playful as a noun.)

5) The student / question / the / rely / of the computer program / after it crashed during his presentation. (Use rely as a noun.)

6) Employers /not / use / a person's / ethnic / when hiring new employees. (Use ethnic as a noun.)

Session #3: Strange Phenomena

Student ID #: _____ **Date: _____**

Part 1: Read the story carefully. After you have read the story, answer the questions that follow.

Part 2: Complete the words by filling in the missing letters.

Score: _____/6

---

1) It started when Micah found a strange book in the library titled The (base: expand) *Expan*__ __ __ __ *of the Mind*.

2) Soon, he began to talk about his (base: convert) conver__ __ __ __to a new way of thinking.

3) Before reading the book, Micah had been known for his (*) (base: excite) excit __ b__l __ __ __; however, after reading the book, Micah began to express more (**) (base: mature) matur __ __ __.

4) What was troubling was that he began to experience periods of (base: forget) forgetf __ l __ __ __ __.

5) When his friends brought up the changes in his behavior, he complained about the (base: rigid) rigid __ __ __ of their minds and left.

Part 3: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parentheses for specific instructions for each sentence.

Score: ___/6

1) The / expand / of human civilization / cause / problem / for the environment. (Use expand as a noun.)

2) The professor's / convert / to a new teaching method / help / student /learn. (Use convert as a noun.)

3) The child / show/ great / mature / while eating with the adults. (Use mature as a noun.)

4) The child / show / great / excitable / during the holidays. (Use excitable as a noun.)

5) The teacher was known for his /forget / he never /remember/ to bring his book to class. (Use forget as a noun.)

6) The man / not / bend / piece of metal / due to its / rigid. (Use rigid as a noun.)

Session #4: Love in an unlikely place

Student ID #: _____ **Date: _____**

Part 1: Read the story carefully. After you have read the story, answer the questions that follow.

Part 2: Complete the words by filling in the missing letters.

Score: _____/6

---

1) Oscar and Louanne's relationship is an inspirat __ __ n __ __ tale of love beginning in an unlikely place.

2) They met online and discovered many similar __ __ __ e s between them.

3) The problem was that Oscar was locked up in a correct__ __ n __ __ institution!

4) He realized that his past actions had caused others a sense of great painf __ l __ __ __ __.

5) The pair had to show great adapt __ b __ l __ __ __for the next few years but they made it work.

6) They have to battle negative percept __ __ __ s of their relationship, but they still love each other.

Part 3: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parentheses for specific instructions for each sentence. Do NOT look back at the previous section!

Score: ___/6

1) Mahatma Gandhi / be / inspire / person. (Use inspire as an adjective.)

2) Man / confuse / twins' names / because of / similar / their looks. (Use similar as a noun.)

3) Criminal / be/ send / to / correct / facility. (Use correct as an adjective.)

4) Painful / of his memories / make / man / cry. (Use painful as a noun.)

5) Adaptable/ be/ important /in a car / because / every driver / have / different needs. (Use adaptable as a noun.)

6) Tourist / had / different / perceive / of the town / than/ residents. (Use perceive as a noun.)

Session #5: The Gaia Hypothesis

Student ID #: _____ **Date: _____**

Part 1: Read the story carefully. After you have read the story, answer the questions that follow.

Part 2: Complete the words by filling in the missing letters.

Score: _____/6

---

1) People who believe in the Gaia Hypothesis say that no amount of (base: cheer) cheerf__l __ __ __ __ about the future will heal the effects of society's (base: waste) wastef __ l __ __ __ __.

2) Nature can only do so much (base: absorb) absor__ __ __ __ __ of poison before it reaches a critical point.

3) The details are complicated and because it cannot be covered with any (base: brief) bre __ __ __ __, it does not have much (base: access) access __ b __ l __ __ __ to the common person.

4) Scientists are currently developing (base: educate) educat__ __ n __ __ programs to teach people how to take care of the planet.

_____

Part 3: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parentheses for specific instructions for each sentence. Do NOT look back at the previous section!

Score: ___/6

_____

1) Secretary's / cheerful / in the morning / make / others in the office / feel / happy. (Use cheerful as a noun.)

_____

_____

2) Human / wasteful / cause / harm / environment. (Use wasteful as a noun.)

_____

_____

3) Atmosphere's /absorb/ of the sun's rays / protect / from dangerous radiation. (Use absorb as a noun.)

_____

_____

4) Man / not know / girlfriend / very well / due to / brief / of their relationship. (Use brief as a noun.)

_____

_____

5) Theater / have/ good/ accessible / to people with disabilities. (Use accessible as a noun.)

_____

_____

6) Children in the best schools / have many / educate / opportunity. (Use educate as an adjective.)

_____

_____

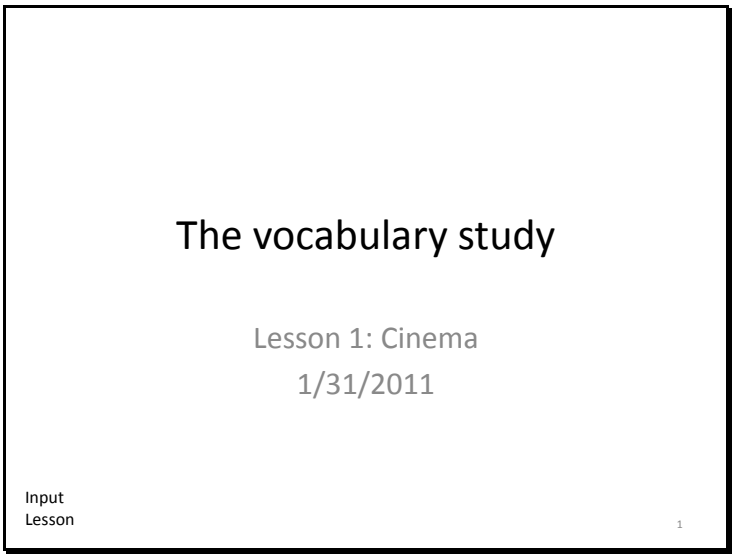
APPENDIX F

POWERPOINT SLIDES FROM STUDY 2

F.1 Input Lessons

F.1.1 Input Lesson 1

Slide 1



Slide 2

Part 1: Interpretation Task

Directions: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

2

Slide 3

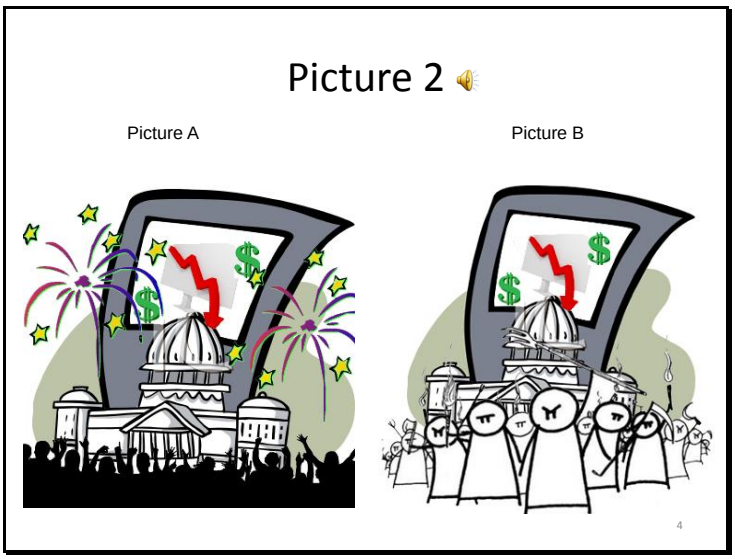
Picture 1

Picture A

Picture B

3

Slide 4



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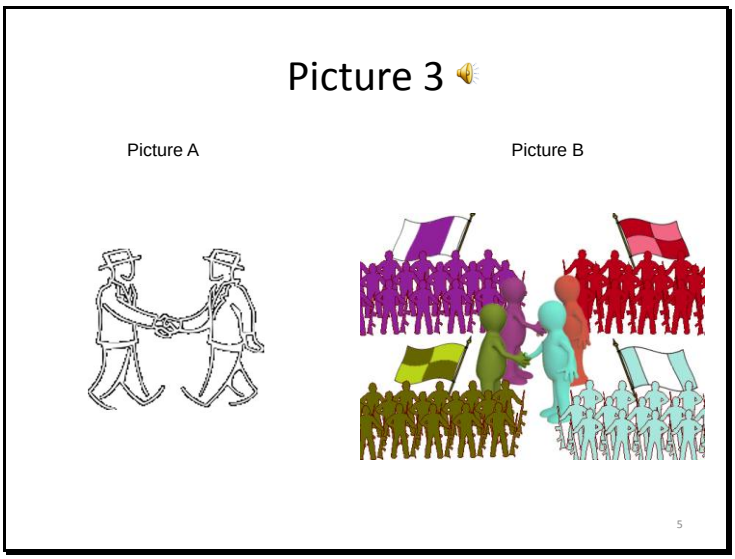

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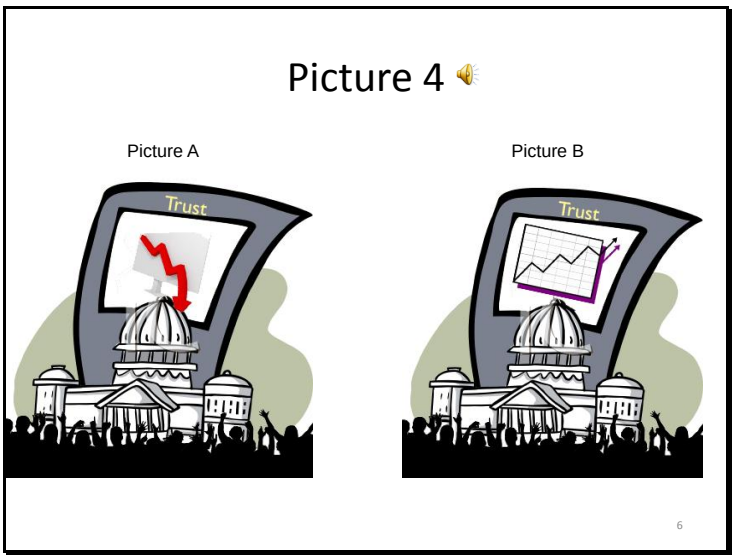

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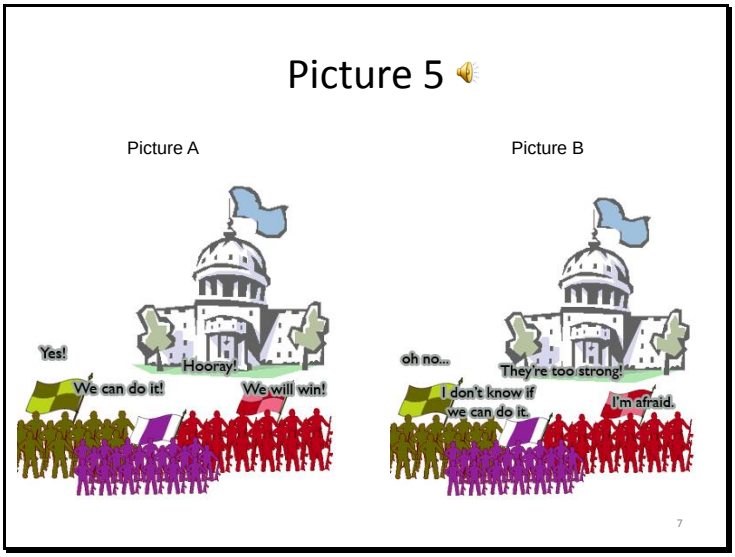

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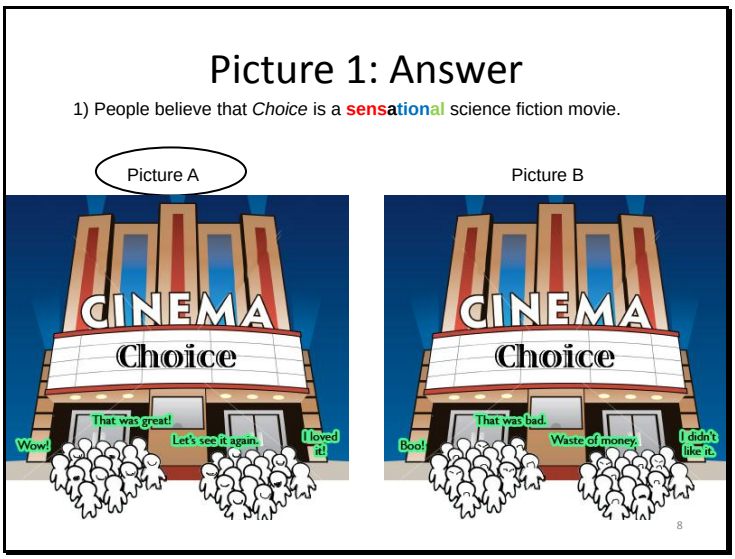

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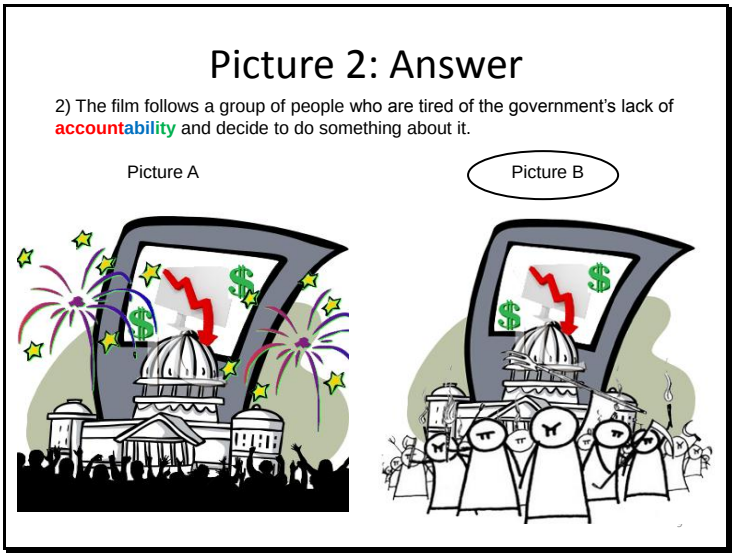


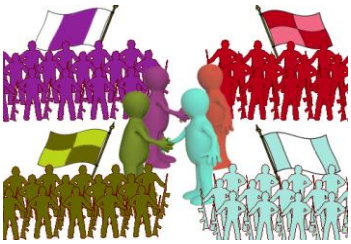
Slide 10

Picture 3: Answer

3) They form an alliance, or friendship, with **opposi**tion**al** groups to threaten the **secur**i**ty** of the state.

Picture A

Picture B



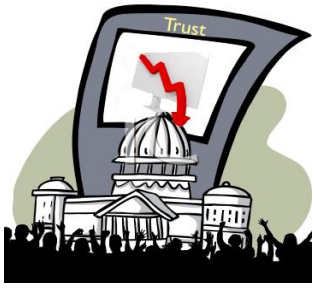
10

Slide 11

Picture 4: Answer

4) The public's **erosi**on of trust in the government gives more power to the rebellion.

Picture A



Picture B

11

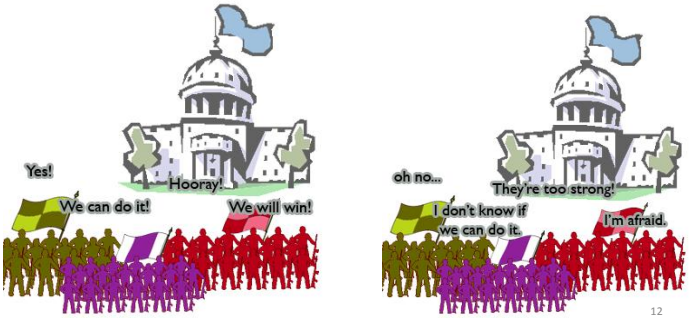
Slide 12

Picture 5: Answer

5) Just when it seems like the government forces will be destroyed the rebel army starts to break down and all of the previous **hopefulness** is gone.

Picture A

Picture B



12

Slide 13

Part 2: Reading

Directions: Read the story carefully. Pay special attention to the highlighted words. After you have read the story, STOP until your teacher tells you to go to the next section.

13

Slide 14

Choice: Now in Theaters!

People believe that *Choice* is a sensational (base: sense) science fiction movie. The film follows a group of people who are tired of the government's lack of accountability (base: account) and decide to do something about it. They form an alliance, or friendship, with other oppositional (base: oppose) groups to threaten the security (base: secure) of the state. The public's erosion (base: erode) of trust in the government gives more power to the rebellion. Just when it seems like the government forces will be destroyed the rebel army starts to break down and all of the previous hopefulness (base: hope) is gone. During this chaos a new leader shows up … but will she be a hero of the people or a vicious dictator?

14

Slide 15

Part 3: Multiple Choice

Directions: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

15

Slide 16

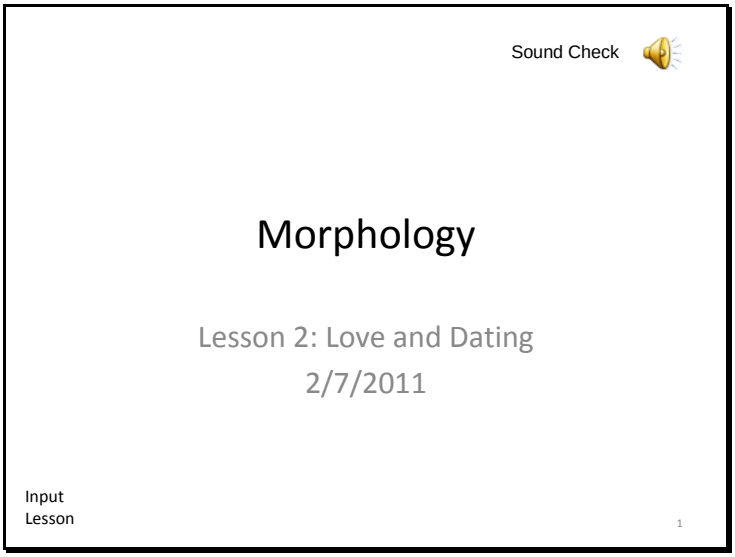
Part 3: Answers

1) c. sensational
2) c. accountability
3) * c. oppositional, ** b. security
4) b. erosion
5) c. hopefulness

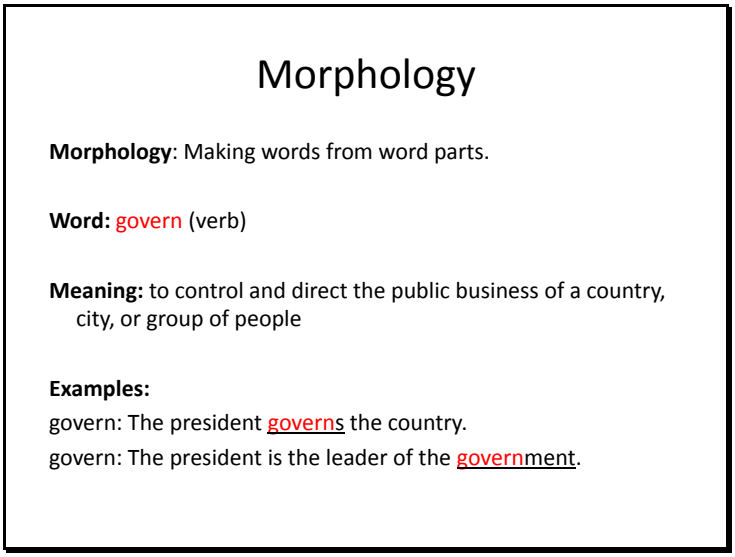
16

F.1.2 Input Lesson 2

Slide 1



Slide 2



Slide 3

Part 1: Interpretation Task

Directions: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

3

Slide 4

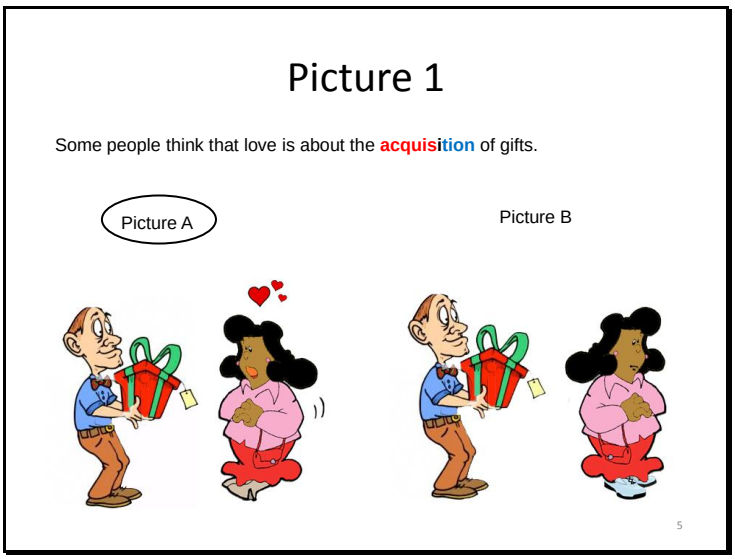
Picture 1

Picture A

Picture B

4

Slide 5



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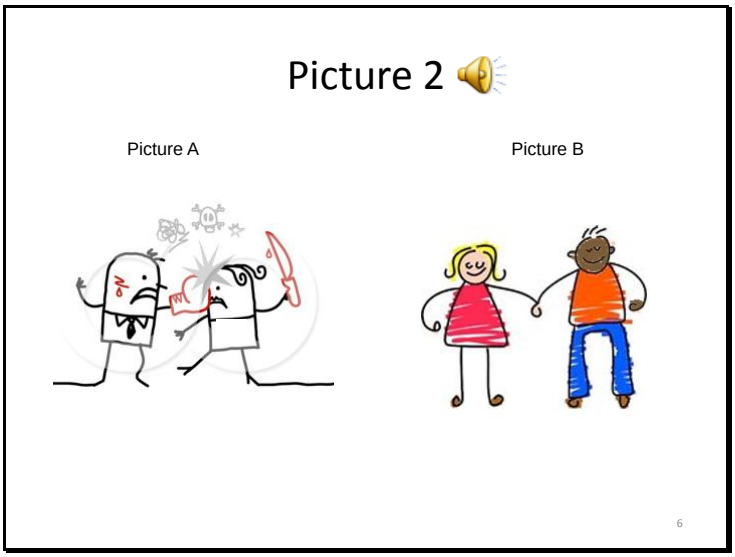

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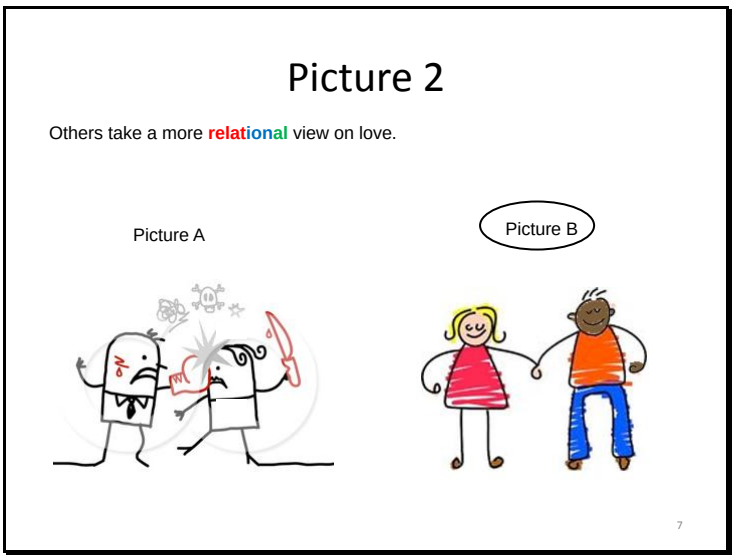

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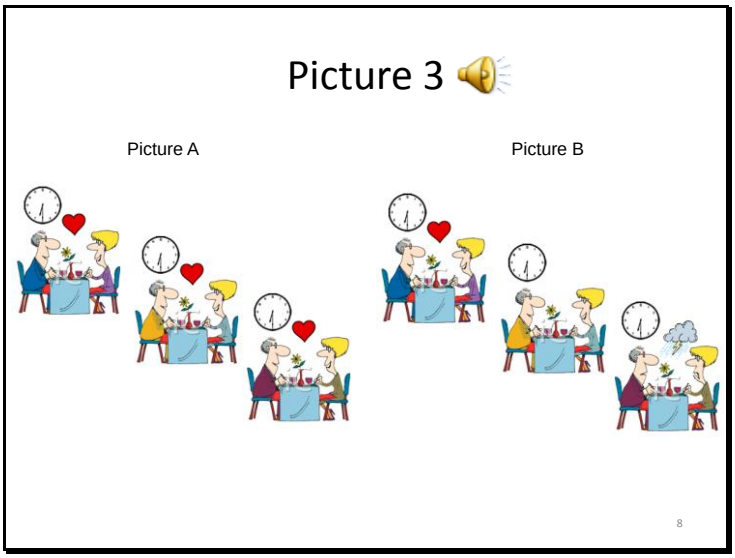

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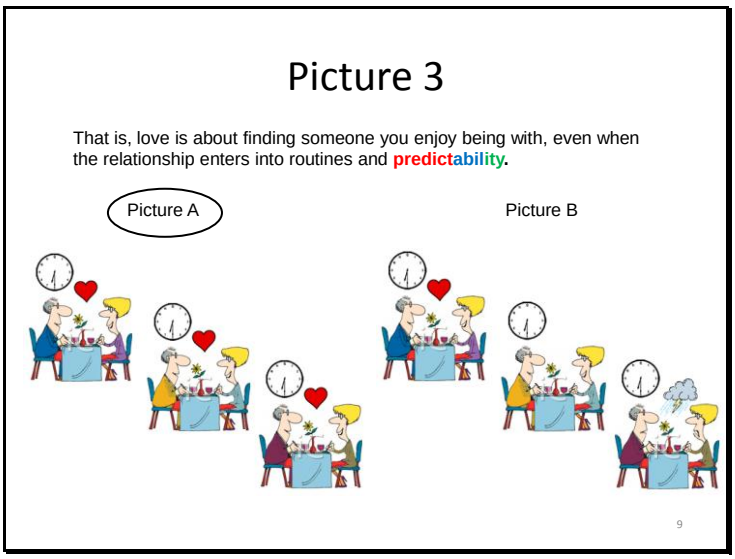

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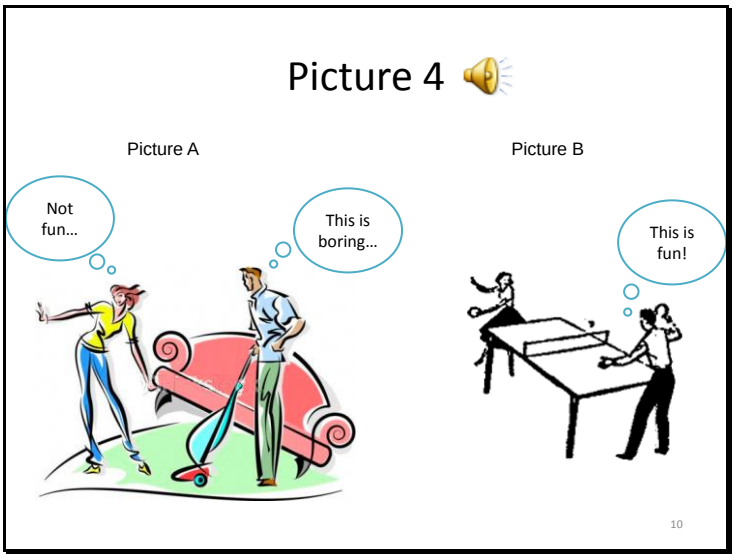

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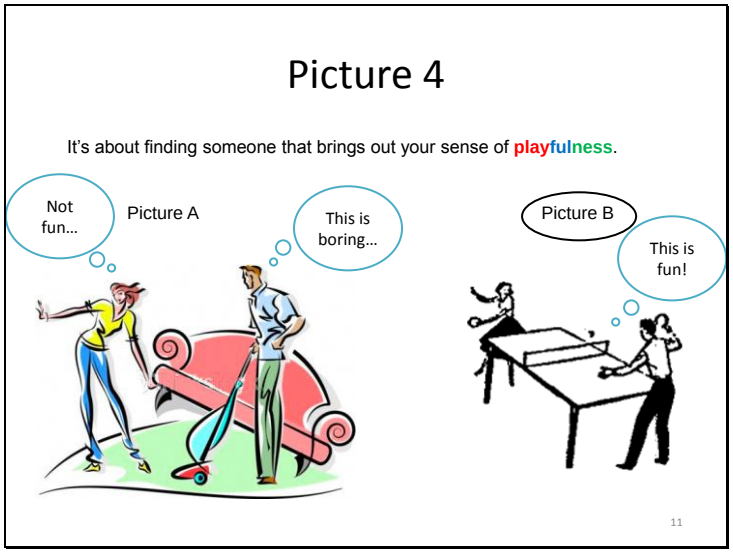

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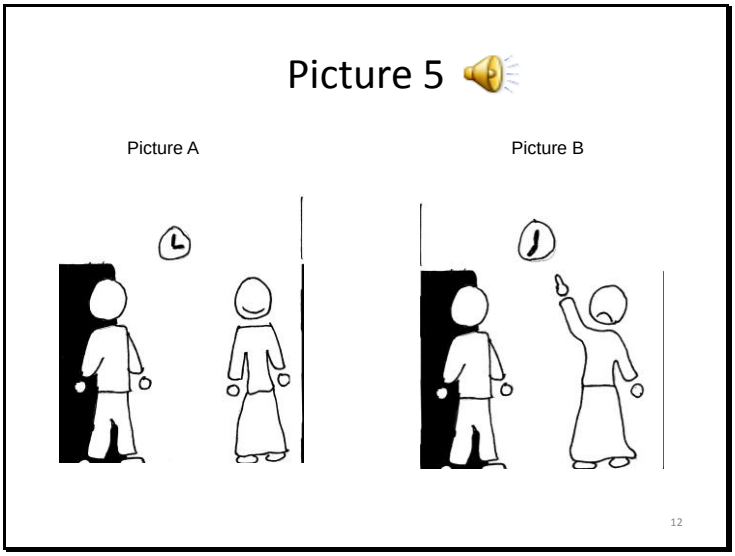

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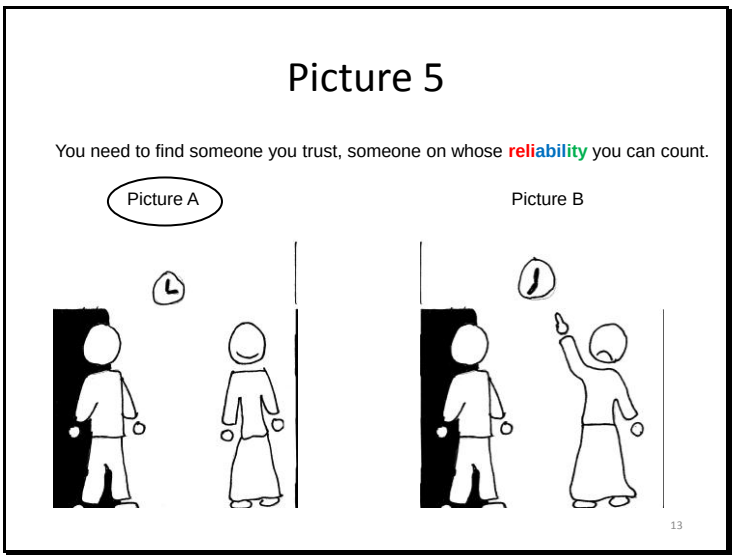

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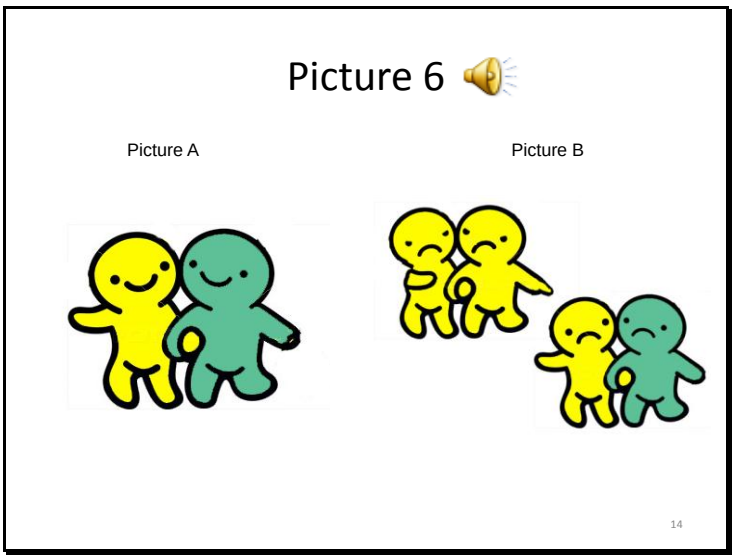
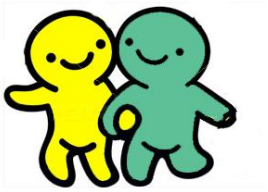


Slide 15

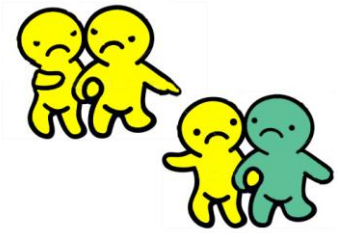
Picture 6

Their **ethnicity**, their age, the amount of money they make – all of that stuff doesn't matter.

Picture A



Picture B



15

Slide 16

Part 2: Reading

Directions: Read the following story carefully. Pay special attention to the highlighted words. After you have read the story, answer the questions on the next page.

16

Slide 17

Love and Dating

Some people think that love is about the **acquisition** (base: acquire) of gifts. Others take a more **relational** (base: relate) view on love. That is, love is about finding someone you enjoy being with, even when the relationship enters into routines and **predictability** (base: predict). It's about finding someone that brings out your sense of **playfulness** (base: play). You need to find someone you trust, someone on whose **reliability** (base: rely) you can count. Their **ethnicity** (base: ethnic), their age, the amount of money they make – all of that stuff doesn't matter. The most important thing is being with someone you love. Everything else comes after that.

17

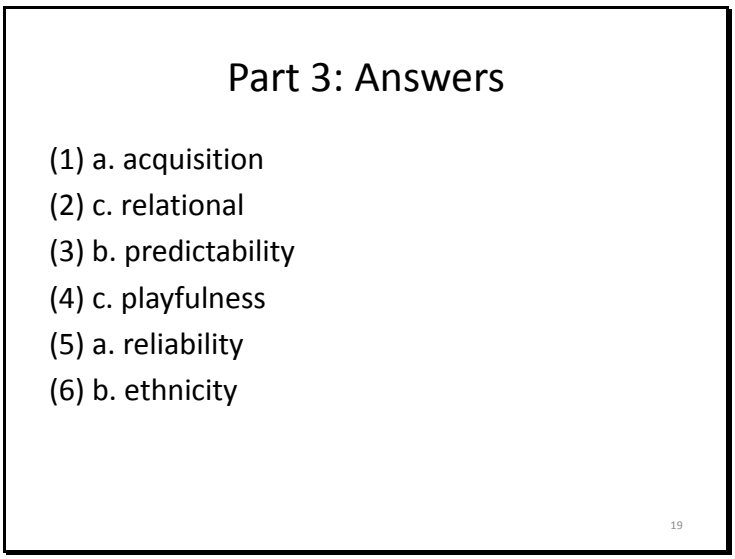
Slide 18

Part 3: Multiple Choice

Directions: Based on the story, circle the letter (a., b., c.) that goes with the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

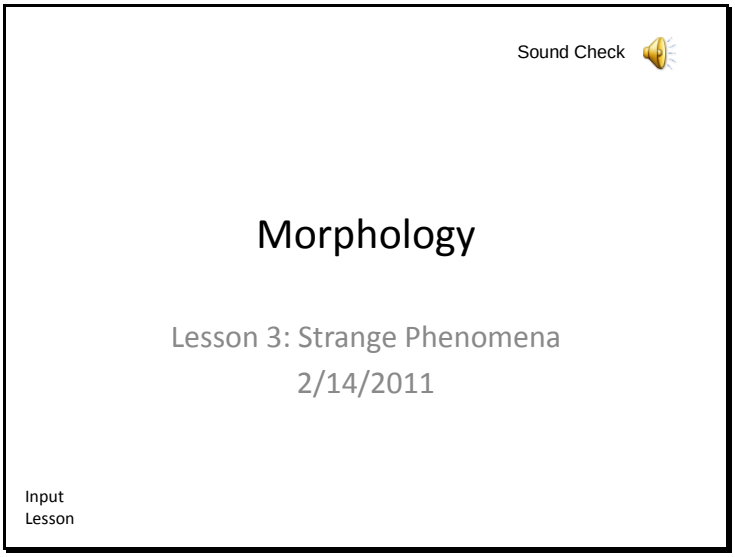
18

Slide 19



F.1.3 Input Lesson 3

Slide 1



Slide 2

Morphology

Morphology: Making words from word parts.

Word: govern (verb)

Meaning: to control and direct the public business of a country, city, or group of people

Examples:

govern: The president governs the country.

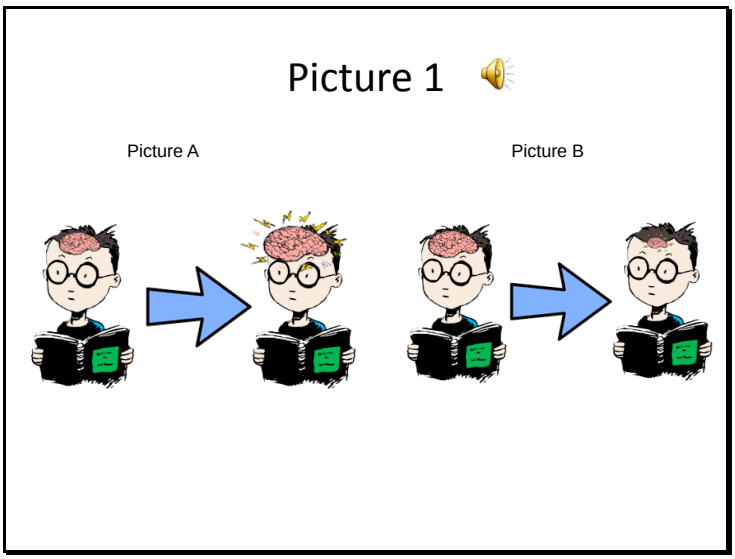
govern: The president is the leader of the government.

Slide 3

Part 1: Interpretation Task

Directions: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

Slide 4



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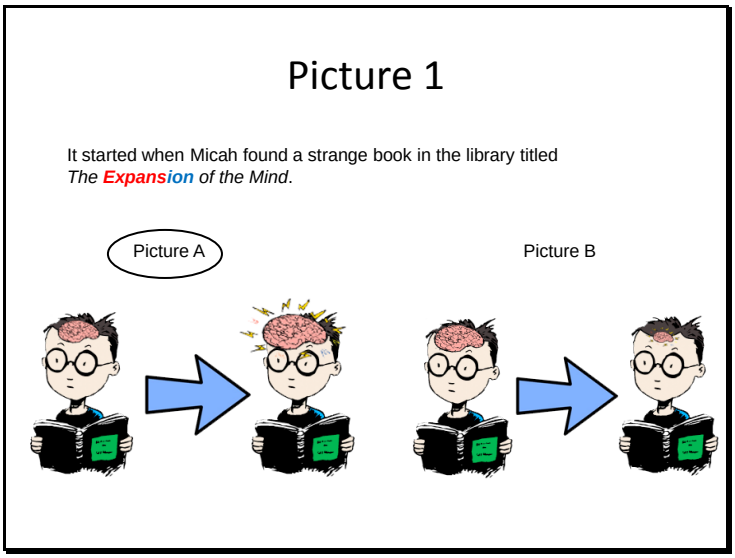

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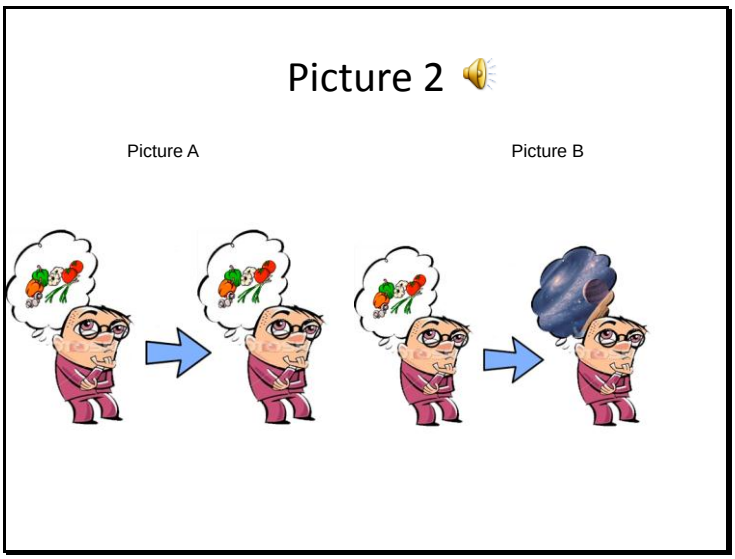

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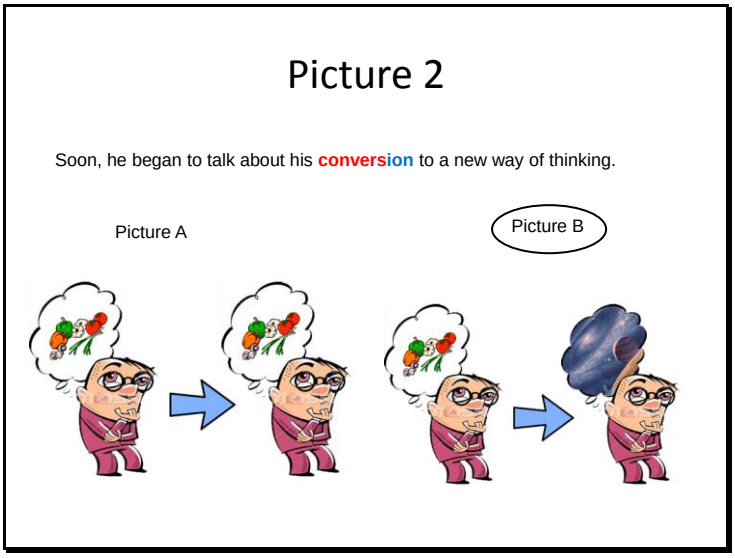

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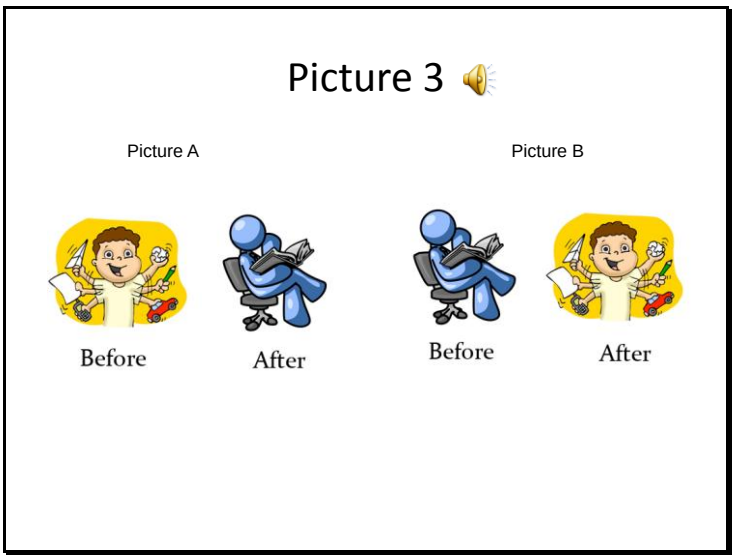

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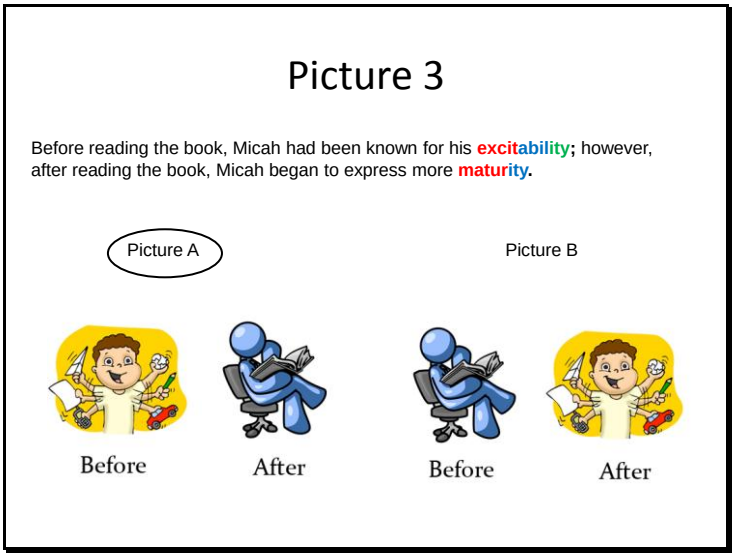

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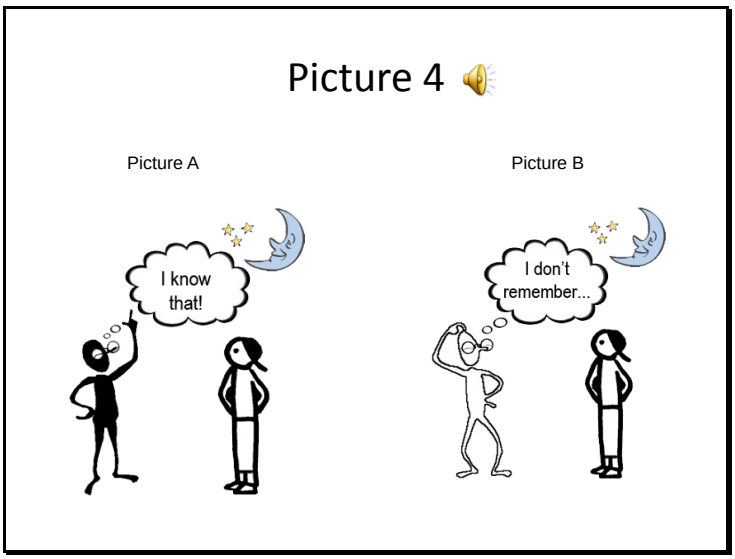

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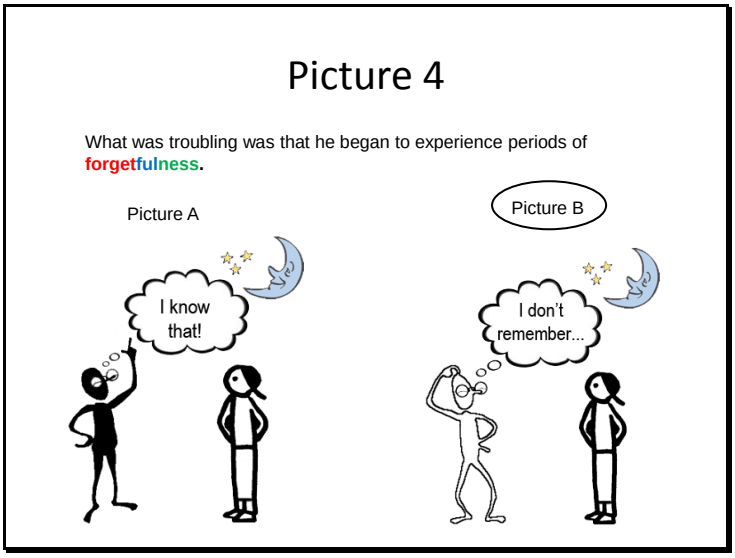

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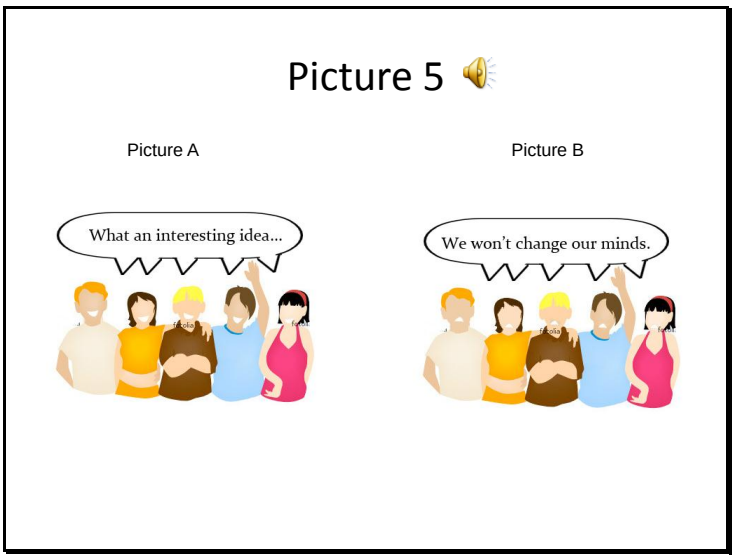

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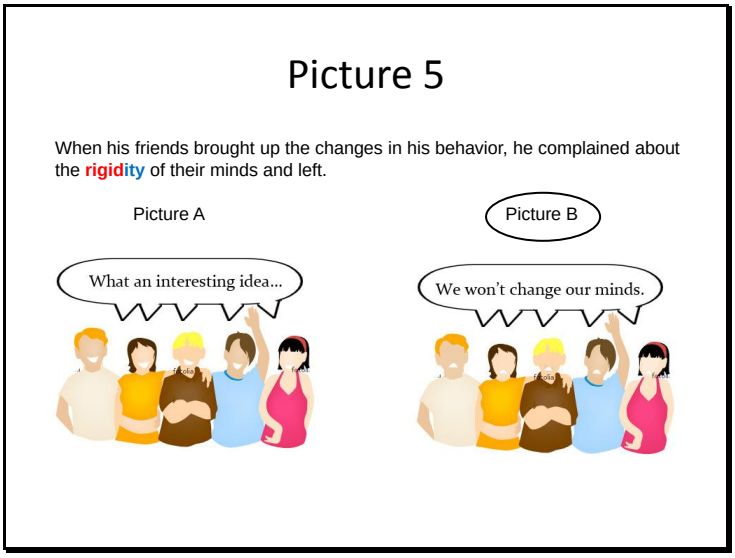


Slide 14

Part 2: Reading

Directions: Read the following story carefully. Pay special attention to the highlighted words. After you have read the story, answer the questions on the next page.

Slide 15

The Expansion of the Mind

It started when Micah found a strange book in the library titled *The **Expansion*** (base: expand) *of the Mind*. Soon, he began to talk about his **conversion** (base: convert) to a new way of thinking. His behavior changed as well. Before reading the book, Micah had been known for his **excitability** (base: excite); however, after reading the book, Micah began to express more **maturity** (base: mature). What was troubling was that he began to experience periods of **forgetfulness** (base: forget). In the middle of a conversation he would forget what he was talking about. When his friends brought up the changes in his behavior, he complained about the **rigidity** (base: rigid) of their minds and left. He said that he was going to travel with the Old Ones to another world. After that, Micah was never heard from again.

Slide 16

Part 3: Multiple Choice

Directions: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

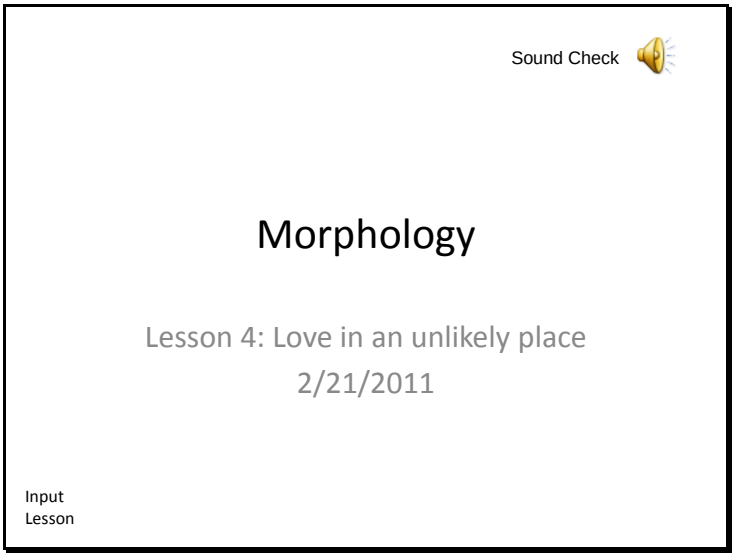
Slide 17

Part 3: Answers

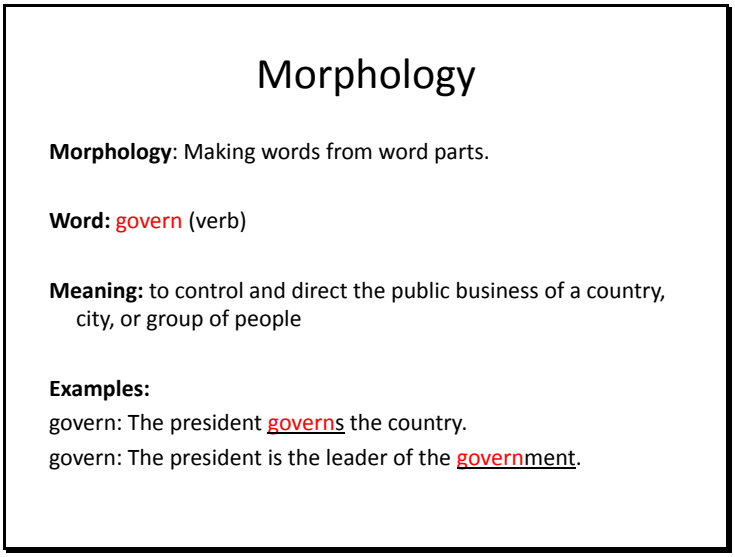
(1) c. expansion
(2) a. conversion
(3) * c. excitability, ** b. maturity
(4) a. forgetfulness
(5) c. rigidity

F.1.4 Input Lesson 4

Slide 1



Slide 2



Slide 3

Part 1: Interpretation Task

Directions: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

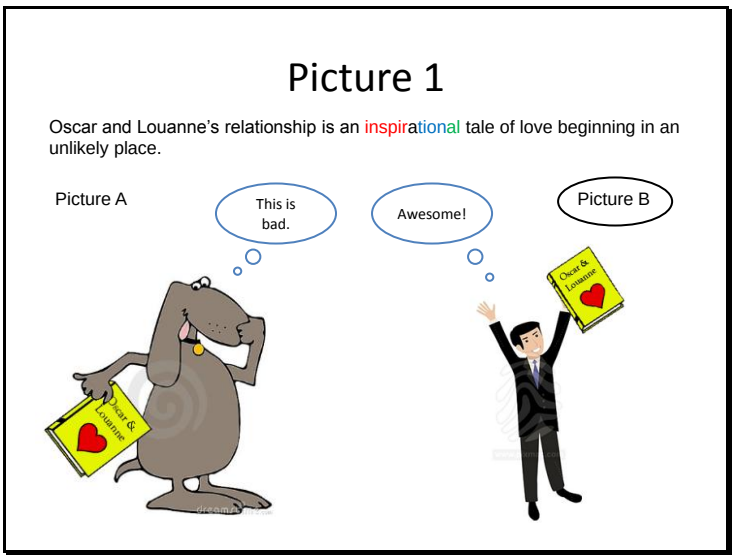
Slide 4

Picture 1

Picture A

Picture B

Slide 5



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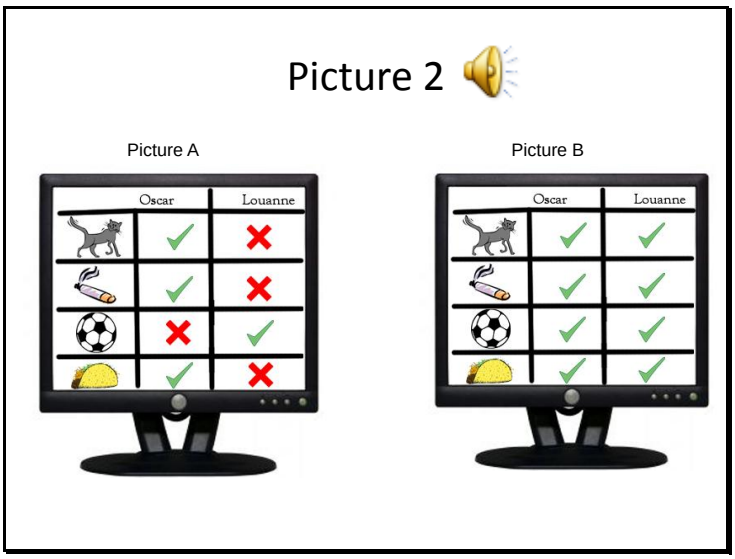

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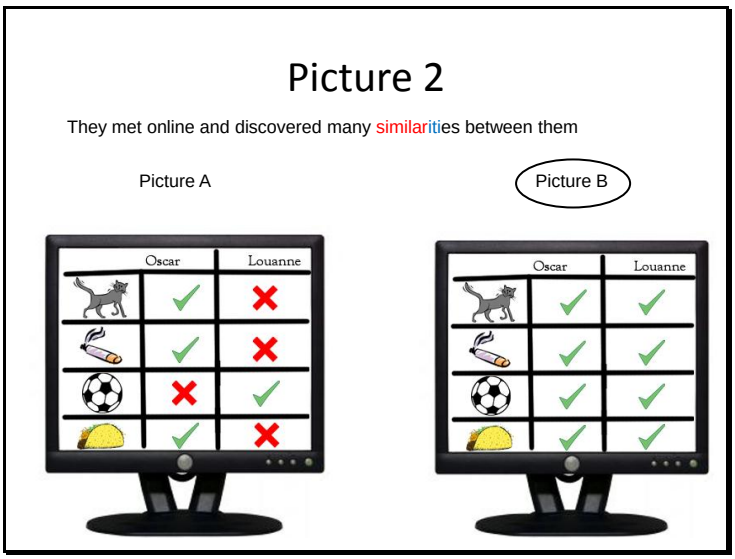

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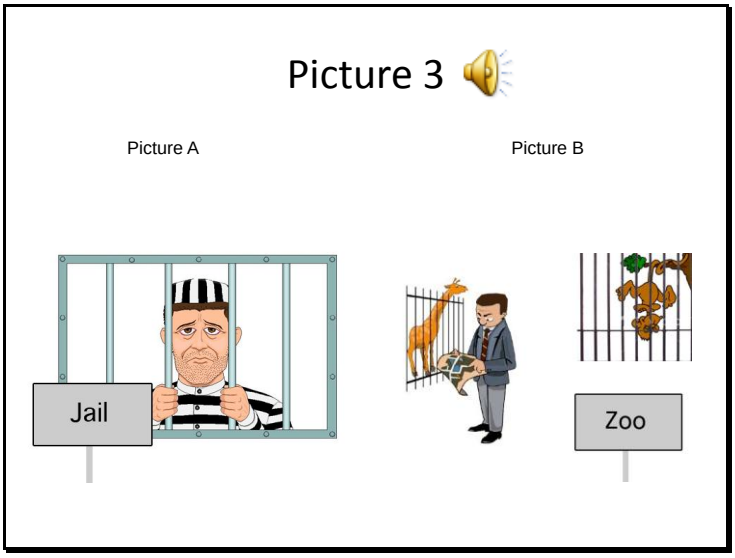

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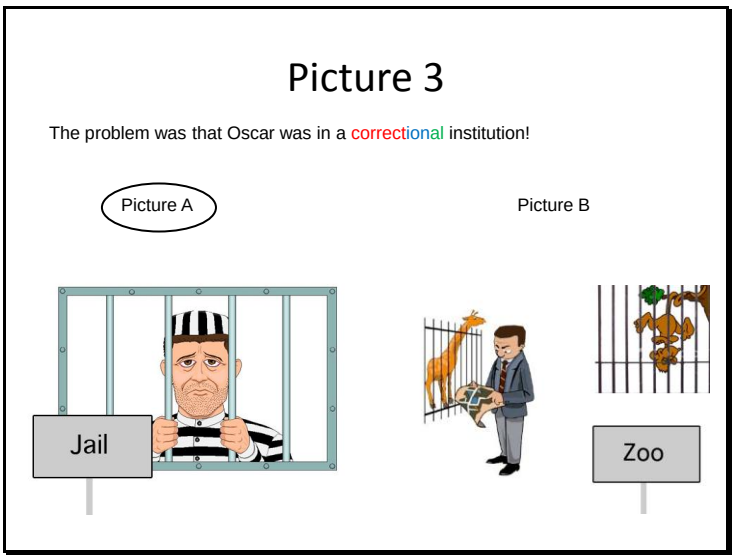

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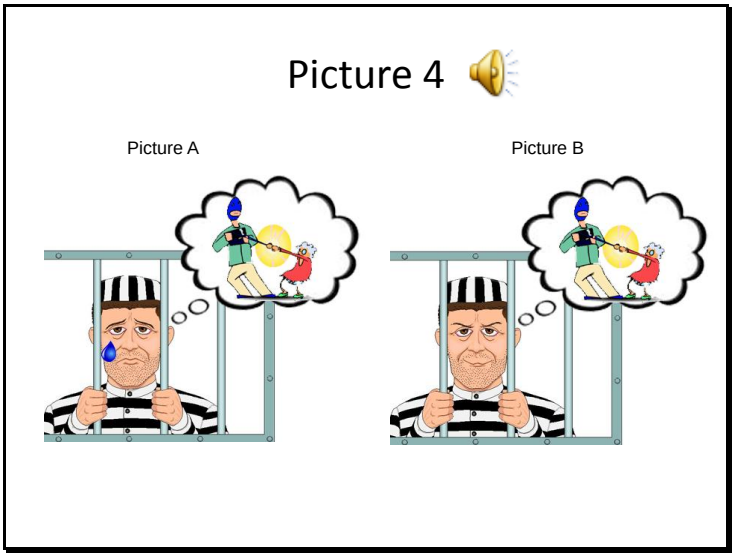

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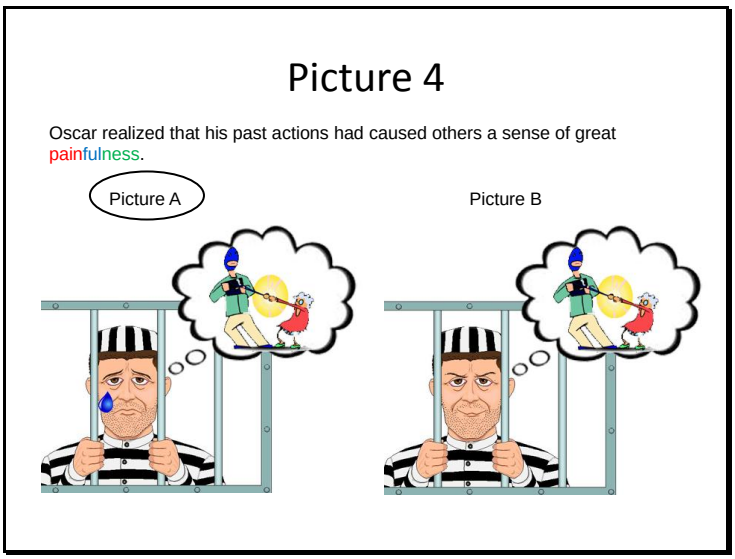

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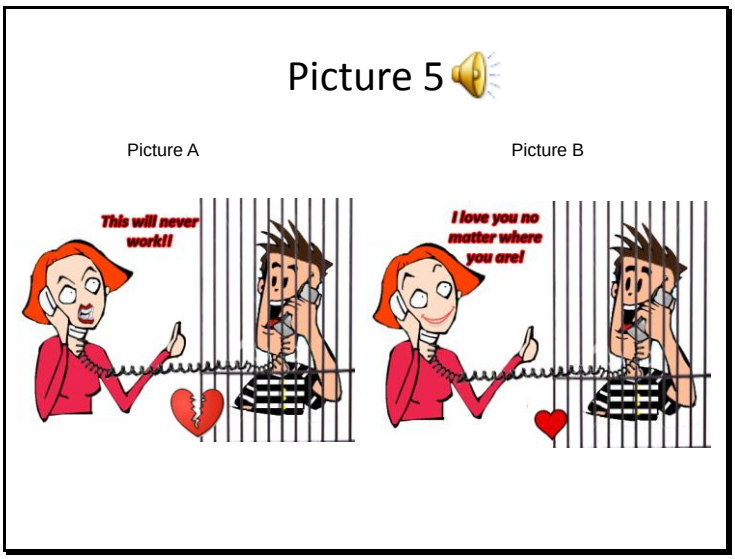

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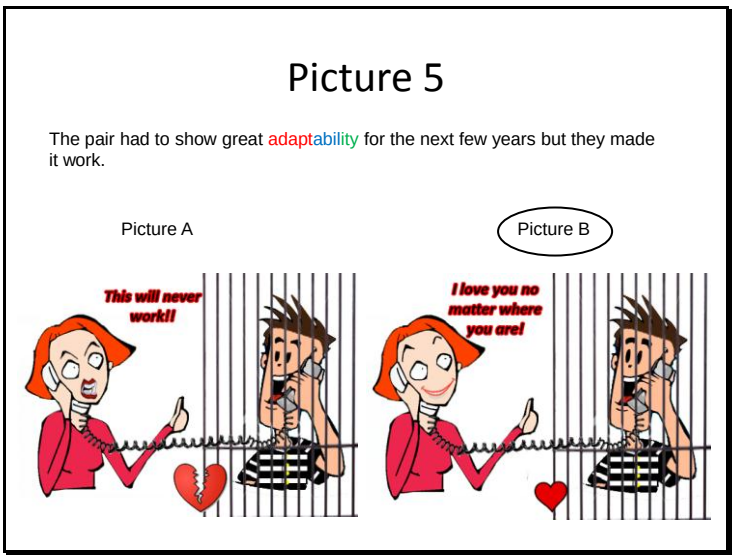

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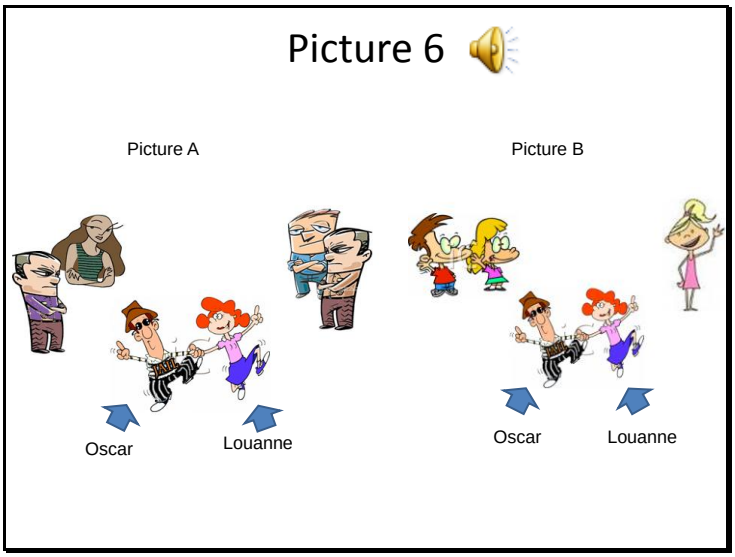
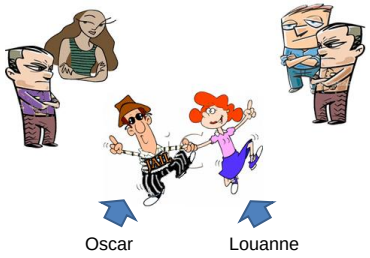


Slide 15

Picture 6

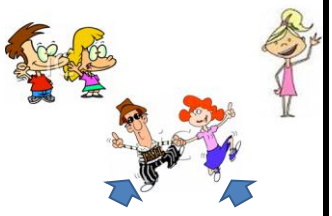
They have to battle negative perceptions of their relationship, but they still love each other.

Picture A



Oscar Louanne

Picture B



Oscar Louanne

Slide 16

Part 2: Reading

Directions: Read the following story carefully. Pay special attention to the highlighted words. After you have read the story, answer the questions on the next page.

16

Slide 17

Love in an unlikely place

Oscar and Louanne's relationship is an **inspirational** (base: inspire) tale of love beginning in an unlikely place. They met online and discovered many **similarities** (base: similar) between them. Things were going well, so they started to talk about bringing their relationship into real life. The problem was that Oscar was in a **correctional** (base: correct) institution! Louanne was shocked, but it was clear that Oscar was a changed man. He realized that his past actions had caused others a sense of great **painfulness** (base: pain). The pair had to show great **adaptability** (base: adapt) for the next few years, but they made it work. After Oscar got out of prison, they got married. They have to battle negative **perceptions** (base: perceive) of their relationship, but they still love each other.

Slide 18

Part 3: Multiple Choice

Directions: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

Slide 19

Part 3: Multiple Choice

(1) c. inspirational
(2) b. similarities
(3) c. correctional
(4) c. painfulness
(5) b. adaptability
(6) a. perceptions

F.1.5 Input Lesson 5

Slide 1

Sound Check 

Morphology

Lesson 5: The Gaia Hypothesis
2/28/2010

Input
Lesson

Slide 2

Morphology

Morphology: Making words from word parts.

Word: govern (verb)

Meaning: to control and direct the public business of a country, city, or group of people

Examples:

govern: The president governs the country.

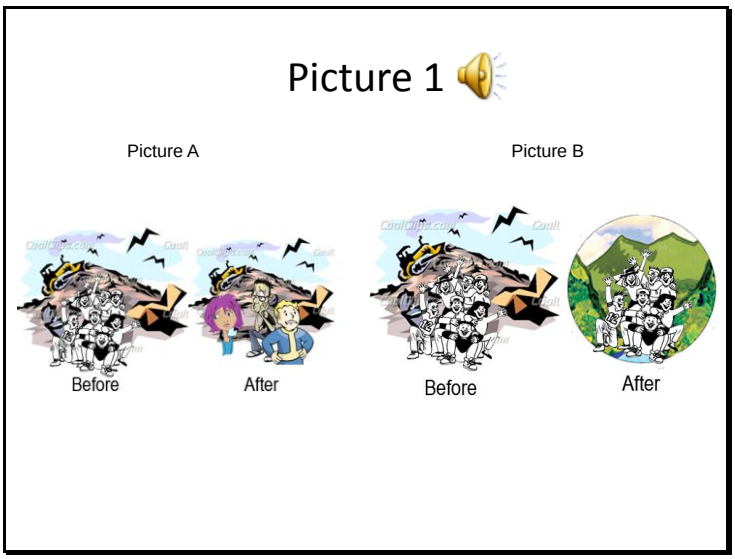
govern: The president is the leader of the government.

Slide 3

Part 1: Interpretation Task

Directions: Listen to the following sentences and choose the picture that goes along with the sentence you hear. Circle Picture A or Picture B.

Slide 4



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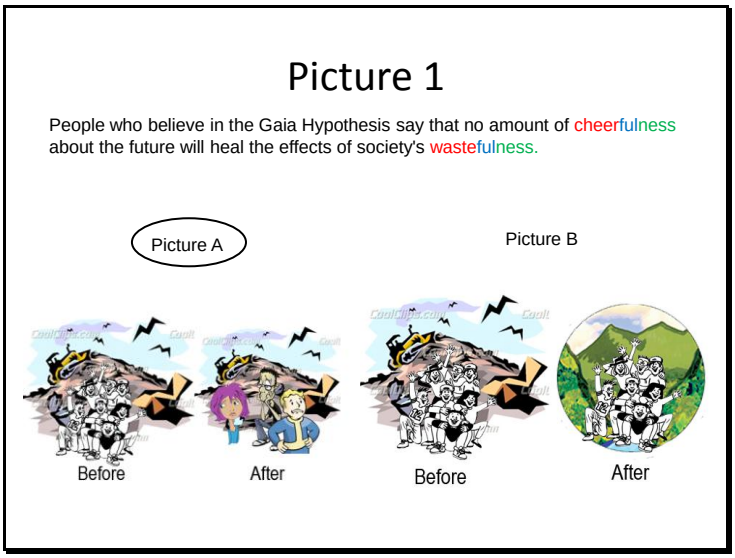

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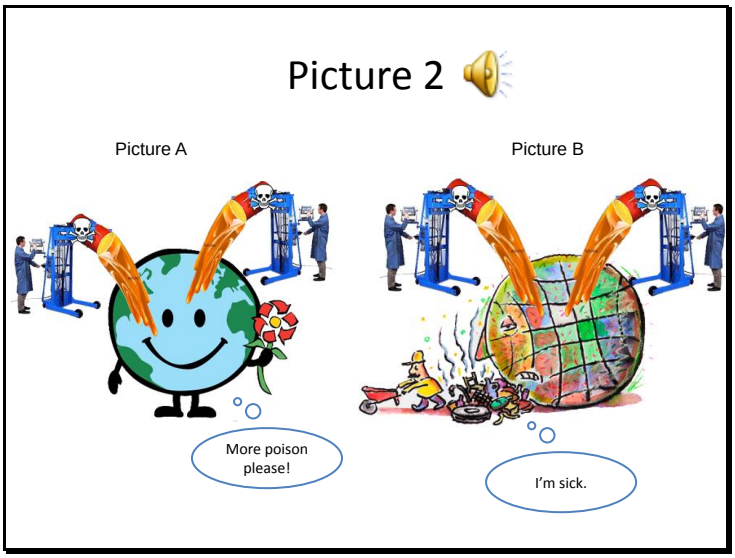

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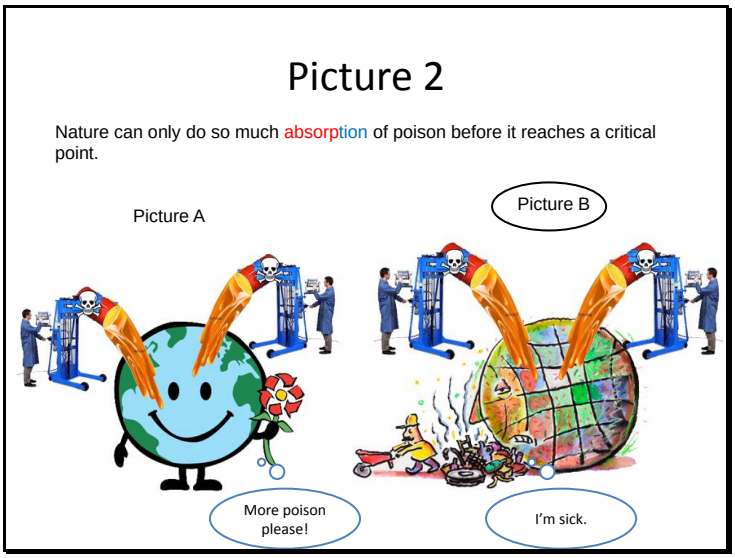

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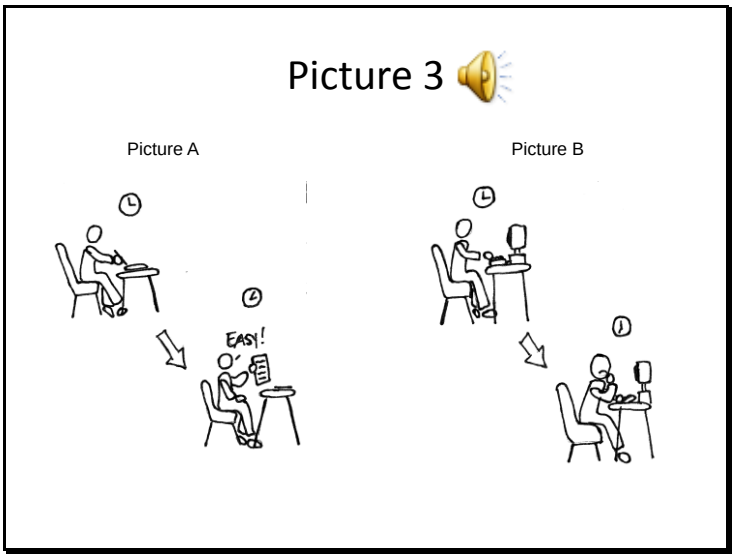

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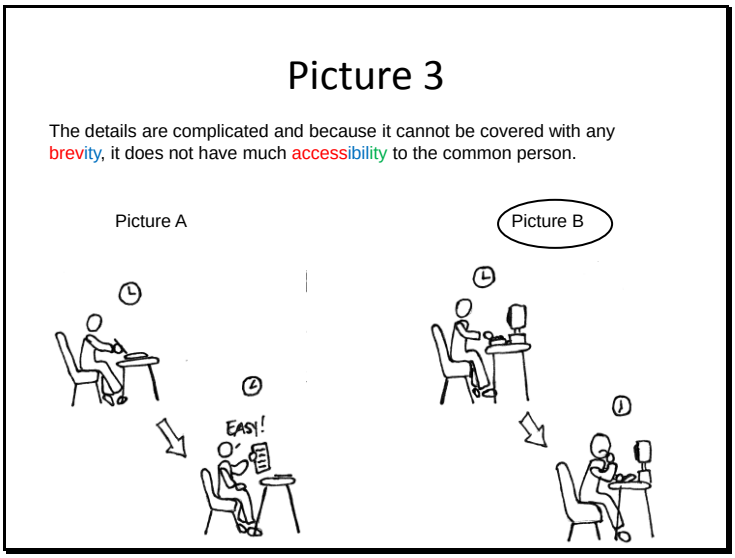

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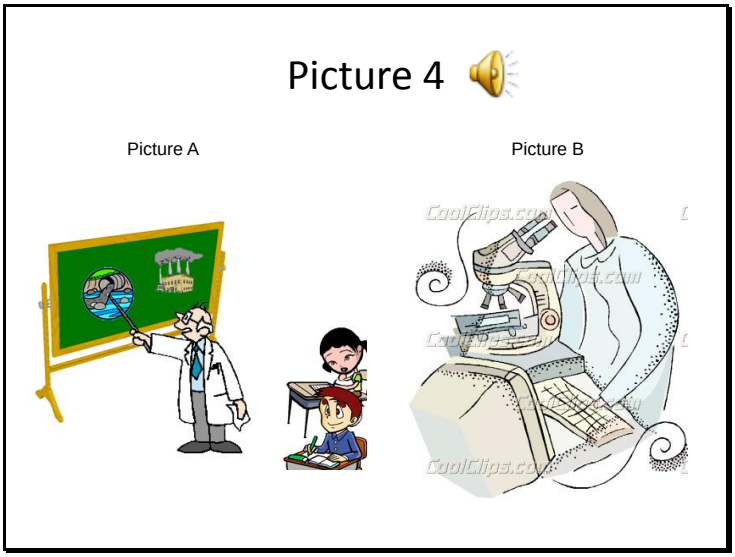

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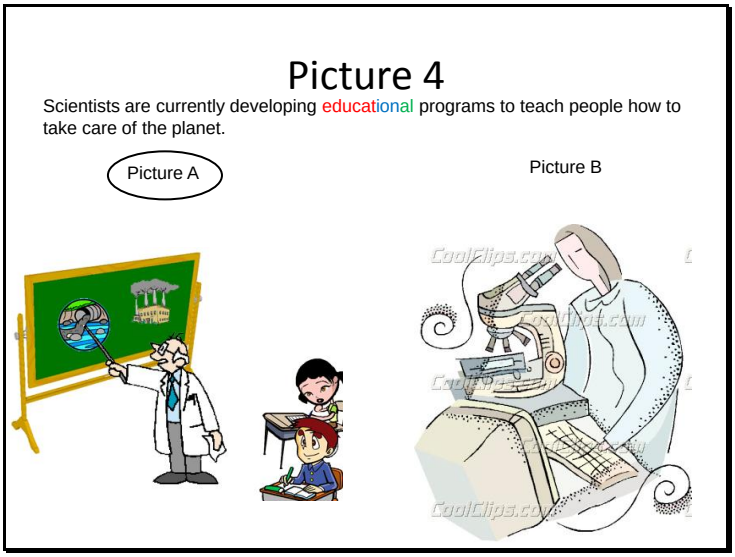


Slide 12

Part 2: Reading

Directions: Read the following story carefully.
Pay special attention to the highlighted words.
Do not turn the page yet.

Slide 13

The Gaia Hypothesis

The "Gaia Hypothesis" is the idea that the planet is alive and we are making her sick. People who believe in the Gaia Hypothesis say that no amount of cheerfulness (base: cheer) about the future will heal the effects of society's wastefulness (base: waste). Nature can only do so much absorption (base: absorb) of poison before it reaches a critical point. This idea actually has some scientific merit. The details are complicated and because it cannot be covered with any brevity (base: brief), it does not have much accessibility (base: access) to the common person. Some people take the idea more literally and think that the planet will fight humanity for hurting nature. All sides agree that we need to be careful about our influence on the environment. Scientists are currently developing educational (base: educate) programs to teach people how to take care of the planet.

Slide 14

Part 3: Multiple Choice

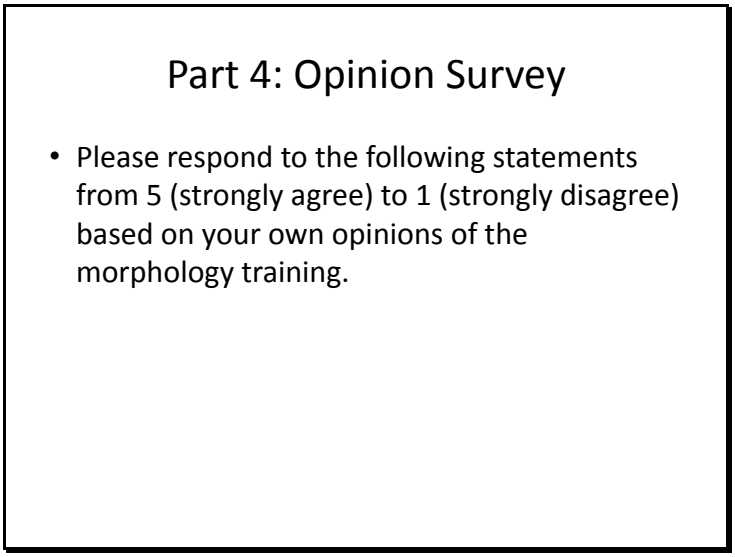
Directions: Based on the story, circle the word that best fits in the blank. Do not refer back to the story. Do not write the word in the blank.

Slide 15

Part 3: Answer Key

1) * a. cheerfulness
   ** b. wastefulness
2) b. absorption
3) * b. brevity
   ** c. accessibility
4) a. educational

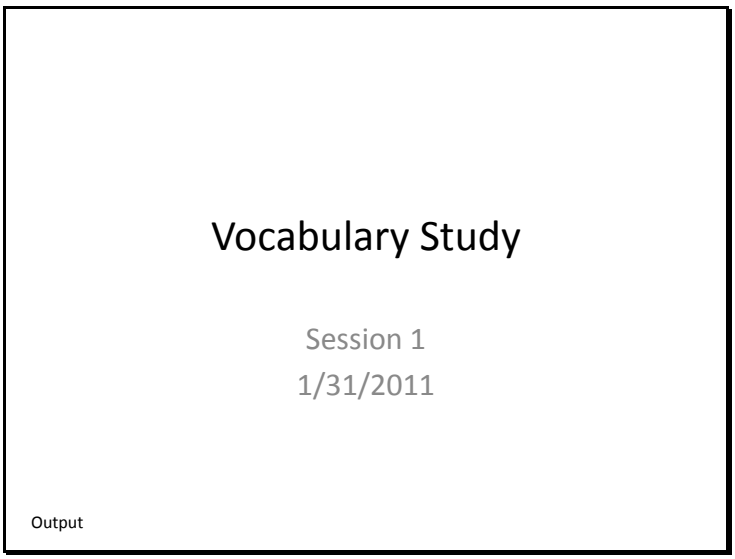
Slide 16



F.2 Output Lessons

F.2.1 Output Lesson 1

Slide 1



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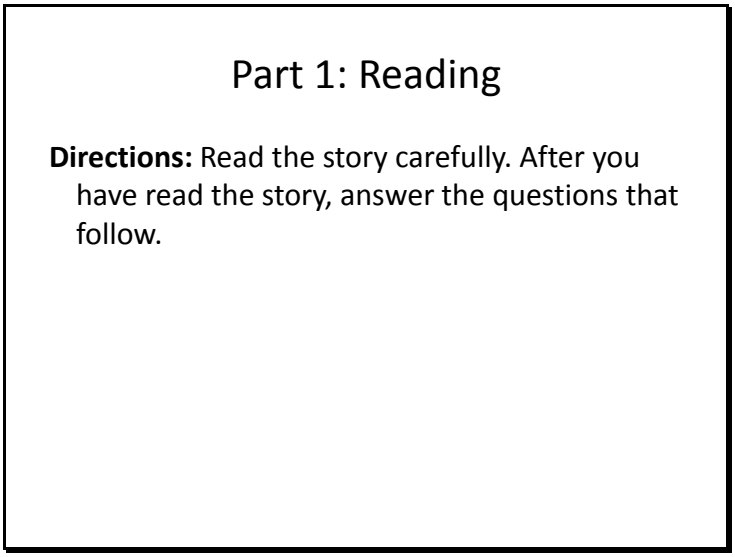


Slide 3

Choice: Now in theaters!

People believe that *Choice* is a sensational science fiction movie. The film follows a group of people who are tired of the government's lack of accountability and decide to do something about it. They form an alliance, or friendship, with other oppositional groups to threaten the security of the state. The public's erosion of trust in the government gives more power to the rebellion. Just when it seems like the government forces will be destroyed, the rebel army starts to break down and all of the previous hopefulness is gone. During this chaos a new leader shows up … but will she be a hero of the people or a vicious dictator?

Slide 4

Part 2: Fill-in-the-blank

Directions: Complete the words by filling in the missing letters.

Slide 5

Part 2: Fill-in-the-blank

1) People believe that *Choice* is a (base: sense) sensat i o n a l science fiction movie.

2) The film follows a group of people who are tired of the government's lack of (base: account) account a b i l i t y and decide to do something about it.

3) They form an alliance or friendship, with other (base: oppose) opposit i o n a l groups to threaten the (base: secure) secur i t y of the state.

4) The public's (base: erode) ero s i o n of trust in the government gives more power to the rebellion.

5) Just when it seems like the government forces will be destroyed the rebel army starts to break down and it all of the previous (base: hope) hopef u l n e s s is gone.

Slide 6

Part 3: Sentence Writing

- **Directions:** Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parentheses for specific instructions for each sentence.

Slide 7

Part 3: Sentence Writing

1) The man thought that the concert was sensational.

2) Politicians sometimes lack accountability when using government money.

3) People sometimes have oppositional views that are not the same as the views of their leaders.

4) The airport's x-ray machines provide good security.

5) Floods cause soil erosion.

6) The new factory brings a sense of hopefulness to unemployed people in Pittsburgh.

F.2.2 Output Lesson 2

Slide 1

Morphology

Session 2

2/7/2011

Output

Slide 2

Morphology

Morphology: Making words from word parts.

Word: govern (verb)

Meaning: to control and direct the public business of a country, city, or group of people

Examples:

govern: The president governs the country.

govern: The president is the leader of the government.

Slide 3

Part 1: Reading

Directions: Read the story carefully before going on to the next section.

Slide 4

Part 1: Love and Dating

Some people think that love is about the acquisition of gifts. Others take a more relational view on love. That is, love is about finding someone you enjoy being with, even when the relationship enters into routines and predictability. It's about finding someone that brings out your sense of playfulness. You need to find someone you trust, someone on whose reliability you can count. Their ethnicity, their age, the amount of money they make – all of that stuff doesn't matter. The most important thing is being with someone you love. Everything else comes after that.

Slide 5

Part 2: Fill-in-the-blank

Directions: Complete the words by filling in the missing letters.

Slide 6

Part 2: Fill-in-the-blank

1) Some people think that love is about the (base: acquire) acquisi t i o n of gifts.
2) Others take a more (base: relate) relat i o n a l view on love.
3) That is, love is about finding someone you enjoy being with, even when the relationship enters into routines and (base: predict) predict a b i l i t y.
4) It's about finding someone that brings out your sense of (base: play) playf u l n e s s.
5) You need to find someone you trust, someone on whose (base: rely) reli a b i l i t y you can count.
6) Their (base: ethnic) ethnic i t y, their age, the amount of money they make – all of that stuff doesn't matter.

Slide 7

Part 3: Instructions

Directions: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parenthesis for specific instructions for each sentence.

Slide 8

Part 3: Sentence Writing

1) The acquisition of a foreign language takes many years of study.
2) The schedule lacks predictability and is confusing for students.
3) According to a relational view of human society, humans like to live near other humans.
4) The man shows a degree of playfulness although he is 100 years old.
5) The student questioned the reliability of the computer program after it crashed during his presentation.
6) Employers cannot use a person's ethnicity when hiring new employees.

F.2.3 Output Lesson 3

Slide 1

Morphology

Lesson: Strange Phenomena

2/14/2011

Output

Slide 2

Morphology

Morphology: Making words from word parts.

Word: govern (verb)

Meaning: to control and direct the public business of a country, city, or group of people

Examples:

govern: The president governs the country.

govern: The president is the leader of the government.

Slide 3

Part 1: Reading

Directions: Read the story carefully before going on to the next section.

Slide 4

Part 1: Reading

It started when Micah found a strange book in the library titled *The Expansion of the Mind*. Soon, he began to talk about his conversion to a new way of thinking. His behavior changed as well. Before reading the book, Micah had been known for his excitability; however, after reading the book, Micah began to express more maturity. What was troubling was that he began to experience periods of forgetfulness. In the middle of a conversation he would forget what he was talking about. When his friends brought up the changes in his behavior, he complained about the rigidity of their minds and left. He said that he was going to travel with the Old Ones to another world. After that, Micah was never heard from again.

Slide 5

Part 2: Fill-in-the-blank

Directions: Complete the words by filling in the missing letters.

Slide 6

Part 2: Fill-in-the-blank

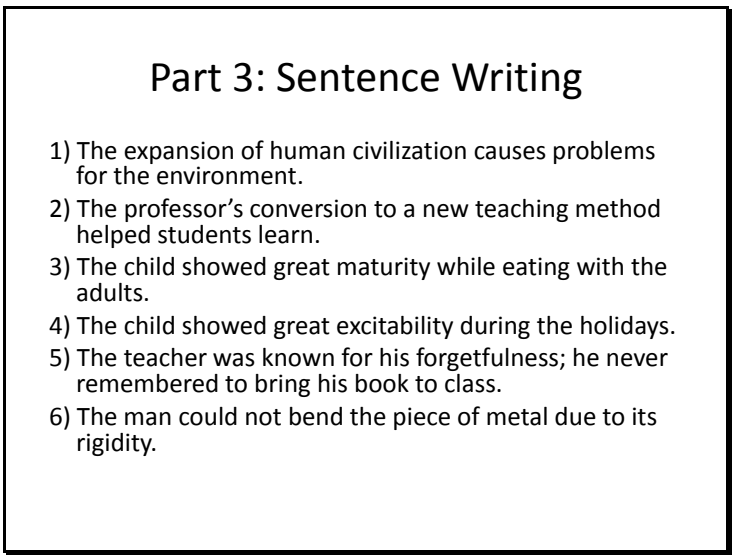
1) It started when Micah found a strange book in the library titled *The Expan s i o n of the Mind*.
2) Soon, he began to talk about his conver s i o n to a new way of thinking.
3) Before reading the book, Micah had been known for his excit a b i l i t y; however, after reading the book, Micah began to express more matur i t y.
4) What was troubling was that he began to experience periods of forgetf u l n e s s.
5) When his friends brought up the changes in his behavior, he complained about the rigid i t y of their minds and left.

Slide 7

Part 3: Instructions

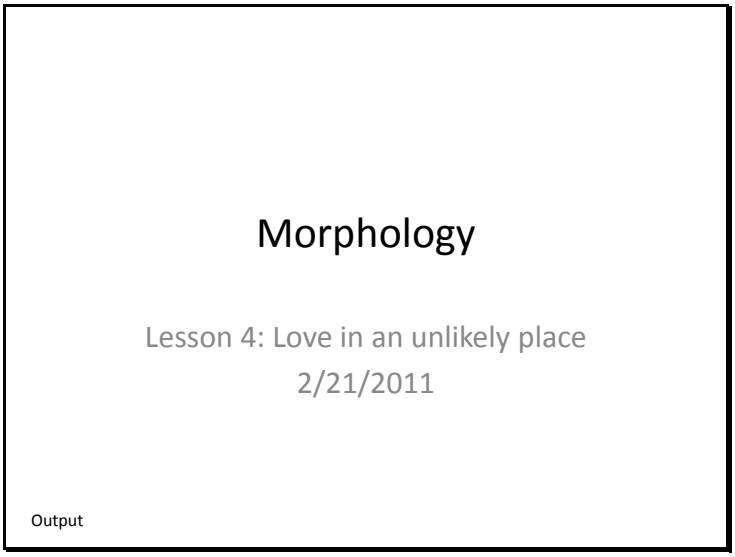
Directions: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parenthesis for specific instructions for each sentence.

Slide 8



F.2.4 Output Lesson 4

Slide 1



Slide 2

Morphology

Morphology: Making words from word parts.

Word: govern (verb)

Meaning: to control and direct the public business of a country, city, or group of people

Examples:

govern: The president governs the country.

govern: The president is the leader of the government.

Slide 3

Part 1: Reading

Directions: Read the story carefully before going on to the next section.

Slide 4

Love in an unlikely place

Oscar and Louanne's relationship is an inspirational tale of love beginning in an unlikely place. They met online and discovered many similarities between them. Things were going well, so they started to talk about bringing their relationship into real life. The problem was that Oscar was in a correctional institution! Louanne was shocked, but it was clear that Oscar was a changed man. He realized that his past actions had caused others a sense of great painfulness. The pair had to show great adaptability for the next few years, but they made it work. After Oscar got out of prison, they got married. They have to battle negative perceptions of their relationship, but they still love each other.

Slide 5

Part 2: Fill-in-the-blank

Directions: Complete the words by filling in the missing letters.

Slide 6

Part 2: Fill-in-the-blank

1) Oscar and Louanne's relationship is an (base: inspire) inspirat i o n a l tale of love beginning in an unlikely place.
2) They met online and discovered many (base: similar) similar i t i e s between them.
3) The problem was that Oscar was locked up in a (base: correct) correct i o n a l institution!
4) He realized that his past actions had caused others a sense of great (base: pain) painf u l n e s s.
5) The pair had to show great (base: adapt) adapt a b i l i t y for the next few years but they made it work.
6) They have to battle negative (base: perceive) percept i o n s of their relationship, but they still love each other.

Slide 7

Part 3: Instructions

Directions: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parenthesis for specific instructions for each sentence.

Slide 8

Part 3: Sentence Writing

1) Mahatma Gandhi was an inspirational person.
2) The man confused the twins' names because of the similarity of their looks.
3) The criminal was sent to a correctional facility.
4) The painfulness of his memories made the man cry.
5) Adaptability is important in a car because every driver has different needs.
6) The tourist had a different perception of the town than the residents.

F.2.5 Output Lesson 5

Slide 1

Morphology

Session 5: The Gaia Hypothesis

3/1/2011

Output

Slide 2

Morphology

Morphology: Making words from word parts.

Word: govern (verb)

Meaning: to control and direct the public business of a country, city, or group of people

Examples:

govern: The president governs the country.

govern: The president is the leader of the government.

Slide 3

Part 1: Reading

Directions: Read the story carefully before going on to the next section.

3

Slide 4

The Gaia Hypothesis

The "Gaia Hypothesis" is the idea that the planet is alive and we are making her sick. People who believe in the Gaia Hypothesis say that no amount of cheerfulness about the future will heal the effects of society's wastefulness. Nature can only do so much absorption of poison before it reaches a critical point. This idea actually has some scientific merit. The details are complicated and because it cannot be covered with any brevity, it does not have much accessibility to the common person. Some people take the idea more literally and think that the planet will fight humanity for hurting nature. All sides agree that we need to be careful about our influence on the environment. Scientists are currently developing educational programs to teach people how to take care of the planet.

Slide 5

Part 2: Fill-in-the-blank

Directions: Complete the words by filling in the missing letters.

Slide 6

Part 2: Fill-in-the-blank

1) People who believe in the Gaia Hypothesis say that no amount of cheerf u l n e s s about the future will heal the effects of society's wastef u l n e s s.
2) Nature can only do so much absor p t i o n of poison before it reaches a critical point.
3) The details are complicated and because it cannot be covered with any brev i t y it does not have much access i b i l i t y to the common person.
4) Scientists are currently developing educat i o n a l programs to teach people how to take care of the planet.

Slide 7

Part 3: Instructions

Directions: Use the words provided below to write a sentence. You will have to make changes to the words provided in order to make them fit in the sentence. Follow the directions in parenthesis for specific instructions for each sentence.

Slide 8

Part 3: Sentence Writing

1) The secretary's cheerfulness in the morning made others in the office feel happy.
2) Human wastefulness causes harm to the environment.
3) The atmosphere's absorption of the sun's rays protects us from dangerous radiation.
4) The man did not know his girlfriend very well due to the brevity of their relationship.
5) The theater had good accessibility to people with disabilities.
6) Children in the best schools have many educational opportunities.

Slide 9

Part 4: Opinion Survey

- Please respond to the following statements from 5 (strongly agree) to 1 (strongly disagree) based on your own opinions of the morphology training.

APPENDIX G

LESSON PLANS FROM STUDY 2

G.1 Input Lessons

G.1.1 Input Lesson 1

Lesson Plans: Cinema
Session 1 – Input processing condition

Goal: Students will practice derivational morphology through exposure to an input treatment.

Materials:
1) Session 1 (input) powerpoint [provided on a jump drive]
2) Copies of the input-processing worksheet.
3) Computer with projector and speakers.

Part 1: Interpretation Task (~8 minutes)
Purpose: This task gives Ss a chance to listen to and process derivational morphology via an aural task before being exposed to the reading passage. Feedback from teachers is critical in helping students focus on the meaning of the derived words before they see them in a paragraph. At first, this task will be very difficult for students until they become more familiar with the affixes through these treatment sessions.

Implementation:

- Set up the PowerPoint.
- Explain that Ss will hear several sentences and they should choose the picture that best represents the sentence they hear.
- Play the recording that accompanies each set of pictures as students work to choose the correct picture. You may wish to play each recording twice.

Feedback:

- Review the correct answers with the PowerPoint slides. (Note: The original sentences accompany the feedback slides, so you can explain why Ss should have chosen a specific picture.)
- This feedback is extremely important to help students to understand the meaning of the derived words in context. Feel free to talk about the meanings of the words in these sentences, but do not focus on the forms by putting them on the board.
- Note: The derived words are broken into parts in the feedback section to prepare students for the reading. You can mention that the different colors represent different parts of the word.

********Answers to Part 1: Interpretation Task********

1) Picture A – People believe that *Choice* is a sensational science fiction movie.

Explanation: The people in A are happy because the movie was sensational or excellent. Explain that something that is a "sensation" is something that people really enjoy.

- You may want to point out what the people are saying and the expressions on their faces as they leave the cinema.

2) Picture B - The film follows a group of people who are tired of the government's lack of accountability and decide to do something about it.

Explanation: The people in B are angry because the government does have any accountability when it comes to spending money.

- People do not usually have fireworks when they are "tired of the government's lack of accountability" (Picture A).
- The chart in the background represents that the government has not been accountable with money.

3) Picture B - They form an alliance, or friendship, with oppositional groups to threaten the security of the state.

Explanation: The different colored armies in B represent oppositional groups that could threaten the security of the state. The men in picture A look the same – they don't represent oppositional groups nor do they appear to pose a threat to the security of the state.

4) Picture A – The public's erosion of trust in the government gives more power to the rebellion.

Explanation: The figure in the background shows erosion of trust. In Picture A, trust is "eroding."

5) Picture B - Just when it seems like the government forces will be destroyed the rebel army starts to break down and all of the previous hopefulness is gone.

Explanation: Picture B shows several armies without a sense of hopefulness. Point Ss attention to what the figures are saying.

Part 2 – Reading (~3-4 minutes)

Purpose: The purpose of this activity is to focus Ss' attention on the components of the derived words within a meaningful context. This is an input-enhancement condition.

Implementation:

- Direct Ss' attention to the Reading paragraph on p. 14.
- Explain that Ss should read the following story carefully and that they should pay special attention to the highlighted words.
- You should also explain that the word in parenthesis (e.g., base: sense) is the base form and that the different colors illustrate different parts of the word.
- After several minutes, move on to Part 3 of the activity.

Part 3 – Multiple Choice (~3-4 minutes)

Purpose: The purpose of this task is to push students to recall the derived form that they had been exposed to in the previous input-enhancement conditions.

Implementation:

- Explain the task – students should circle the letter of the word that fits best in the blank. (All of the choices are bases or derivates of a base, but only one choice is correct).
- Do not let students view the story while they are working on this task.

Feedback:

- Review the correct answers with students and provide explanations as necessary.

*********Answers to Part 3*********

1) Answer: C. | People believe that *Choice* is a _____science fiction movie.

a. sense b. sensation c. sensational

2) Answer: C | The film follows a group of people who are tired of the government's lack of _____ and decide to do something about it.

a. account b. accountable c. accountability

3) Answer: C./B. | They form an alliance, or friendship, with (*) _____ groups to threaten the (**) _____of the state.

* a. oppose b. opposition c. oppositional

** a. secure b. security c. securable

4) Answer: B. | The public's _____ of trust in the government gives more power to the rebellion.

a. erode b. erosion c. erodable

5) Answer: C | Just when it seems like the government forces will be destroyed the rebel army starts to break down and it all of the previous _____ is gone.

a. hope b. hopeful c. hopefulness

G.1.2 Input Lesson Plan 2

Lesson Plans: Love and Dating
Session 2 – Input processing condition

Goal: Students will practice derivational morphology through exposure to an input treatment.
Materials:
1) Session 1 (input) powerpoint. {provided on a jump drive}
2) Copies of the input-processing worksheet.
3) Computer with projector and speakers.

(*NEW*) Introduction: Morphology (1 minutes)
Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:
- Explain that morphology is "making words from word parts" (this is simple definition so that students can grasp the idea)
- Go through the example with the word *govern* quickly before students begin to work on the activity.
*The affix *ment* changes verbs to nouns.
- Eventually you can skip this activity once students are in tune with what is going on.

Part 1: Interpretation Task (6-7 minutes)
Purpose: This task gives Ss a chance to listen to and process derivational morphology via an aural task before being exposed to the reading passage. Feedback from teachers is critical in helping students focus on the meaning of the derived words before the words are broken into parts. At first, this task will be very difficult for students until they become more familiar with the affixes through these treatment sessions.
Implementation:
- Set up the PowerPoint.
- Explain that Ss will hear several sentences and they should choose the picture that best represents the sentence they hear. The sentences in this lesson are connected in a short story.
- Play the recording that accompanies each set of pictures as students work to choose the correct picture. You may wish to play each recording twice.
Feedback:
- Review the correct answers with the PowerPoint slides. (Note: The original sentences accompany the feedback slides, so you can explain why Ss should have chosen a specific picture.)

- This feedback is extremely important to help students to understand the meaning of the derived words before they process the parts in the reading section.
* **Note:** Students receive immediate feedback after every sentence so that the sentence that they heard is still fresh in their memory when they receive the feedback.

********Answers to Part 1: Interpretation Task********

1) Picture A - Some people think that love is about the **acquisition** of gifts.
Explanation: The woman in Picture A is in love with the man because he gives her gifts. Hence, she believes that love is about the acquisition of gifts.
2) Picture B: Others take a more **relational** view on love.
Explanation: The man and the woman in B are holding hands and interested in a relationship and have a "relational" view on love. The man and the woman in A are just the opposite, they are interested in fighting and do not have a relational view on love.
3) Picture A: That is, love is about finding someone you enjoy being with, even when
the relationship enters into routines and **predictability.**
Explanation: The couple in A have a predictable schedule (they eat everyday at 6:30), yet they continue to love one another. The couple in B also have a predictable schedule; however, they don't enjoy being together after a while.
4) Picture B: It's about finding someone that brings out your sense of **playfulness.**
Explanation: The couple in B are playing together and having fun. They have found a partner that brings out their sense of playfulness. The couple in A are cleaning and not having fun together.
5) Picture A: You need to find someone you trust, someone on whose **reliability** you can count.
Explanation: The woman in A counts on her partner's reliability and she is happy when he comes home on time. The woman in B can't count on her partner's reliability and she is unhappy when he comes in late.
6) Picture A: Their **ethnicity**, their age, the amount of money they make – all of that stuff doesn't matter.
Explanation: The figures in A represent people from different ethnicities. They are happy together and their ethnicity doesn't matter. For the figures in B, ethnicity does matter and the figures behind the happy couple are unhappy to see people from different ethnicities together.

Part 2 – Reading (4-5 minutes)

Purpose: The purpose of this activity is to focus Ss' attention on the components of the derived words within a meaningful context. This is an input-enhancement condition.

Implementation:

- Direct Ss' attention to the Reading section on slide 16.
- Explain that Ss should read the following story carefully and that they should pay special attention to the highlighted words.
- You should also explain that the word in parenthesis (e.g., base: acquire) is the base form and that the different colors illustrate different parts of the word.

- After several minutes, move on to Part 3 of the activity.

Part 3 – Multiple Choice (3 minutes)

Purpose: The purpose of this task is to push students to recall the derived form that they had been exposed to in the previous input-processing condition.

Implementation:

- Explain the task – students should circle the letter of the word that fits best in the blank. (All of the choices are derivatives, but only one choice is correct).

Feedback:

- Review the correct answers with students and provide explanations as necessary (slide 18).

Note: To speed up the activity, just read the answers as they appear on the PowerPoint. Students should be able to check their answers on their own.

******Short answers to Part 3*******

(1) a. acquisition
(2) c. relational
(3) b. predictability
(4) c. playfulness
(5) a. reliability
(6) b. ethnicity

*********Complete Answers to Part 3*********

1) Answer = A: Some people think that dating is about the _____ of gifts.
a. acquisition b. acquire c. acquisitional

2) Answer = C: Others take a more _____ view on love.
a. relate b. relation c. relational

3) Answer = B. That is, love is about finding someone you enjoy being with, even when the relationship enters into routines and _____.
a. predictable b. predictability c. predict

4) Answer = C: It's about finding someone that brings out your sense of _____.
a. playful b. play c. playfulness

5) Answer = A: You need to find someone you trust, someone on whose _____ you can count.
a. reliability b. rely c. reliable

6) Answer = B: Their _____, their age, the amount of money they make – all of that stuff doesn't matter.
a. ethnic b. ethnicity c. ethnicable

G.1.3 Input Lesson Plan 3

Lesson Plans: Strange Phenomena
Session 3 – Input processing condition

Goal: Students will practice derivational morphology through exposure to an input treatment.

Materials:
1) Session 3 (input) powerpoint. {provided on a jump drive}
2) Copies of the input-processing worksheet.
3) Computer with projector and speakers.

Introduction: Morphology (1 minutes)
Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:
- Explain that morphology is "making words from word parts" (this is simple definition so that students can grasp the idea)
- Go through the example with the word *govern* quickly before students begin to work on the activity.
- Eventually you can skip this slide once students are in tune with what is going on.

Part 1: Interpretation Task (6-7 minutes)
Purpose: This task gives Ss a chance to listen to and process derivational morphology via an aural task before being exposed to the reading passage. Feedback from teachers is critical in helping students focus on the meaning of the derived words before the words are broken into parts. At first, this task will be very difficult for students until they become more familiar with the affixes through these treatment sessions.

Implementation:
- Set up the PowerPoint.
- Explain that Ss will hear several sentences and they should choose the picture that best represents the sentence they hear. The sentences in this lesson are connected in a short story.
- Play the recording that accompanies each set of pictures as students work to choose the correct picture. You may wish to play each recording twice.

Feedback:
- Review the correct answers with the PowerPoint slides. (Note: The original sentences accompany the feedback slides, so you can explain why Ss should have chosen a specific picture.)

- This feedback is extremely important to help students to understand the meaning of the derived words before they process the parts in the reading section.
* **Note:** Students receive immediate feedback after every sentence so that the sentence that they heard is still fresh in their memory when they receive the feedback.

********Answers to Part 1: Interpretation Task********
1) Picture A: It started when Micah found a strange book in the library titled *The **Expansion** of the Mind*.
Explanation: The man in Picture A is reading a book on the "expansion of the mind" and his mind is expanding from reading the book. Picture B is not correct because the man is reading the book and his mind is shrinking (e.g., no expansion).

2) Picture B: Soon, he began to talk about his **conversion** to a new way of thinking.
Explanation: Picture B is correct because the man's thought processes are changing from thinking about food all the time (e.g., Picture A) to thinking about the universe. Picture B represents a "conversion" in his thought process.

3) Picture A: Before reading the book, Micah had been known for his **excitability;** however, after reading the book, Micah began to express more **maturity.**
Explanation: Picture A is correct because it shows Micah as an "excitable" person before he read the book and as a "mature" person sitting and reading a book in the after picture. Picture B represents the opposite order.

4) Picture B: What was troubling was that he began to experience periods of **forgetfulness.**
Explanation: Picture B is correct because the man in Picture B is forgetful and doesn't remember things. The man in Picture A is not forgetful and he remembers things.

5) Picture B: When his friends brought up the changes in his behavior, he complained about the **rigidity** of their minds and left.
Explanation: Picture B is correct because it illustrates a group of Micah's friends who won't change their minds (i.e., their minds are rigid). Picture A does not represent people with rigid minds because they are open to new ideas. Point students to what the people are saying to help demonstrate the concept of rigidity.

<u>Part 2 – Reading (4-5 minutes)</u>
Purpose: The purpose of this activity is to focus Ss' attention on the components of the derived words within a meaningful context. This is an input-enhancement condition.
Implementation:
- Direct Ss' attention to the Reading section on slide 16.
- Explain that Ss should read the following story carefully and that they should pay special attention to the highlighted words.

- You should also explain that the word in parenthesis (e.g., base: expand) is the base form and that the different colors illustrate different parts of the word.
- After several minutes, move on to Part 3 of the activity.

Part 3 – Multiple Choice (3 minutes)

Purpose: The purpose of this task is to push students to recall the derived form that they had been exposed to in the previous input-processing condition.

Implementation:

- Explain the task – students should circle the letter of the word that fits best in the blank. (All of the choices are derivatives, but only one choice is correct).

Feedback:

- Review the correct answers with students and provide explanations as necessary (slide 18).

Note: To speed up the activity, just read the answers as they appear on the PowerPoint. Students should be able to check their answers on their own.

******Short answers to Part 3*******

(1) c. expansion

(2) a. conversion

(3) * excitability, ** maturity

(4) a. forgetfulness

(5) c. rigidity

*********Complete Answers to Part 3*********

1) Answer = C: It started when Micah found a strange book in the library titled *The* _____ *of the Mind*.

a. expansive b. expand c. expansion

2) Answer = A: Soon, he began to talk about his _____ to a new way of thinking.

a. conversion b. convert c. convertible

3) Answers = C/B: Before reading the book, Micah had been known for his (*) _____; however, after reading the book, Micah began to express more (**)_____.

(*) a. excitable b. excite c. excitability

(**) a. mature b. maturity c. matureful

4) Answer = A: What was troubling was that he began to experience periods of _____.

a. forgetfulness b. forgetful c. forget

5) Answer = C: When his friends brought up the changes in his behavior, he complained about the _____ of their minds and left.

a. rigidable b. rigid c. rigidity

G.1.4 Input Lesson Plan 4

Lesson Plans: Love in an unlikely place
Session 4 – Input processing condition

Goal: Students will practice derivational morphology through exposure to an input treatment.

Materials:
1) Session 4 (input) powerpoint. {provided on a jump drive}
2) Copies of the input-processing worksheet.
3) Computer with projector and speakers.

Introduction: Morphology (1 minutes)
Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:
- Explain that morphology is "making words from word parts" (this is simple definition so that students can grasp the idea)
- Go through the example with the word *govern* quickly before students begin to work on the activity.
- Eventually you can skip this activity once students are in tune with what is going on.

Part 1: Interpretation Task (~ 10 minutes)
Purpose: This task gives Ss a chance to listen to and process derivational morphology via an aural task before being exposed to the reading passage. Feedback from teachers is critical in helping students focus on the meaning of the derived words before the words are broken into parts. At first, this task will be very difficult for students until they become more familiar with the affixes through these treatment sessions.

Implementation:
- Set up the PowerPoint.
- Explain that Ss will hear several sentences and they should choose the picture that best represents the sentence they hear. The sentences in this lesson are connected in a short story.
- Play the recording that accompanies each set of pictures as students work to choose the correct picture. You may wish to play each recording twice.

SUGGESTION: It may be helpful to students if you talk about what's happening in the pictures before they listen to the sentences. You might ask something like: What is happening in Picture A? | What is happening in Picture B?

Feedback:
- Review the correct answers with the PowerPoint slides. (Note: The original sentences accompany the feedback slides, so you can explain why Ss should have chosen a specific picture.)
- This feedback is extremely important to help students to understand the meaning of the derived words before they process the parts in the reading section.
* **Note:** Students receive immediate feedback after every sentence so that the sentence that they heard is still fresh in their memory when they receive the feedback.

********Answers to Part 1: Interpretation Task********
1) Picture B - Oscar and Louanne's relationship is an **inspirational** tale of love beginning in an unlikely place.
Explanation: The answer is Picture B because the man is "**inspired**" by the book and thinks that it is awesome. In other words, the book was **inspirational** to him. Picture A is not correct because the "dog" (I think it's a dog!) is in no way inspired by the book – The dog thinks that the book is bad. It may be helpful to direct Ss' attention to what the figures are saying.

2) Picture B: They met online and discovered many **similarities** between them.
Explanation: The answer is Picture B because it shows that Oscar and Louanne have a lot of **similar** interests. They both like cats, smoking, soccer, and tacos. Picture A shows just the opposite – they do not share any **similar** interests.

3) Picture A: The problem was that Oscar was in a **correctional** institution!
Explanation: Picture A is correct because it shows Oscar in Jail – a place to receive **correction**. In this case, **correctional** (base: correct) is being used as an adjective to describe a place where a person goes to receive **correction** for bad behavior. Picture B shows Oscar in a zoo and has nothing to do with **correction**.

4) Picture B: He realized that his past actions had caused others a sense of great **painfulness**.
Explanation: The answer to this question is very much embedded in the context of this sentence. The correct answer is A because Oscar is realizing that stealing a purse from an older woman caused others a lot of **pain**. In Picture B Oscar smiles when he thinks about stealing purses from older women. In this case, he does not realize that his past actions have caused others a lot of **painfulness**. [The meaning of painfulness is emotional distress.]

5) Picture B: The pair had to show great **adaptability** for the next few years but they made it work.
Explanation: Picture B is correct because Louanne can **adapt** to Oscar being in prison. Explain to students that a relationship with a prison would be difficult because he or she is "in prison" and there are many restrictions on visitation for prisoners. In the two pictures on this slide, Oscar and Louanne maintain contact via telephone through prison bars. The Louanne in Picture A cannot **adapt** to this type of relationship, whereas the Louanne in Picture B loves Oscar no matter what.

6) Picture A: They have to battle negative **perceptions** of their relationship, but they still love each other.

Explanation: Picture A is the correct answer because Louanne and Oscar are happily in love even though people glare at them in an unfriendly manner. Point out that the people in Picture A look mean because they have negative **perceptions** of Louanne being in love with someone who was in jail. The people in Picture B don't have "negative **perceptions**" of Oscar and Louanne's relationship – they smile and wave as Oscar and Louanne walk by.

Part 2 – Reading (3-4 minutes)

Purpose: The purpose of this activity is to focus Ss' attention on the components of the derived words within a meaningful context. This is an input-enhancement condition.

Implementation:

- Direct Ss' attention to the Reading section on slide 16.
- Explain that Ss should read the following story carefully and that they should pay special attention to the highlighted words.
- You should also explain that the word in parenthesis (e.g., base: acquire) is the base form and that the different colors illustrate different parts of the word.
- After several minutes, move on to Part 3 of the activity.

Part 3 – Multiple Choice (3 minutes)

Purpose: The purpose of this task is to push students to recall the derived form that they had been exposed to in the previous input-processing condition.

Implementation:

- Explain the task – students should circle the letter of the word that fits best in the blank. (All of the choices are derivatives, but only one choice is correct).

Feedback:

- Review the correct answers with students and provide explanations as necessary (slide 18).

Note: To speed up the activity, just read the answers as they appear on the PowerPoint. Students should be able to check their answers on their own.

******Short answers to Part 3*******

(1) c. inspirational
(2) b. similarities
(3) c. correctional
(4) c. painfulness
(5) b. adaptability
(6) a. perceptions

*********Complete Answers to Part 3*********

1) Answer = C: Oscar and Louanne's relationship is an _____ tale of love beginning in an unlikely place.

a. inspire b. inspiration c. inspirational

2) Answer = B: They met online and discovered many _____ between them.

a. similar(s) b. simliariti(es) c. similarness(es)

3) Answer = C: The problem was that Oscar was in a _____ institution!

a. correct b. correction c. correctional

4) Answer = C: He realized that his past actions had caused others a sense of great _____.

a. painness b. painful c. painfulness

5) Answer = B: The pair had to show great _____ for the next few years, but they made it work.

a. adapt b. adaptability c. adaptitiable

6) Answer = A: They have to battle negative _____ of their relationship, but they still love each other

a. perception(s) b. perceptible(s) c. perceive(s)

G.1.5 Input Lesson Plan 5

Lesson Plans: The Gaia Hypothesis
Session 5 – Input processing condition

Goal: Students will practice derivational morphology through exposure to an input treatment.

Materials:

1) Session 5 (input) powerpoint. {provided on a jump drive}
2) Copies of the input-processing worksheet.
3) Computer with projector and speakers.

Introduction: Morphology (1 minutes)

Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:

- Explain that morphology is "making words from word parts" (this is simple definition so that students can grasp the idea)
- Go through the example with the word *govern* quickly before students begin to work on the activity.

- Eventually you can skip this activity once students are in tune with what is going on.

Part 1: Interpretation Task (6-7 minutes)

Purpose: This task gives Ss a chance to listen to and process derivational morphology via an aural task before being exposed to the reading passage. Feedback from teachers is **critical** in helping students focus on the meaning of the derived words before the words are broken into parts. At first, this task will be very difficult for students until they become more familiar with the affixes through these treatment sessions.

Implementation:

****NEW* **** Explain what the Gaia Hypothesis is before students read because students are probably not familiar with the Gaia Hypothesis.

- Briefly explain that this hypothesis claims that the Earth is a living system of interactions between biological organisms (i.e., plants and animals), the oceans, the land, and the atmosphere. Those who believe in this hypothesis claim that human actions may cause severe problems for the environmental systems. **

- Explain that Ss will hear several sentences and they should choose the picture that best represents the sentence they hear. The sentences in this lesson are connected in a short story.

- Play the recording that accompanies each set of pictures as students work to choose the correct picture. You may wish to play each recording twice.

SUGGESTION: It may be helpful to students if you talk about what's happening in the pictures before they listen to the sentences. You might ask something like: What is happening in Picture A? | What is happening in Picture B?

Feedback:

- Review the correct answers with the PowerPoint slides. (Note: The original sentences accompany the feedback slides, so you can explain why Ss should have chosen a specific picture.)

- This feedback is extremely important to help students to understand the meaning of the derived words before they process the parts in the reading section.

* **Notes:**

- Students receive immediate feedback after every sentence so that the sentence that they heard is still fresh in their memory when they receive the feedback.

- The word ACCESSIBILITY is somewhat different from other words that students have seen because the -ABLE affix sometimes has a different phonological/orthographic form (IBLE). There is no cut and dry rule for when to use ABLE vs. IBLE, so this can be tricky even for native speakers. It is important that students know to look out for these changes and that they know that the two suffixes have the same meaning.

********Answers to Part 1: Interpretation Task********

1) Picture A -People who believe in the Gaia Hypothesis say that no amount of **cheerfulness** about the future will heal the effects of society's **wastefulness**.

Explanation: The answer is Picture A because it shows people who are cheerful about the future changing despite society's wastefulness; however, their cheerfulness does nothing to heal the effects of society's wastefulness (which is depicted by the sad people in the after picture). Picture B is not the answer because it shows that cheerfulness can change the effects of society's wastefulness.

2) Picture B: Nature can only do so much **absorption** of poison before it reaches a critical point.
Explanation: The answer is Picture B because it shows the Earth absorbing poison and reaching a critical point (i.e., the Earth is sick from absorbing poison). Picture A is not correct in the context of the sentence because the Earth is healthy and asks for more poison. The idea is that absorption of poison makes the Earth unhealthy as in Picture B. It may be helpful to direct Ss' attention to the speech bubbles to help illustrate the concept of absorption.

3) Picture B: The details are complicated and because it cannot be covered with any **brevity**, it does not have much **accessibility** to the common person.
Explanation: Picture B is correct because it shows something that takes a long time (=SOMETHING NOT BRIEF) and is not easy to grasp (=NOT ACCESSIBLE). The person in Picture B is frowning because he has been sitting at the computer for hours and is still not able to grasp the details of whatever he is studying. Picture A shows the reverse in that the material is easy to grasp (=ACCESSIBLE) and is doesn't take a long time to learn (= BRIEF).

4) Picture A: Scientists are currently developing educational programs to teach people how to take care of the planet.
Explanation: Picture A is correct because it shows a scientist developing an educational program to teach people how to take care of the planet. Picture B shows a scientist doing research. We don't know from Picture B if the scientist is doing anything to develop an educational program, so Ss must choose picture A.

Part 2 – Reading (3-4 minutes)

Purpose: The purpose of this activity is to focus Ss' attention on the components of the derived words within a meaningful context. This is an input-enhancement condition.

Implementation:

- Direct Ss' attention to the Reading section on slide 16.
- Explain that Ss should read the following story carefully and that they should pay special attention to the highlighted words.
- You should also explain that the word in parenthesis (e.g., base: acquire) is the base form and that the different colors illustrate different parts of the word.
- After several minutes, move on to Part 3 of the activity.

Part 3 – Multiple Choice (3 minutes)

Purpose: The purpose of this task is to push students to recall the derived form that they had been exposed to in the previous input-processing condition.

Implementation:

- Explain the task – students should circle the letter of the word that fits best in the blank. (All of the choices are derivatives, but only one choice is correct).

Feedback:

- Review the correct answers with students and provide explanations as necessary (slide 18).

Note: To speed up the activity, just read the answers as they appear on the PowerPoint. Students should be able to check their answers on their own.

******Short answers to Part 3*******

1) * a. cheerfulness, ** b. wastefulness

2) b. absorption

3) * b. brevity, ** c. accessibility

4) a. educational

*********Complete Answers to Part 3*********

1) Answers = A|B: People who believe in the Gaia Hypothesis say that no amount of (*) _____about the future will heal the effects of society's (**) _____.

(*) a. cheerfulness b. cheer c. cheerful

(**) a. waste b. wastefulness c. wasteful

2) Answer = B: Nature can only do so much _____ of poison before it reaches a critical point.

a. absorb b. absorption c. absorbable

3) Answers = B | C: The details are complicated and because it cannot be covered with any (*) _____ it does not have much (**) _____to the common person.

(*) a. brief b. brevity c. briefness

(**) a. accessible b. access c. accessibility

4) Answer = A: Scientists are currently developing _____programs to teach people how to take care of the planet.

a. educational b. education c. educate

Part 4: Opinion Survey (2-3 minutes)

Purpose: Collect students' opinions on the morphology training in order to improve the training for use in future ELI classes.

Implementation:
- Pass out the short surveys after students finish Part 3.
- Explain the instructions: “Please rate the following statements from 5 (strongly agree) to 1 (strongly disagree) based on your own opinions of the morphology training.”
- You might explain the scale by saying if they strongly agree with the statement, they should choose “5”; if they strongly disagree with a statement, they should choose “1”. In the case that they are not sure, they are free to choose “3” which means they are not sure.
- Give students a few minutes (1-3 minutes) to work on the survey and then collect all surveys.

G.2 Output Lesson Plans

G.2.1 Output Lesson Plan 1

Lesson Plans: Cinema
Session 1 – Pushed output condition

Goal: Students will practice derivational morphology by producing language output.

Materials:
1) Session 1 (output) PowerPoint [Provided on a jump drive.]
2) Copies of the output worksheets.
3) Computer and projector.

Part 1: Reading (2-3 minutes):
Purpose: This task provides exposure to the target forms in a meaningful context.
***Note**: Do not pass out the worksheets until after students have read the story.
Implementation:
- Set up the PowerPoint.
- Explain that Ss will read a passage (slide 3) and then answer questions related to the passage.
- Give Ss 2-3 minutes to read the passage and then move to the next section – do not leave the PowerPoint on the slide with the reading passage.

Part 2:Fill-in-the-blank (2-3 minutes)
Purpose: This task is designed to focus Ss’ attention on derivational suffixes through a generation task.
Implementation:

- Explain that students should fill in the blanks with the missing letters. (Work through the first item if Ss are confused).
- Explain that one letter fits into each blank.
- Explain that the base word is given in parentheses.
- Students should attempt to recall the appropriate suffixes on their own before feedback is provided.

Feedback:
- Show Ss the correct answers from the PowerPoint slides (slide 5).

*******Answers to Part 2*******

1) Coming to theaters near you, the (base: sense) sensat i o n a l science fiction movie of the season: *Choice.*

2) The film follows a group of people who are tired of the government's lack of (base: account) account a b i l i t y and decide to do something about it.

3) They form an alliance or friendship, with other (base: oppose) opposit i o n a l groups to threaten the (base: secure) secur i t y of the state.

4) The public's (base: erode) ero s i o n of trust in the government gives more power to the rebellion.

5) Just when it seems like the government forces will be destroyed the rebel army starts to break down and all of the previous (base: hope) hopef u l n e s s is gone.

<u>Part 3: Dehydrated sentences (~ 10 minutes)</u>

Purpose: This task is designed to "push" Ss to use derived words to create meaningful sentences.

Implementation:

- Go over the instructions with students and have them start to write sentences. (If necessary, go over the first sentence as an example to get students started).

Feedback:
- The teacher and the researchers should circulate while Ss are writing to provide feedback on the sentences Ss are writing (feedback is especially important for the derived words.)
- After Ss finish, show them the model sentences from the PowerPoint so that they can check their sentences with a model.
- Ss' answers may vary slightly from these models.

*******Possible Answers to Part 3*******

1) Man / think / concert / be / sensation. (Use sensation as an adjective.)
Answer: The man thought that the concert was sensational.
2) Politicians / lack / accountable / when /use / government money. (Use accountable as a noun.)
Answer: Politicians sometimes lack accountability when using government money.
3) People /hold/ oppose / views / that are not the same as the views of their leaders. (Use oppose as an adjective.)
Answer: People sometimes have oppositional views that are not the same as the views of their leaders.
4) Airport / x-ray machines / provide / secure. (Use secure as a noun.)

Answer: The airport's x-ray machines provide good security.
5) Flood / cause / soil / erode / (Use erode as a noun.)
Answer: Floods cause soil erosion.
6) New factory / bring / hopeful / unemployed people / Pittsburgh. (Use hopeful as a noun.)
Answer: The new factory brings a sense of hopefulness to unemployed people in Pittsburgh.

G.2.2 Output Lesson Plan 2

Lesson Plans: Love and Dating
Session 2 – Pushed output condition

Goal: Students will practice derivational morphology by producing language output.

Materials:
1) Session 2 (output) PowerPoint [Provided on a jump drive.]
2) Copies of the output worksheets.
3) Computer and projector.

(*NEW*) Introduction: Morphology (1 minutes)
Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:
- Explain that morphology is "making words from word parts" (this is simple definition so that students can grasp the idea)
- Go through the example with the word *govern* quickly before students begin to work on the activity.
    - The affix *ment* changes verbs to nouns.
- Eventually you can skip this activity once students are in tune with what is going on.

Part 1: Reading (2-3 minutes):
Purpose: This task provides exposure to the target forms in a meaningful context.
***Note**: Do not pass out the worksheets until after students have read the story.
Implementation:
- Set up the PowerPoint.
- Explain that Ss will read a passage (slide 3) and then answer questions related to the passage.
- Give Ss 2-3 minutes to read the passage and then move to the next section – do not leave the PowerPoint on the slide with the reading passage.

Part 2:Fill-in-the-blank (3-4 minutes)

Purpose: This task is designed to focus Ss' attention on derivational suffixes through a generation task.

Implementation:

- Explain that students should fill in the blanks with the missing letters. (Work through the first item if Ss are confused).

- Explain that one letter fits into each blank.
- Explain that the base word is given in parentheses.
- Students should attempt to recall the appropriate suffixes on their own before feedback is provided.

Feedback:

- Show Ss the correct answers from the PowerPoint slides (slide 5).

(*NEW*) I've changed the way that the answers are revealed on the PowerPoint. Each answer appears after the teacher clicks on the screen. The answers can now be reviewed sequentially without revealing all of the answers at the same time.

*******Answers to Part 2*******

1) Some people think that love is about the (base: acquire) acquisi t i o n of gifts.
2) Others take a more (base: relate) relat i o n a l view on love.
3) That is, love is about finding someone you enjoy being with, even when the relationship enters into routines and (base: predict) predict a b i l i t y.
4) It's about finding someone that brings out your sense of (base: play) playf u l n e s s.
5) You need to find someone you trust, someone on whose (base: rely) reli a b i l i t y you can count.
6) Their (base: ethnic) ethnic i t y, their age, the amount of money they make – all of that stuff doesn't matter.

Part 3: Dehydrated sentences (~ 10 minutes)

Purpose: This task is designed to "push" Ss to use derived words to create meaningful sentences.

Implementation:

- Go over the instructions with students and have them start to write sentences. (If necessary, go over the first sentence as an example to get students started).

- Encourage Ss to write sentences without looking back at the previous section.

Feedback:

- The teacher and the researchers should circulate while Ss are writing to provide feedback on the sentences Ss are writing (feedback is especially important for the derived words.)
- After Ss finish, show them the model sentences from the PowerPoint so that they can check their sentences with a model.
- Ss' answers may vary slightly from these models.

*******Possible Answers to Part 3*******

1) The **acquisition** (verb → noun) of a foreign language takes many years of study.
2) The schedule lacks **predictability** (verb → ADJ → noun) and is confusing for students.

* [predict (verb) → predictable (ADJ) → predictability (noun)]

3) According to a **relational** (verb → noun → ADJ) view of human society, humans like to live near other humans.
* [relate (verb) → relation (noun) → relational (ADJ)
4) The man shows a degree of **playfulness** (verb → ADJ → noun) although he is 100 years old.
    * [play (verb) → playful (ADJ) → playfulness (noun)]
5) The student questioned the **reliability** (verb → ADJ → noun) of the computer program after it crashed during his presentation.
    * [rely (verb) → reliable (ADJ) → reliability (noun)]
6) Employers cannot use a person's **ethnicity** (ADJ → noun) when hiring new employees.

G.2.3 Output Lesson Plan 3

Lesson Plans: Strange Phenomena
Session 3 – Pushed output condition

Goal: Students will practice derivational morphology by producing language output.

Materials:
1) Session 3 (output) PowerPoint [Provided on a jump drive.]
2) Copies of the output worksheets.
3) Computer and projector.

Introduction: Morphology (1 minutes)
Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:
- Explain that morphology is "making words from word parts" (this is simple definition so that students can grasp the idea)
- Go through the example with the word *govern* quickly before students begin to work on the activity.
    - The affix *ment* changes verbs to nouns.
- Eventually you can skip this activity once students are in tune with what is going on.

Part 1: Reading (2-3 minutes):
Purpose: This task provides exposure to the target forms in a meaningful context.
***Note**: Do not pass out the worksheets until after students have read the story.
Implementation:
- Set up the PowerPoint.

- Explain that Ss will read a passage (slide 3) and then answer questions related to the passage.
- Give Ss 2-3 minutes to read the passage and then move to the next section – do not leave the PowerPoint on the slide with the reading passage.

Part 2:Fill-in-the-blank (3-4 minutes)

Purpose: This task is designed to focus Ss' attention on derivational suffixes through a generation task.

Implementation:

- Explain that students should fill in the blanks with the missing letters. (Work through the first item if Ss are confused).
- Explain that one letter fits into each blank.
- Explain that the base word is given in parentheses.
- Students should attempt to recall the appropriate suffixes on their own before feedback is provided.

Feedback:

- Show Ss the correct answers from the PowerPoint slides (slide 5).
- I've changed the way that the answers are revealed on the PowerPoint. Each answer appears after the teacher clicks on the screen. The answers can now be reviewed sequentially without revealing all of the answers at the same time.

*******Answers to Part 2*******

1) It started when Micah found a strange book in the library titled *The Expan s i o n of the Mind*.
2) Soon, he began to talk about his conver s i o n to a new way of thinking.
3) Before reading the book, Micah had been known for his excit a b i l i t y; however, after reading the book, Micah began to express more matur i t y.
4) What was troubling was that he began to experience periods of forgetf u l n e s s.
5) When his friends brought up the changes in his behavior, he complained about the rigid i t y of their minds and left.

Part 3: Dehydrated sentences (~ 10 minutes)

Purpose: This task is designed to "push" Ss to use derived words to create meaningful sentences.

Implementation:

- Go over the instructions with students and have them start to write sentences. (If necessary, go over the first sentence as an example to get students started).
- Encourage Ss to write sentences without looking back at the previous section.

Feedback:

- The teacher and the researchers should circulate while Ss are writing to provide feedback on the sentences Ss are writing (feedback is especially important for the derived words.)
- After Ss finish, show them the model sentences from the PowerPoint so that they can check their sentences with a model.
- Ss' answers may vary slightly from these models.

- I've changed the way that the answers are revealed on the PowerPoint. Each answer appears after the teacher clicks on the screen. The answers can now be reviewed sequentially without revealing all of the answers at the same time.

*******Possible Answers to Part 3*******

1) The **expansion** (V-> N) of human civilization causes problems for the environment.
2) The professor's **conversion** (V->N) to a new teaching method helped students learn.
3) The child showed great **maturity** (ADJ->N) while eating with the adults.
4) The child showed great **excitability** (V-> ADJ -> N) during the holidays.
* [excite (v) → excitable (adj.) → excitability (N)]
5) The teacher was known for his **forgetfulness** (V-> ADJ -> N); he never remembered to bring his book to class.
* [forget (v.) → forgetful (ADJ) → forgetfulness (N.)]
6) The man could not bend the piece of metal due to its **rigidity** (ADJ -> N).

G.2.4 Output Lesson Plan 4

Lesson Plans: Love and Dating
Session 4 – Pushed output condition

Goal: Students will practice derivational morphology by producing language output.

Materials:
1) Session 4 (output) PowerPoint [Provided on a jump drive.]
2) Copies of the output worksheets.
3) Computer and projector.

Introduction: Morphology (1 minutes)
Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:
- Explain that morphology is "making words from word parts" (this is simple definition so that students can grasp the idea)
- Go through the example with the word *govern* quickly before students begin to work on the activity.

- Eventually you can skip this activity once students are in tune with what is going on.

Part 1: Reading (2-3 minutes):

Purpose: This task provides exposure to the target forms in a meaningful context.

***Note**: Do not pass out the worksheets until after students have read the story.

Implementation:

- Set up the PowerPoint.
- Explain that Ss will read a passage and then answer questions related to the passage.
- Give Ss 2-3 minutes to read the passage and then move to the next section – do not leave the PowerPoint on the slide with the reading passage.

Part 2:Fill-in-the-blank (3-4 minutes)

Purpose: This task is designed to focus Ss' attention on derivational suffixes through a generation task.

Implementation:

- Explain that students should fill in the blanks with the missing letters. (I would expect that most students know what to do now, so you probably won't have to explain much.)
- Explain that one letter fits into each blank.
- Explain that the base word is given in parentheses.
- Students should attempt to recall the appropriate suffixes on their own before feedback is provided.

Feedback:

- Show Ss the correct answers from the PowerPoint slides.

I've changed the way that the answers are revealed on the PowerPoint. Each answer appears after the teacher clicks on the screen. The answers can now be reviewed sequentially without revealing all of the answers at the same time.

*******Answers to Part 2*******

1) Oscar and Louanne's relationship is an (base: inspire) inspirat i o n a l tale of love beginning in an unlikely place.

2) They met online and discovered many (base: similar) similar i t i e s between them.

3) The problem was that Oscar was locked up in a (base: correct) correct i o n a l institution!

4) He realized that his past actions had caused others a sense of great (base: pain) painf u l n e s s.

5) The pair had to show great (base: adapt) adapt a b i l i t y for the next few years but they made it work.

6) They have to battle negative (base: perceive) percept i o n s of their relationship, but they still love each other.

Part 3: Dehydrated sentences (~ 10 minutes)

Purpose: This task is designed to "push" Ss to use derived words to create meaningful sentences.

Implementation:

- Go over the instructions with students and have them start to write sentences. (Again, Ss probably know what to do here.)
- Encourage Ss to write sentences without looking back at the previous section.

Feedback:

- The teacher and the researchers should circulate while Ss are writing to provide feedback on the sentences Ss are writing (feedback is especially important for the derived words.)
- After Ss finish, show them the model sentences from the PowerPoint so that they can check their sentences with a model.
- (*NEW*) The answers now appear one at a time when you click the mouse on the feedback slide.
- Ss' answers may vary slightly from these models.

*******Possible Answers to Part 3*******

1) Mahatma Gandhi was an inspirational person.
2) The man confused the twins' names because of the similarity of their looks.
3) The criminal was sent to a correctional facility.
4) The painfulness of his memories made the man cry.
5) Adaptability is important in a car because every driver has different needs.
6) The tourist had a different perception of the town than the residents.

G.2.5 Output Lesson Plan 5

Lesson Plans: The Gaia Hypothesis
Session 5 – Pushed output condition

Goal: Students will practice derivational morphology by producing language output.

Materials:

Session 5 (output) PowerPoint [Provided on a jump drive.]; copies of the output worksheets; computer and projector.

Introduction: Morphology (1 minutes)

Purpose: Refresh students' memories as to what morphology is and give a concrete example before they start working. (Students will see the same example each lesson).

Implementation:

- Explain that morphology is “making words from word parts” (this is simple definition so that students can grasp the idea)
- Students are probably well aware of this slide by now - you can probably just skip it.

Part 1: Reading (2-3 minutes):

Purpose: This task provides exposure to the target forms in a meaningful context.

***Note**: Do not pass out the worksheets until after students have read the story.

Implementation:

******NEW* ******

- Explain what the Gaia Hypothesis is before students read because students are probably not familiar with the Gaia Hypothesis. Briefly explain that this hypothesis claims that the Earth is a living system of interactions between biological organisms (i.e., plants and animals), the oceans, the land, and the atmosphere. Those who believe in this hypothesis claim that human actions may cause severe problems for the environmental systems. **
- Explain that Ss will read a passage and then answer questions related to the passage.
- Give Ss 2-3 minutes to read the passage and then move to the next section – do not leave the PowerPoint on the slide with the reading passage.

Part 2: Fill-in-the-blank (3-4 minutes)

Purpose: This task is designed to focus Ss’ attention on derivational suffixes through a generation task.

Implementation:

- Explain that students should fill in the blanks with the missing letters. (I would expect that most students know what to do now, so you probably won’t have to explain much.)
- Explain that one letter fits into each blank.
- Explain that the base word is given in parentheses.
- Students should attempt to recall the appropriate suffixes on their own before feedback is provided.

Feedback:

- Show Ss the correct answers from the PowerPoint slides.
- I’ve changed the way that the answers are revealed on the PowerPoint. Each answer appears after the teacher clicks on the screen. The answers can now be reviewed sequentially without revealing all of the answers at the same time.

*******Answers to Part 2*******

1) People who believe in the Gaia Hypothesis say that no amount of cheerf u l n e s s about the future will heal the effects of society's wastef u l n e s s.

2) Nature can only do so much absor p t i o n of poison before it reaches a critical point.

3) The details are complicated and because it cannot be covered with any brev i t y it does not have much access i b i l i t y to the common person.

4) Scientists are currently developing educat i o n a l programs to teach people how to take care of the planet.

Part 3: Dehydrated sentences (~ 10 minutes)

Purpose: This task is designed to "push" Ss to use derived words to create meaningful sentences.

Implementation:

- Go over the instructions with students and have them start to write sentences. (Again, Ss probably know what to do here.)

- Encourage Ss to write sentences without looking back at the previous section.

Feedback:

- The teacher and the researchers should circulate while Ss are writing to provide feedback on the sentences Ss are writing (feedback is especially important for the derived words.)
- After Ss finish, show them the model sentences from the PowerPoint so that they can check their sentences with a model.
- The answers now appear one at a time when you click the mouse on the feedback slide.
- Ss' answers may vary slightly from these models.

*****Possible Answers to Part 3*****

1) The secretary's cheerfulness in the morning made others in the office feel happy.
   [cheer (v./n.) --> cheerful (adj.) --> cheerfulness (n.)]
2) Human wastefulness causes harm to the environment.
   [waste (v./n.) --> wasteful (adj.) --> wastefulness (n.)]
3) The atmosphere's absorption of the sun's rays protects us from dangerous radiation.
   [absorb (v.) --> absorption (n.)]
4) The man did not know his girlfriend very well due to the brevity of their relationship.
   [brief (adj.) --> brevity (n.)]
5) The theater had good accessibility to people with disabilities.
   [access (v.) --> accessible (adj.) --> accessibility (n.)]
6) Children in the best schools have many educational opportunities.
   [educate (v.) --> education (n.) --> educational (adj.)]

Part 4: Opinion Survey (2-3 minutes)

Purpose: Collect students' opinions on the morphology training in order to improve the training for use in future ELI classes.

Implementation:

- Pass out the short surveys after students finish Part 3.
- Explain the instructions: "Please rate the following statements from 5 (strongly agree) to 1 (strongly disagree) based on your own opinions of the morphology training."

- You might explain the scale by saying if they strongly agree with the statement, they should choose “5”; if they strongly disagree with a statement, they should choose “1”. In the case that they are not sure, they are free to choose “3” which means they are not sure.
- Give students a few minutes (1-3 minutes) to work on the survey and then collect all surveys

APPENDIX H

DELAYED POSTTEST (STUDY 2)

H.1 Words on the delayed posttest

Table 40. Words on the Study 2 delayed posttest

Condition	Taught	Pre_post Gain	Untaught	Pre_post Gain
ful+ness	cheerfulness	60%	thankfulness	54%
able+ity	predictability	20%	sustainability	13%
ity	similarity	30%	legality	12%
tion	absorption	12%	exclusion	11%
able	reliable	26%	dependable	10%
ness	N/A	N/A	toughness	19%
ful	forgetful	12%	truthful	18%
ful+ness	forgetfulness	39%	forcefulness	42%
able+ity	adaptability	10%	dependability	8%
ity	brevity	7%	neutrality	8%
tion	sensation	12%	intention	5%
able	adaptable	25%	variable	5%
ness	N/A	N/A	closeness	12%

H.2 Delayed posttest document

MORPHOLOGY: FILL IN THE BLANK

Directions: Fill in the blank with the appropriate form of the word. All words require a change. In Example A, *govern* requires an /s/ in order to agree with the subject *president.* In Example B, govern (verb) is changed to a noun by adding /*ment/* to form government.

Example A: Govern: The president *govern*s_____the country.

Example B: Govern. The *govern*ment____ makes the country's laws.

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1. Forceful: The counselor told us that _____ was not a good way to solve problems.
2. Tough: The athlete's _____ came from his intense training.
3. Brief: The speech's _____ was refreshing.
4. Sustain: The government did not consider environmental _____ when they cut down the forest.
5. Forget: The student's _____ causes her lots of problems.
6. Similar: The _____ between the twin sisters was remarkable.
7. Adapt: Animals that show great _____ will survive.
8. Predict: The woman considered Ben to be boring because of his _____.
9. Sense: The monster crept up behind the woman and she felt a strange _____ on her neck.
10. Neutral: Canada is known for its _____ in times of war.
11. Legal: The _____ of the man's actions was questioned during his trial.
12. Truth: The statement was thrown out for not being _____.
13. Thankful: During holidays, it is good to express your _____.
14. Exclude: The movie star was angry about her _____ from the guest list.
15. Rely. The boy thinks that his father is _____.
16. Depend: The mother wanted a _____ baby-sitter to watch her children while she worked.
17. Forget: The notebook helps the student remember when she is _____.
18. Absorb: Sponges with good _____ work the best.
19. Close: The two brothers were known for the _____of their relationship.

20. Depend: Toyota cars are well known for their _____ since they last for over 10 years.
21. Intend: The boy's _____ was to make people laugh.
22. Vary: The weather is so _____ it is hard to know how to dress!
23. Cheerful: The teacher's _____ came through in everything he did.
24. Adapt: Humans are _____ and can live in many different environments.

APPENDIX I

INTERVIEW PROTOCOL FROM STUDY 3

Part A: Goals and background information

[**Purpose:** The purpose behind these questions is to find out background information about the participants such as why they want to learn English.]

Basic information:

1) What is your native language?

2) Where are you from?

3) Why are you studying English here in Pittsburgh?

4) What do you hope to do after you finish studying here?

5) How long did you study English in your home country?

6) What skills do you want to learn while you're here? (Ex: speaking, writing, etc.)

Part B: Learning derived words (10 minutes)

[Purpose: I want to gather information about previous experience learning derivational morphology and whether they think this type of instruction is beneficial (beliefs and motivations).]

1) What is the best way to learn vocabulary?

2) What is the worst way to learn vocabulary?

3) Have you ever studied derivational morphology (besides in this study)?

4) Do you think that learning about derived words (or word parts) is important?

If so, why?

If not, why not?

5) Did this study help you meet your goals for learning English? Why or why not?

If Yes, which part helped you the most?

6) Would you recommend this type of practice to a friend? Why or why not?

APPENDIX J

CLASSROOM OBSERVATION FORM FROM STUDY 3

Observation Form:

Description: This observation form should be filled out while observing the class or immediately after the training session is completed. Help out as directed by the teacher and work on this form when your assistance is not needed.

I. The basics:

Class: Date:
Reading Teacher: # of students in class:
Session: (e.g., Session 1 – Input/Output):

II. Description: (Take notes on how students engage in the activity and with the teacher during the activity.)

1) Describe the lesson (How is the material presented?)

2) Describe how students engage in the activities? (e.g., What do they do or say while they are working on the materials?)

3) How do the students engage with the teacher during the activities? (e.g., do they ask questions – if so, note the questions, do students say anything about the activities?)

4) How long does each activity take?
* Time for part 1:
* Time for part 2:
* Time for part 3:

5) Other comments and observations:

III. Evaluation:

1) What went well during the training session?

2) How could the training be improved based on your observations?

APPENDIX K

OPINION SURVEY FROM STUDY 3

Reading Teacher: _____ Pitt Username (optional): _____

Part 4 | Opinion Survey: Please rate the following statements from 5 (strongly agree) to 1 (strongly disagree) based on your own opinions of the morphology training.

Statements about the morphology training	**Agree**				**Disagree**
1) I knew a lot about morphology (making words from word parts) before this training.	5	4	3	2	1
2) I consciously tried to use different word forms before this training.	5	4	3	2	1
3) This training helped me learn more about morphology.	5	4	3	2	1
4) I consciously try to use different word forms now because of this training.	5	4	3	2	1
5) I liked learning about morphology through this training.	5	4	3	2	1
6) I would like to receive additional training on morphology in my ELI classes.	5	4	3	2	1

APPENDIX L

SUMMARY OF CLASSROOM OBSERVATIONS FROM STUDY 3

Table 41. Summary of classroom observations from Study 3

Ses.	Condition/ Teacher	Time	Teacher's Actions	Student Engagement	Other Comments
1	Input (Teacher H)	20 mins	- Part 1 – Pictures – Tr elicits meaning of derived words after students go through the pictures. - Part 2 – Reading - Tr instructs learners to read the passage on their own. - Part 3 – Multiple choice – Tr provides feedback on MC questions using the powerpoint slides.	- students listen - students react to Tr's questions - they are confused at this point about some of the words and task requirements.	
1	Input (Teacher A)	26 mins	- elicited answers from students as they went through the activities. - lots of time spent on pictures and multiple choice	- Ss are quiet.	
1	Output (Teacher E)	19 mins	- Tr presents activities according to lesson plan.	- students were very quiet during the training. - students ask a few questions during	

				Task 3.	
2	Input (Teacher A)	12 mins	- intro. to morphology - Part 1 - Picture task –Teacher provides grammar explanations "tion changes the base word to a noun" for most of the words. - Part 2 - Reading task – tells students to read quietly. - Part 3 - Multiple choice – Tr gives grammar explanations.	- Students listen, but they are not very active.	
2	Output (Teacher E)	21	- intro to morphology - Tr elicits answers from part 2 and part 3. - Tr answers Ss' questions, leads discussion.	- Students asked questions about "relational" and "correctional".	
2	Input (Teacher B)	22 mins	- intro to morphology - Part 1 - Picture task – elicited answers from Ss; drew attention to word elements to draw out word meaning (-*tion* means noun) *asked questions about the pictures before Ss listened to draw attention to meaning. - Other activities presented according to lesson plan.	- Students answer Tr's questions and ask questions on their own. * write acquisition on the board.	
2	Input (Teacher C)	12 mins	- Teacher talked about the purpose of the study , which was to learn how to make new words from word parts. - Part 1: Teacher asked about root words.	- Students answered Tr's questions about root words. - Ss did not ask any questions.	- presented as a research activity.
2	Output (Teacher F)	20 mins	- intro to morphology - Reading – Explains activity - Fill-in – Tr provides feedback on sentences by reading the sentences with the correct answers. - Sentences – Tr circulates to help Ss with	- Ss ask questions about patterns in morphology.	

			sentence writing.		
3	Input (Teacher A)	21 mins	- intro to morphology - led students through each picture to the correct answer. - talks about clues to word meaning . - asks students to explain why they chose a particular picture. - For the multiple choice part, Tr asked follow-up questions – why is the answer correct.	- Students call out answers – respond to Tr's questions. - Ask about strategies or clues for thinking about morphology.	- Teacher used lots of prompting, eliciting answers, eliciting metacognition. - Ss were very engaged in the lesson, more than before.
3	Input (Teacher C)	12 mins	- intro to morphology - Picture task – teacher asks for root words when reviewing the answers. - Multiple choice task – elicits responses from students; repeats answers after Ss read the sentences.	- Students respond to the teacher's questions. - They know the root words.	- presented as research study.
3	Output (Teacher E)	16 mins	- Study presented according to the lesson plans. - Feedback provided from slides.	- Students ask a few questions about the sentences they wrote.	- presented as a research study.
3	Output (Teacher F)	21 mins	- intro to morphology – Tr briefly discusses part of speech changes. Part 1 – Tr instructs Ss to read quietly; Part 2 – Tr reviews answers according to slides. Part 3 – Tr explains the task and then circulates to help Ss. * Brief focus on multiple affixes with "forgetfulness"	- Part 1 – Students read quietly. - Part 2 – Ss work with generation activity. * Some Ss finish very quickly, other take more time. * Students make mistakes – expantion vs. expansion Part 3: Ss ask questions about inflectional morphology (e.g.,	

				possessive marking).	
3	Input (Teacher D)	21 mins	- Intro to morphology – very engaging. * elicits info. about morphology from students before beginning. Part 1 – Pictures – The teacher asks, "What's happening in Picture A/Picture B" before Ss listen to the sentences. * After listening, asks for words that they didn't understand. * The endings are elicited. Part 2 – Reading – Tr explains that the red part of the word is the base word; then Ss read. Part 3 – Tr reviews answers with students.	- Students are extremely engaged – active in answering and asking questions.	
4	Input (Teacher A)	13 mins	- intro to morphology - On Picture task – elicits base forms; asks for part of speech; asks Ss to explain how they know part of speech (rationale). - Tr asked Ss what was happening in some of the pictures before Ss listed to the sentences.	- Students respond to teacher's questions. - Students could typically recognize the root word.	
4	Input (Teacher C)	10 mins	- introduces the project as a research study; explains morphology. - On Picture task – Tr talks about each picture before Ss listen. - Tr skipped the slides that provided explicit answers. - On multiple choice – prompted Ss to provide answers, asked for root word.	- Students seemed to be enthusiastic and engaged.	- introduced as research study. - Tr skipped feedback slides.

4	Output (Teacher E)	20 mins	- introduction to morphology - Part 1 – Tr instructs Ss to read the story. - Part 2 – Tr reviews answers from the slide. - Part 3 – Tr reviews answers from the slide.	- Ss seem to be engaged. - Ss ask me what the goal of the project is.	- introduced as a research study.
4	Input (Teacher B)	20 mins	- introduction to morphology - Part 1 – Pictures – Tr elicits responses from Ss, has students explain their answers. Meaning is in focus for much of this activity.	- Ss seem to be engaged, interested in the activities. - They answer questions when called upon, but don't ask any questions on their own.	- introduced as morphology practice - Ss say that morphology is "word parts"
5	Output (Teacher G)	19 mins	- intro to morphology - Reading passage – Teacher went through each sentence to make sure students understood the meaning of the words in the sentences. - Fill-in-the-blank – Reviewed answers on the slide to provide feedback. - Sentence writing – Ss write sentences; Tr reviews sentences quickly so that Ss can check their answers. - End: Tr explains, "Remember the purpose is to get you to notice the difference in the words, to help you grow your vocabulary"	- Students are relatively quiet during the lesson. - One student asked about the relationship between brief and brevity.	
5	Output (Teacher F)	20 mins	- Part 1 – reading – Tr instructs Ss to read the passage on their own. - Part 2 – fill-in – Tr reviews slides sometimes drawing attention to correct spellings and the meaning of the root word.	- Ss ask questions about morphological processes: * Is the change in absorb --> absorption common? * What about brief --> brevity	- Introduced as morphology project, not study.

			- Part 3 – sentences – Tr circulated giving students prompts as they wrote sentences.		- Tr used the reading passage to draw attention to other grammatical features: “a” vs. “the”
5	Output (Teacher E)	18 mins	- intro to the topic - Part 1 – Tr instructs Ss to read the passage. - Part 2 – Tr directs the activity, has Ss fill in the blanks with the missing letters. - Part 3 – Tr provides feedback, asks questions about the sentences.	- Students seem to know what is going on. – Answers are elicited easily. Part 1: Two questions: What does *merit* mean? and Why /f/ - /v/ in brevity?	
5	Input (Teacher C)	13 mins	- intro to the topic - Part 1 – Pictures – Tr talks about the pictures before Ss listen; elicits what is happening. * Tr asks students to explain their answers. - Part 2 – Reading – Tr gives Ss a few minutes to read the passage. - Part 3 – Multiple choice – Tr has students read the answers and provides feedback.	- Students answer questions when called upon. - Ss ask questions about vocabulary.	

APPENDIX M

SUMMARIES OF STUDENT INTERVIEWS FROM STUDY 3

Table 42. Summary of students' prior experience with morphology

ID	NL	Level/ Cond	Reason for studying English	Studied morph. before.	Word parts are important.	This study helped meet your goals.	Other comments
A	Spanish	4/O	Apply to university in U.S.	No.	Yes. Would recommend training to a friend.	Yes. Liked the generation task. Helped him learn words.	Feedback from teacher isn't necessary. The slides are sufficient.
B	Arabic	4/I	Complete an MBA	No.	Yes. Would recommend to a friend. Wants ELI to incorporate in their courses.	Yes. Helps increase vocabulary quickly and "with easy way." Helps with the identification of new words. Liked listening.	Learns vocabulary by looking up 5 words a day and learning how to use them as different parts of speech (uses Excel).

					Wouldn't change anything about the study.		
C	Arabic	4/O	Complete an MA degree.	Yes. Studied linguistics.	Yes. Would recommend to a friend.	Yes. Learned that there are many parts of speech for one word.	Liked the fill-in-the-blank. Thinks that this type of training is really helpful for using a dictionary.
D	Chinese	3/I	Spouse in Pittsburgh, wants to improve English/apply to school	No. Just from the study in the ELI.	Yes. Can help in reading. If knows basic forms, they can guess the words meaning.	Yes. Liked the interpretation task. Thinks that the interesting pictures will help her learn better.	
E	Arabic	3/I	Apply to university in the U.S.	No.	Yes, because English words can be used as many different parts of speech.	Yes. When in Saudi Arabia, thought that a word had only one function.	Says that, "all Arabic students don't have any idea about morphology. They must learn it."
F	Arabic	4/O	Want to attend a university in the U.S.	Had some information, but didn't know how to use it. Was waiting to learn about it.	Yes. Knows the importance of morphology from Arabic.	No. Not enough practice. Thinks that the ELI needs to have an entire class on morphology + dictionary usage.	The core vocab is the worst way to learn vocabulary because there is no context.
G	Spanish	4/O	Needs English for international business.	No. Realized that morphology existed in	Yes. You can learn multiple words at the same time if	Yes. Thinks that this study is the best way to learn vocabulary. Would not change anything	* Quote about word knowledge. * Morphology is a very very good way to learn

			Speaking is really important.	Spanish + English bcs of this study.	you study word families.	about the study.	English. You need to learn all of the forms of the word at the same time. * Poor score on the pretest was highly motivating
H	Arabic	3/I	Wants to study in an American college.	No. Did not know the structures before.	Yes. Thinks that this is a good way to improve writing skills; wants to use words in the "perfect way."	Yes. Helped with writing and listening. Liked the interpretation task.	* Liked that the teacher showed the parts of the word (input enhancement). * This study helped this student recognize that word endings could provide clues to a word's part of speech.
J	Chinese	4/I	Wants to study in the U.S.	Yes. Previous English teachers showed him how to transform words.	Yes because if we learn words with parts, we don't have to memorize more words.	Yes, but didn't like the final multiple choice activity (Input condition) because it was too easy – he had already seen the sentences in part 1 and part 2.	Best to learn vocabulary in context. Liked the enhanced text activity.

Note. In the Level/Condition (cond) column: High intermediate = 4, Low intermediate = 3, Input Condition = I, Output Condition = O.

Table 43. Summary of students' vocabulary and grammar learning experiences

ID	NL	Level/ Cond	How long study English?	How did you study English in your home country?	Best way to learn vocabulary.	Worst way to learn vocabulary.	Personal vocabulary strategies.
A	Spanish	4/O	Since 7 y.o.	Primarily study grammar; little emphasis on pronunciation and writing.	Practice and read books.	Movies and TV.	Uses electronic translator.
B	Arabic	4/I	For 6 years.	Focus on grammar. Students read a chapter and then wrote sentences.	Look up words – definitions, synonyms, usage in a sentence, and parts of speech.	Translate vocabulary from their native language.	Looks up 5 new words a day and keeps track of vocabulary in an Excel workbook.
C	Arabic	4/O	6 years.	Traditional lecture is the most common method; however some teachers use communicative methods for speaking.	Keep a vocabulary notebook. Write base form and try to write down related words. Write sentences for these words.	Just writing the word without trying to figure out the context or the part of speech of the word.	Vocabulary notebook.
D	Chinese	3/I	10 years.	Grammar and writing. Did not practice listening or speaking.	See the word in a sentence.	Just see the word and learn how to spell it.	N/A
E	Arabic	3/I	6 years.	Focus on grammar and writing; very	Practice with speaking and writing.	No opinion.	N/A

				little speaking.			
F	Arabic	4/O	6 years.	Work on grammar more than vocabulary.	Listening to music and watching movies or the news.	Core vocabulary lists because there is no context.	Uses a "word family" approach to learning collocates and related words.
G	Spanish	4/O	11 years.	Two hours a week in elementary and high school. Very limited. Wife is native English speaker.	Learn morphology. You don't have to memorize each word individually.	Memorize one word at a time.	Practiced morphology at home by writing down a base form and trying to come up with alternate forms.
H	Arabic	3/I	9 years.	Studied grammar and speaking in primary and secondary school. Practiced with computer games.	Practice using new forms of the word when writing or speaking.	Just learn the word without any definition or example sentence.	
J	Chinese	4/I	15 years	This student remembers taking a lot of tests in English class, but rarely focusing on speaking or writing.	Memorize vocabulary by seeing in a sentence.	Memorize the word and the meaning in native language.	

APPENDIX N

TRANSCRIPTS FROM QUALITATIVE INTERVIEWS (STUDY 3)

N.1 Student A Interview

Subject ID: Student A
Subject Native language: Spanish from Mexico

D: research assistant (Daniel)
I: interviewee

D: What is your native language?
I: Spanish.
D: And where are you from?
I: Mexico.
D: Why are you studying English here in Pittsburgh.
I: Because I want to apply for university here, psychology.
D: At Pitt?
I: Yeah, but at first I have to learn, well, English.
D: How long did you study English in Mexico.
I: Since I have been, like, seven years old.
D: So, in school?
I: Yeah.
D: Did you study after graduating? In anything other than the ELI?
I: Yeah, in our institute in Mexico, but it was different to my school. Because when we were in school, commonly we study, it's like another topic like (?) like mathematics or English but after that I study in another institution especial, special for English.
D: How many years, do you think, after school in these institutes?

I: One year.
D: In grade school, what did they teach, what skills did they focus on?
I: Grammar, I think it's only grammar. Just a little pronunciation and a little writing. Not like this. If I can compare here to my school, only grammar.
D: Did you study morphology at all, besides the ELI, besides this study?
I: No.
D: What do you think is the best way to learn vocabulary.
I: Practice and reading and read books.
D: Reading books and then seeing them –
I: In English, yeah because I have read some books here, in English, and it helped me a lot to learn more vocabulary.
D: What kinds of strategies do you use when you're reading English words, if you come across a word you don't know.
I: Translator. (?) translator. Or my roommate.
D: Do you write it down to help you learn it or …?
I: No, I only memorize.
D: What do you think is the worst way to learn vocabulary?
I: Movies and TV, I guess.
D: Why do you think those are the worst way?
I: Why? Because maybe in the TV we see or hear a lot of slangs and pronunciation is different and you cannot acquire some of the words.
D: Do you think that learning about word parts is important?
I: Yeah, of course.
D: Why?
I: You mean morphology?
D: Yeah.
I: Yeah, because maybe it's going to be easy for you to take one different words and you can compare it, if you have a word and you want to make it an adjective, it's easy for you if you know morphology if you can change it and you can deduct a different word.
D: Do you think this study has helped you meet your goals for learning English?
I: Yeah, definitely because it's helped me to detect some things that's a rule, in some way, to convert the words to another.
D: In the different classes there are different parts of each Monday. There was a part 1, maybe they showed you – it was different in each classes but maybe part 1 was fill in the blank, part 2 was pictures, part 3 was a story or something. Of those parts, which one did you find the most helpful?
Which one is the last part? Because I don't remember the last part.
D: It was different in the different classes, so I don't know …
I: I think the first one was fill the blanks, was more helpful.
D: And why do you think the fill in the blanks was more helpful?
I: Because when you review and you have your feedback you can check which one with your mistakes and you can correct and learn and memorize why.
D: Would you recommend this kind of morphology practice to a friend?
I: If he is learning English, yeah definitely.
D: Why?

I: Because it helped me. It helped me in some rules and it could help other people to recognize. Because I'm tell you – because I'm speaking Spanish, we have rules to convert these words. You have the rules but you have a lot of exceptions, in Spanish we don't have a lot exceptions. Maybe for a native Spanish could be helpful.
D: You said the fill in the blank was the most helpful because you could ask feedback. If you could get feedback from the teacher on a different kind of activity, do you think they would be just as helpful or is there something special about the fill in the blank that makes it easier to---
I: No, it was the feedback in some way. But because I could(?) write and I can see which one were my mistakes but fill the blanks … I think it was more helpful because you can deduct from the context of the sentence which is an adjective, a noun, or whatever and you can think and deduct which one is an adjective, which is the end. And if you were wrong you can check the feedback and you can help you to understand and to memorize these kind of thing.

N.2 Student B Interview

Subject ID: Student B
Subject Native language: Arabic from Saudi Arabia

D: research assistant (Daniel)
I: interviewee

D: What is your native language?
I: Arabic.
D: And where are you from?
I: From Saudi Arabia.
D: Why are you studying English here at Pitt?
I: I had a chance to came here because my brother is studying here also, so I came here too. Also I hear that Pittsburgh in the city(?) it's one of the good institute in the US.
D: A good place to study English?
I: A good place to study English, yeah.
D: You and your brother, are you both just studying English?
I: No, actually my brother is studying MBA and now he's in the last term. I'm here studying English, after that I'm planning to complete my master degree in business administration.
D: In Pittsburgh or maybe somewhere else?
I: I hope so, it depends on my GMAT score.
D: What skills are you hoping to learn or to work on in Pittsburgh?

I: I want to improve my speaking and writing. First speaking, especially, and pronunciation and speaking fluently and writing just to – I have big trouble in writing, especially in spelling and connect the idea to each other.
D: So making English sentences that make sense and putting them all together?
I: Excuse me?
D: Writing English sentences – so you said you had some difficulty with spelling and making sentences make sense.
I: Yeah. For me, I feel it's okay for me and also sometimes I feel it's not okay but I cannot know how I can change it to good sentence or right sentence.
D: So it's hard to tell?
I: Yeah, it's hard to tell.
D: Did you study English in Saudi Arabia?
I: Yeah, I've been study English for almost six years.
D: After high school and elementary school?
I: Yeah, I consider that yeah, when I studying in the university.
D: Six years in the university and then…
I: Yeah, six university and I (?) there for one years so I just keep my English working as – just watch movies, listen some music, English music until I came to here.
D: When you studied in the university, how did they teach English? What methods did they use?
I: Just the classical way that a teacher came to us and read the chapter and write some sentences, some examples and gave us homework and do it. That's it.
D: What kind of skills did they work on?
I: They were focusing on the grammar, mostly.
D: Did you find that to be useful?
I: No, I actually I was shocked when I came to here and I found myself that all six years I been studying English doesn't work (?) here.
D: Was that disappointing? Frustrating?
I: Yeah. Actually I've been studying English just for the first year, it's like English courses. But the other five years, because I was in, I studied engineering, so my studying was in English. So I was dealing as in English, but not studying. Just I have to read I have to write I have to speak just individually. Individual effort without any guidance or any … I mean even if I did mistakes in my papers, the instructor they didn't focus on my grammar or on my idea, just focus did I get the point or not.
D: Were you also, probably, learning very academic engineering English?
I: Yeah, very academic English, not the normal life use English.
D: The next section is on some – how you think about learning. What do you think is the best way to learn vocabulary?
I: I think this way that I do it now, that every day I try to look up a new five words and looking for their definitions in English and their synonyms and looking for some sentences to know how can I use it with different part of speech. And from (?) I review it, and I try to incorporate it with my speaking, daily speaking.
D: You do five words a day?
I: Yeah and I put it in an Excel spreadsheet to track it, something like this.
D: Did you come up with that on your own?

I: Actually, this was my brother advice. Before I was using, just to whatever word that I hear it and I know it and I didn't know the meaning I just take it and I looked up an Arabic definition, not an English definition. But I found this way it's easy to forget it. When I started this way to track it in Excelsheet, just five words I look it up to synonyms and part of speech and sentences, it's good for me to memorize it.
D: You put all of the different information in the spreadsheet? The synonyms and the parts –
I: No no – the synonym and this kind of the false lecture(?) in the word sheet(?), the Excel sheet, just the new words. From time to time it's in front of me, that I can look it up.
D: What do you think is the worst way to learn vocabulary?
I: The way those people who try to translate the vocabulary into their language, they don't get the right meaning and it's easy to forget it.
D: Have you ever studied morphology, words and word parts, outside of this study?
I: No, this is my first time.
D: Do you think that learning about word parts is important?
I: Yeah, it's important. It's make it easy, at least you can understand – not the right meaning but what the word, this word point is.
D: Do you think that this study, the morphology study, helped your meet your goals for learning English?
I: I feel yes, yeah. Because I believe that the most important thing to learning English to build the vocabularies. So this way that increase my vocabulary very quickly and with easy way. So I just know the root and after that if I master that the suffix and prefix and this kind of other parts, it's gonna be easy for me to memorize the words and even if I face a new words at least I will know is it, or know that the similar meaning.
D: Would you recommend this kind of practice to a friend?
I: Yeah. I would like if the ELI would incorporate this kind of way to their courses.
D: You suggested that the ELI should use it in their courses –
I: Yeah because we have already core vocabulary, the five core vocabulary so we know it with the different part of speech so if they can incorporate the morphology, I think it gonna be useful … at least to letting people get used to these kind of words.
D: Is there anything that you would suggest to improve the way that it was taught?
I: In ELI?
D: Well, with the morphology.
I: The morphology … no. What I get from this study I feel is good for me.
D: Which part of the study was the most helpful. You know, every Monday you did part one and then you did part two and then you did part three. Can you remember which part was the most helpful for you?
You mean listening or reading or fill in the blank?
D: Yeah.
I: I think the listening part.
D: Why was that?
I: I think it's the most hard part, so we can recognize the specific word and if you be good at that, to recognize this word, it's gonna be easy to write it or to memorize it after that.

N.3 Student C Interview

Subject ID: Student C
Subject Native language: Arabic from Saudi Arabia

D: research assistant (Daniel)
I: interviewee

D: What is your native language?
I: My native language is Arabic.
D: And where are you from?
I: I am from Saudi Arabia.
D: Why are you studying English here in Pittsburgh?
I: I'm studying English here in Pittsburgh to prepare me and my language to complete my master.
D: In what?
I: In second language acquisition.
D: Do you want to teach language in Saudi Arabia?
I: That's right. Teaching English, as a foreign language.
D: How long have you studied English in Saudi Arabia?
I: I studied English in college and also in high school, it's a (?) subject.
D: Is that four years college, four years high school?
I: Three years high school and three years for college.
D: What skills do you want to learn while you're here?
I: Here I'm considering to improve my writing skills because at home the teachers they don't focus on writing, they only focus on grammar or reading skills – building vocabulary – but they never taught us how to write in English and it's a completely different skills than my mother tongue.
D: What kind of methods did they use to teach reading, grammar, and vocabulary?
I: Here at Pitt?
D: No, back home.
I: The popular teaching methods that the teacher use back home is traditional lecture, some of them use a communicative methods, especially in speaking but the most common teaching method is lecture, traditional lecture method.
D: And then students taking notes?
I: Yeah, taking notes.
D: What do you think is the best way to learn vocabulary?
I: From my experience the best way to learn a new vocabulary is to write it in your notebook and try to find a part of speech of this parts – I mean the basic form and adjective, adverbs, and try finally to put it in a sentence and after a period of time, try to revise these, part of speech, and again try to write a sentence – for example after one month, or three months, return to this word and again write it in a new sentence.

D: Do you think that in the classroom, that's how vocabulary teaching show go? Having students write it down and then review it later?
I: I think this is the better way to teach the foreign students new vocabulary, plus, you have to consider it in pronunciation and in part of speech and how they use it in a sentence because sometimes, for example, in English there are some words you can't use it in a specific situation but you can use it in another situations. You have to understand the meaning of the vocabulary from the context, that helps you more to use it in future.
D: Making use of it is very important?
I: That exactly.
D: What do you think is the worst way to learn vocabulary, or the least helpful way?
I: I think the worst way is just writing the word and try to revise this word without understanding the part of speech, without trying to figure out the right context of this word. Just trying to mention this word again and again, repeating.
D: Have you ever studied morphology outside of this study?
I: Sure, I'm graduated from English department, so I studied morphology, syntax, semantics and all of these fields.
D: Was your undergrad degree in English?
I: My undergrad in English, linguistic.
D: Just in general?
I: In linguistic in general, theoretical and applied … because we have literature, linguistic, and translation. This is under the head of 'college of English'.
D: So you studied English as a part of your linguistic studies?
I: That's right.
D: Did you have classes, like, just learning English classes as well as English … English learning and English linguistic classes?
I: No, it's mixed. For example: in the second year, you have to study morphology, syntax and all the theoretical linguistics, plus you have to study some … in every year you have to take a translation subject and you have to take one literature subject, plus to your core.
D: Do you want to study linguistics here at Pitt or just somewhere in the United States or not in the United States?
I: I don't know, it depends on getting the admissions from the universities.
D: Do you think that learning morphology and the word parts is important for language learning?
I: Sure, it's important.
D: Why?
I: Simply: when the students learn the part of speech of the word, he can use it in many sentences. For example: he can use the word as a verb and he can use it as a noun. That's help him to be more skillful and more useful of the words that he learn.
D: Do you think this study helped you meet your goals for learning English?
I: This study, for me, I think its helped me from one side – or the most important things that I learned from this study that there are many part of speech of the word. I mean, exactly: some words have a noun and they have another form of a noun. Did you get that part?
D: Well, I mean it's all being – I'm going to type it up later.
I: Yeah – there are some words in English, they have more than one form of one noun.
D: So, learning lots of words through the morphology?

I: Exactly and this helped me to understand that when I learn the part of speech of the word I have to get back to find it in a context, what suitable context that we can use it and other context it will not be suitable to be used.
D: So figuring how words are used is most useful.
I: Exactly.
D: Which part of the study sessions helped you the most? On the Mondays, there were different sections, which section do you think was the most useful?
I: I don't remember the name of the section, but I think the most useful section for me and for my colleagues is the section that ask you to pick the right part of speech to complete the sentence.
D: Fill in the blank?
I: Fill in the blank, I think, fill in the blank.
D: Why was it the most helpful?
I: It's helpful because the students sometimes get normal or get usual use a word in one form, and when he read the sentences and discover that the usual form that he use it will not be correct in this sentence or it's not going to be suitable in this sentence so he has to find another form that will be – or, that fit in the sentences and it will be correct. I remember, one of the students, he told me: "I use the word, this word and I don't ever know that there is another form of this word" because there is so rarely that we see another form of this word. "Thanks", we don't know the basic form of this word, I'm sorry, not the basic form, the noun of thank, thankness I think, we don't ever see the noun form of thank. Just in this study. And most of the students understand that we have to get back, now, to the dictionary to figure out other part of speech of these words.
D: Would you recommend this type of practice, or these kind of morphology tips to a friend learning English?
I: Sure.
D: Why?
I: As I mentioned before, it will help them to improve their vocabulary and how to use it in a correct context and I hope that, even here in ELI, if they try to give us the words and ask us to figure out another part of speech from the dictionary because, you know, when you open the dictionary and try to find another part of speech that makes the students remember this word, because the process of researching and finding and reading the definition, all of these things make the students more focusing on this word and he will understand it and not easy to forget it.
D: Do you have any suggestions for ways that this study could be improved?
I: Any suggestions for this study? No, actually I don't have any suggestions. I think that … you have good work, great work actually. Yeah. Maybe if the researcher, next time, try to focus on common words that the students don't understand or don't ever find another part of speech of these words and if the researcher find a solution for this problem how we understand this form used in this context and not used in other contexts. As I mentioned before, there are some words that have more than one form for a noun and how we, as foreign students, distinguish between these forms, why we are use it in a context.
D: Going back to what you said earlier, what made you want to study English? Or to study second language acquisition?
I: You mean my goal?
D: Yeah.

I: At the beginning I like to learn a foreign language. Since I entered a college at home and while I was studying in college my professor, first time, introduced to us a second language acquisition and I remember also he read to us an introduction for a book in applied linguistics for a researcher from England, I think, and in that time I think the researcher there he talks about us as a students, about our problems, me and my colleagues as the professor reads the book in front of us. I thought that man knows everything about us as students and our struggles and we can improve our English in easy way and instead of studying language five years, or six years, we can improve our skills in two years and we will be more fluently. So I like it because I think it helps me, in that time and now and it will helps my colleagues and my people at home to study English because, maybe you know it or not, most of the foreign students in my home, they heard English, there is a prototype in their minds – or stereotype, I'm sorry, stereotype in their minds: "this is a very difficult subject, we can't learn it" and there is not a problem with the language. The problem the teachers how they introduce these subjects to the students and how they teach them the language. I hope to solve this problem at home and to help learners all over the world to communicate easily.
D: Do you think that learning English is an important thing? Or useful?
I: I think English language is now it's consider as a *lingua franca*. It's the first language of the whole world and most of the countries around the world it's a second language and, as we know, technology now it's rapidly improved and we need to use the technology and we can't access or more practice with (?) we will not be able to use technology without knowing English.

N.4 Student D Interview

Subject ID: Student D
Subject Native language: Chinese from China

D: research assistant (Daniel)
I: interviewee

D: What is your native language?
I: Chinese.
D: Where are you from?
I: China.
D: Why are you studying English in Pittsburgh?
I: Because my husband works (???) in Pittsburgh. I have an opportunity to improve my English.
D: What do you hope to do after you finish studying?
I: If I have an opportunity I want to apply school or …
D: In the United States?
I: Maybe.
D: Do you have any subjects in mind?

I: Maybe continue my work, I'm accounting.
D: Did you study English in China?
I: Yeah,
D: For how long?
I: I think for more than 10 years.
D: In school?
I: Yeah, in school.
D: What were those lessons like? How did they teach English in China?
I: Because my teacher is Chinese, so I don't think at that time we have good experience, just for learn grammar or writing, but for listening or speaking not so much.
D: Mostly grammar and writing?
I: Yeah.
D: What English skills do you want to work on when you study in Pittsburgh?
I: Speaking, listening and writing. I think writing is important. Also, listening is good I can understand, I can have a good communicate(?) with person.
D: What is the best way to teach vocabulary?
I: I need to know how to use these vocabulary. I need to know what is a noun, what is a verb, how to use these. Sometimes I'm just confused, I cannot use correctly.
D: What methods do you think are best for teaching how to use the words?
I: Giving example for we can … for example if give a sentence it can show the word and the sentence how, why use these part of speech, why is it different.
D: Giving you example sentences?
I: Yeah, yeah.
D: What is the worst way to teach vocabulary?
I: Just know how to spell a word. We don't know how to use these.
D: Have you ever studied morphology (i.e., words and word parts) besides during this study?
I: No, just the study in ELI. From Ben show us.
D: Do you think that learning about word parts is important?
I: Yeah, right now I think …
D: Why?
I: Because we can use these word correct, we need it for writing or speaking or guess its meaning or we can use it … I think we need – for reading, I think it's better for reading if I, maybe know these words' basic form, we need a guess some situation, guess a meaning. Can help my reading.
D: It's an important part of understanding and using English?
I: Yeah.
D: Did this study help you meet your goals for learning English? Did it help you with your speaking, listening and writing?
I: Yeah, of course.
D: Which part of the study helped you the most? Which kind of exercise?
I: You mean for vocabulary?
D: Yes, for the word part learning. Different classes used different teaching methods, so I don't know which section you were in but, for example, in one of the sections they showed pictures and then they showed a story and then they used the words. Which one of those kinds of teachings helped you learn the words the best?

I: I think for picture. We can first – I think I can remember these words in situations, we can remember long, maybe, interesting picture can help me memorize good.
D: It helped you connect the word to the meaning through the picture?
I: Yeah.
D: Would you recommend this type of practice to a friend? The morphology study? The studying the word parts.
I: Yeah, maybe, I hope so.
D: Why?
I: I think it's a good strategy I can share with my friends and tell, maybe, can use this program, yeah, can help us.
D: Why do you think it's a good strategy?
I: Because for me I think it's – if I see this it can memorize it good but just listening, maybe, just forget, yeah.

N.5 Student E Interview

Subject ID: Student E
Subject Native language: Arabic from Saudi Arabia

D: research assistant (Daniel Hatfield)
I: interviewee

D: What is your native language?
I: My native language is Arabic.
D: Where are you from?
I: I am from Saudi Arabia.
D: And why are you studying English here in Pittsburgh?
I: To improve my language and to complete my major, pharmaceutical science.
D: You're taking classes at Pitt for pharmaceutical science?
I: No, now (???) improve my language.
D: And then you will return home and finish…?
I: No, I want to get admission.
D: In the United States?
I: In the United States.
D: After you finish studying in the ELI you hope to complete a degree.
I: Yes.
D: How long did you study English is Saudi Arabia?
I: Maybe for … six months.
D: Did you have any English classes in school?

I: Elementary school and high school, yeah.
D: How long was that?
I: How long, maybe … six years.
D: But then you did six months –
I: Six months after.
D: In school, when you were growing up, what were the English classes like? What skills did they work on?
I: Where?
D: At home, when you were small.
I: Only the focus on the grammar. Speaking is a little and writing is a little. Most of time, grammar.
D: When you studied, the six months after, what did you work on?
I: I did on the speaking.
D: This was in Saudi Arabia?
I: Yeah, in Saudi Arabia. But, you know, the native language there is Arabic so …
D: It was difficult, yeah. What kind of English skills do you want to learn in the ELI?
I: All of them. Yeah, all of them. Plus I have difficult to speak.
D: Have you ever studied morphology before?
I: No.
D: In the study it was the first time that you've heard about that?
I: Yeah.
D: What do you think is the best way to learn vocabulary?
I: More practice.
D: What kind of practice?
I: Speaking and writing I think is the most important to learn vocabulary.
D: Using the words?
I: Yeah.
D: Do you mean a teacher will give you a list-?
I: Yeah, each week they give us maybe four or five words and we will practice on it.
D: What do you think is the worst way to learn vocabulary?
I: I don't know … I don't have any idea about that.
D: What do you think is a way that is not as good as using vocabulary words in speaking and writing?
I: Like, use the same word every time and not develop your speaking or writing by new word. But in the ELI English Language Institute in Pittsburgh you must use each vocabulary you learn it before. I think, no, worst way to learn vocabulary.
D: Do you think that learning about word parts and morphology is important?
I: Yeah.
D: Why?
I: Because each word in English have a lot of, like: accept, acceptable. Same word but different in noun and adverb and adjective. I think you must read(?) to learn morphology.
D: Yeah, that's exactly what Ben thinks. That's why he did this study. Do you think this morphology study helped you meet your goals for learning English?
I: Yeah.
D: Why?

I: For the same reasons.
D: Because?
I: Because when I am in Saudi Arabia, I think the words only one. No adverb – you can use it in adverb and you can use it in adjective, but when I came here I see different.
D: So you learn one word but it's actually a lot of words.
I: Yeah, lot of words.
D: What part do you think helped you the most? What part of the lesson. Like, on Mondays they had one part – I don't know what section you were in …
I: The same classes I have reading and writing and speaking and grammar and listening.
D: But during the parts with morphology, on Mondays? In one section they looked at pictures first and then a story and then they … I don't know what section you were in so I don't know what morphology part you learned –
I: Most of time in writing, I use morphology.
D: With writing, okay. Would you recommend this kind of practice to a friend.
I: Yeah.
D: Why?
I: Because all Arabic students don't have any idea about morphology. They must learn it.

N.6 Student F Interview

Subject ID: Student F
Subject Native language: Arabic from Saudi Arabia

D: research assistant (Daniel Hatfield)
I: interviewee

D: What is your native language?
I: My native language is Arabic.
D: And where are you from?
I: Saudi Arabia.
D: And why are you studying English in Pittsburgh?
I: I'm planning to attend Pitt (?) University.
D: What are you going to study?
I: I'm going to study a master in education.
D: How long did you study English in Saudi Arabia?
I: I can't say period because we have been studying English since we are in intermediate school, but we didn't really know why were we studying English. So we just studied English, then took exams, and then forget it. But later on I took a course in the U.K. and learned general English and nowadays I'm studying more academic English.
D: About how many years, then, of intermediate school to graduation…?

I: Let's say six years.
D: About six years of English in school and then plus, in the U.K. And then how did they teach you?
I: They have a very very good curriculum, but very bad methods.
D: Why do you say that?
I: I say that because I should be majoring in education, so I can judge how did they teach us. And they should have learned us, at the beginning, why should we learn. Then start to learning because if the education has meaning, you will be motivated to learn and to stick to the motivation you have and to remember them for good.
D: What kind of skills did they work on?
I: They work on grammar more than vocab. This is the bad thing about it. And they start with grammar and reading.
D: So not a whole lot of focus on speaking?
I: No.
D: Did you do anything like you did in the ELI classes with the word building? The pieces?
I: We have had some information about this pieces but we didn't extend this information and know how can we use it. The rules to use this.
D: What kind of skills do you want to work on in the ELI?
I: The first thing we have to learn is writing. And the skill of speed reading.
D: To help out with your studies?
I: Yeah – and we don't have the patience to listen or watch something we don't understand. That's why we can't pick up vocabulary from other resources. We start with learning vocabulary, then trying to get them in context. It's better to get them first from the context and search for the meaning 'cause you will remember them. But we have no…
D: It's easier if you have more explicit instruction?
I: If we start watching and listening to some context we just understand 30% of, we will get more vocab and we will be asking ourselves, others, what does that mean? So they will give us the definition, the meaning, and the usage. Sometimes we know the word, we know the meaning but we can't use it.
D: What do you think the best way to learn vocab is?
I: I think it's listening and watching.
D: Watching …?
I: Movies, news, songs, stuff like that.
D: Why?
I: Why, because … we learn vocab and then have the definition but we don't know how to use it, so the usage is more important than the meaning. If I can't use it - if I know the meaning but I can't catch it when I listening, it's –
D: What's the point?
I: Yeah, what's the point?
D: What do you think the worst way to learn vocabulary is?
I: The worst way is core vocabulary.
D: *laughs*
I: Yeah.
D: And why? Because there's no context?

I: Yeah, because there's no context. Because they lead you to the path *they* want, not the path you need. Sometimes you need to learn *other* vocabulary, other than they teach you.
D: Beyond the curriculum.
I: Yeah.
D: Have you ever studied morphology, the words and the parts, besides this study. I guess you said that before…. So a little bit but not –
I: A little bit but we didn't extend the knowledge and know the rules. We know there is something called morphology, we have the same in Arabic, so we was waiting for this part of language because it gives you more variety of words, so you can use just and origin to have many vocabulary. But we didn't study the rules. We can't use it.
D: That's one of the reasons why Ben is doing this project, because he thinks it's very important to learn how to make more words, so you can know more words … so it is very important, so yes. Do you think this study helped you meet your goals for learning English?
I: Not really because … yeah, I know already the importance of morphology. I need you to address this and to tell the schools about it and create a new class for it. I think to merge listening with speaking together and have a new class with morphology and dictionary using is much better than just stay with listening and – individually, listening and speaking. Because they goes together. So instead we should study listening and speaking together and have a new class of morphology and dictionary usage.
D: So separate out the skills a little bit more.
I: Yeah.
D: Do you think you would recommend this kind of practice to a friend? Say, if it was not in this kind of situation?
I: Yeah, I've been doing that. I've doing similar things, which I called "word family". I learn a word, I learn the word family, which goes with, collocate with it, opposite of it, and other things like that.
D: Could you give me an example?
I: If I learn, for example, if I learn 'pen'. I learn 'write', I learn 'erase', I learn 'pencil', 'ruler', stuff goes … 'stationary' for example. So I can remember them as a group.
D: Do you draw out these maps?
I: No, I draw out these maps in my mind. And sometimes I re-write them down.
D: That sounds like a good strategy … did you come up with that on your own or did you learn that in your education classes?
I: No, it was … I came with it, my own.

N.7 Student G Interview

Subject ID: Student G
Subject Native language: Spanish

D: research assistant (Daniel)
I: interviewee

D: Tell me what you were just saying.
I: I am from Columbia. My native language is Spanish. I am studying English here because I'm a lawyer. I have my own office in Columbia. I have many clients from many countries who want to go to Columbia and who are going to Columbia right now to invest. When you go to another country to invest your money and also to do business the first thing that you want to do is to look for a lawyer there and them tell you what you have to do there. I need to improve my English and I have to learn English, perfect English, to help me to speak English with my clients. That's my goal here and that's why I'm here.
D: Speaking is the main goal? Communication?
I: The first thing that I want is to speak English, more than writing or reading. But also, I need to read and to understand the context of everything – but it's not the first goal that I have now. I need to speak and listening and understand what people talk to me.
D: How long did you study English in Columbia? Did you?
I: I realized last week that, I think it's the first time, this one, that I studied, really, at English language. When I was a kid I had two hours per week for English class in my elementary and high school. Just two hours per week … the verb to be, house, dog, father, mother – that's all! I've never been in English classes, in English intensive classes. This is my first time. My wife speaks English all the time, she's Columbia but she lived here and she grew up here, in Pittsburgh, so she speaks English all the time, to my kids. I understand it, always when she speaks to them and also to me. When I have to understand other people, I have the problem. I think this is the first time that I've ever really studied English.
D: When you studied two hours a week, intermediate to high school?
I: Yes, high school and elementary school.
D: About how many years was that?
How many years before?
D: Between elementary and high school.
I: No, I start with those English classes when I was seven years old and I finish them when I was 18 years old, so – 11 years, around, 11 years.
D: Then, in the meantime, after high school, did you study at all?
I: No.
D: Did you use English?
I: Yes, I tried. *laughs* I used to but then a lot of mistakes.

D: Tell me what you were telling me before, when you were speaking before, when you were speaking with XXXX about the study.
I: When we had the pretest I felt so bad that day. Yes. The first part, I remember that I chose number 4 – I know that word, I know that word, I know that word, I know that word. Yes, sure! But the second part, when I had to *use* that word, or make a sentence, or to change the noun to adjective or to verb, wow! I realized that I don't know that word. Or maybe I know that word but I don't know how to use that. I have to, go(?) back to the first part, erase number 4, put number 3, even 2 sometimes! So it was very funny but it was very serious for me because I realized that, oops, I have to learn more, I have to study more. And I ask XXXX about the morphology meaning, because even in Spanish I didn't know the meaning of 'morphology'. I said, hm … morphology, what's that? And finally he told me: what is morphology. And I ask XXXX: "I really want to learn more and I want to learn morphology! Because I think that's the clue to learn English, or to learn any language, maybe. But I care English for now!
D: It really affected your motivation?
I: Yes, absolutely. That's why when XXXX asked if we want to have this interview I said yes! I want it but I don't know why that day we didn't have time to sign up but I'm now here.
D: You said it was really important, what do you think the best way to learn vocabulary is?
I: I think morphology is a good way, is a very very good way and a very important way. Yes.
D: Why do you think it's so good?
I: Because in that way you can learn not the one – maybe two or three or four words in the same moment. If you attach the verb and the noun and the adjective it's easier than if you just learn, today, the verb and in two weeks the noun form of that verb. It's better if you can attach them.
D: That's exactly what Ben thinks –
I: I think that's the purpose of the study, of the research.
D: What do you think is the worst way, then?
I: If you, today, learn one word, it's a verb. And in two weeks you say: "you know what? The adjective, that word has another form, it's a noun, but you can use like this" – maybe you waste your time at that moment, at that time, two weeks ago. If you want really teach or learn those words, noun and adjective and the verb, adverb – it's easy if you attach all of those in the same moment.
D: Everything at once.
I: Yeah.
D: Have you ever studied this kind of thing, the morphology, besides this?
I: I've never known 'what is morphology'. I realized the meaning of morphology, even in my language, with this study. Always, when you see, it's curious, at least, that you want to know: "what is that? Why that word we can use with a little change in another form?" I think that is my problem, that is my real problem. When I arrived here and I started with a ELI course I realized that "wow, what is a noun? And what is an adjective?" it's very hard for me. Verbs, maybe, it's easier but if you have to choose if a word is a noun and an adjective, hmm… it's not easy for me. And the pretest , heheh, that's what happened.
D: Do you think that learning about word parts is important?
I: Yes, absolutely. I told you why.
D: Did this study help you meet your goals for leaning English?
I: Yes, absolutely, that's what I told you. I think I talked more than --
D: It sounds like you would definitely recommend this to someone else.

I: I think that this is the way. Absolutely. I think that this is the way to teach and to learn English.
D: I don't know what your results were, but do you feel like you did a whole lot better on the post-test?
I: In some parts it was better. In other parts, it was worse. I don't know why. I didn't know, I really don't know why. When I saw my results I said "okay, c'mon! yes it's better this way." After those tests, during one month, four weeks, five weeks? But in other parts I took worse results, I don't know why.
D: Can you think of any reasons? Did you think about them differently?
I: No, I … didn't know some meanings of those words and it was ironic because after the test that week I knew the meaning of those words. In the pre-test I wrote down some words that I didn't know. It helped me a lot at my home I learn those words. But I didn't do it the last test. It's a pity because I think it could be a good tool for me if I was wrote(?), if I wrote the words that I didn't know the meaning.
D: Do you think that any parts of the study could be improved? Could be better?
I: No.

N.8 Student H Interview

Subject ID: Student H
Subject Native language: Arabic from Saudi Arabia

D: research assistant (Daniel Hatfield)
I: interviewee

D: What is your native language?
I: Arabic.
D: Where are you from?
I: Saudi Arabia.
D: Why are you studying English here in Pittsburgh?
I: To can improve my English skills to have admission and study in American college.
D: What do you want to study.
I: Accounting, master degree in accounting.
D: How long have you studied English before the ELI?
I: Actually I start study English from the elementary school.
D: Were there English classes all throughout your primary school?
I: Yes.
D: About how many years was that?
I: Nine years.
D: What kind of teaching methods did they use?

I: They use British English.
D: What skills did they work on?
I: Grammar and speaking.
D: Was there a lot of book –
I: -and word vocabulary. No.
D: Not a lot of book work.
I: No.
D: How was it taught, then?
I: By using material or games, computers, also computer games.
D: What skills, in particular, do you want to learn or work on here at the ELI?
I: Take notes and writing. Listening.
D: Do you think improving your listening skills will help you with your ability to take notes?
I: [affirmative nod]
D: Do you think that your time in the ELI has improved those --?
I: Yes, yes.
D: What do you think is the best way to learn vocabulary, new vocabulary?
I: When I use it while I writing or speaking and use(?) the different forms for the word.
D: When they are first presented to you, what do you think is the best way? Do you think the words alone or with the definition or with example sentences?
I: Yes, with example sentences, I think it's the best, so I can guess the meaning first.
D: What do you think is the worst way to learn vocabulary?
I: Just the word without any definition or example sentences.
D: Have you ever studied morphology outside of this study?
I: No.
D: Do you think that it's important? That learning word parts—
I: Yes, very important.
D: Why?
I: So I can improve my writing skills and use the word in perfect way.
D: Do you think this study has helped you with your goals of writing notes and listening?
I: Yes.
D: During the Monday sessions, there were – during the morphology section, there were different parts, right? Maybe the first part they showed the words, second part you read it, third part maybe there were pictures. Which part do you think was the most helpful for you?
I: The writing.
D: The fill in the blank?
I: Yes, the fill in the blank. It's very useful.
D: Why was that the most useful.
I: Because I heard the word and then I can guess what form, what part of speech I can put the word.
D: Do you think you would recommend this type of morphology practice to a friend?
I: Yes. Very helpful.
D: Are there any improvements that can be made? Any suggestions you have for the way that it is taught?

I: It's a good way to teach morphology because the teacher shows the part of the word, if they end in 'i-t-y' it's become noun or 'l-y' becomes adverb. This very helpful. I didn't know this structure before.

N.9 Student J Interview

Subject ID: Student J
Subject Native language: Mandarin Chinese from Taiwan

B: researcher (Benjamin)
I: interviewee

B: What is your native language?
I: Chinese.
B: Chinese, Mandarin?
I: Yeah, Mandarin.
B: Where are you from?
I: Taiwan.
B: This is a question that's a little bit more involved: why are you studying English here in Pittsburgh?
I: Because my brother is study grad school here.
B: Do you have any goals – what do you want to do with English after you leave the ELI?
I: I want to study in the US, so I have to improve my English.
B: What do you want to study?
I: My major?
B: [affirmative nod]
I: I study computer science.
B: How long have you studied English in your home country? How many years?
I: I think it's long, because we have to study English since I was junior high school.
B: How many years? If you could, just an estimate. It's okay if you don't have the exact number.
I: Maybe fifteen.
B: Fifteen years? Okay. Could you describe, just a little bit, how you learned English in your home country. What were the classes like?
I: I think's very few speaking part in my classes. We … I think most of the class is for the test. We have many test and so I think many Asian students are good in grammar. Writing and speaking are not so good because may teachers in our country are – were not good at speaking, I think.
B: While you're here, so while you're studying in the ELI what do you want to learn? What kinds of things do you want to learn about English?

I: The normal conversation with native speaker. I hope I can learn more from English books, read the books more easy.
B: Do you think that the ELI does a good job at helping you speak with native speakers and read more books?
I: I don't know yet. [laughs]
B: Now, the next thing I'm going to ask you just about word learning, so we're going to switch from just general background information more to learning about words and morphology. Just a general question: what do you think is the best way to learn vocabulary?
I: How to use the vocabulary in a sentence. I prefer to memorize vocabularies with a full sentence.
B: What is the worst way, then, to learn vocabulary?
I: Just memorize the word and the meaning in my language. I think it's the worst because I did it for long time and it's not effective.
B: What about with reading? Do you think that reading is a good way to learn more vocabulary?
I: Yes but I think the word must be … be repeatly? If I just read it once and I don't read it again, I will forget very soon.
B: Yeah, me too. In the study, so the training that you did in class with me, you saw a lot of words broken down into a base word and another part. Have you ever studied that before in your home country?
I: Maybe yes because we memorize the base form then teachers would – they taught us how to transform into another word, yeah. Most of them have the rule.
B: How did the teacher teach that? Writing things on the board or from a list?
I: From a list.
B: Just a follow-up question: what types of affixes did you study when you studied this before, if you remember.
I: Again?
B: Which affixes, for instance - I'll give you an example here: -ity, -ness – these were some of the affixes from the study. Can you remember any of these that you studied back in Taiwan?
I: A-b-l-e or, I think …
B: That's okay, take your time.
I: T-i-o-n …
B: That's okay, don't worry about it. Yeah, that was a while ago. And the second question: so you've done this before but do you think that learning about words and word parts is important for language learning?
I: Yeah, sure.
B: Why?
I: If we learn words with parts we don't have to memorize more words.
B: That's what I think too. Thinking back to the training that you received – and if you were in XXXX class you saw a – first you heard sentences with pictures, then you read a short story with these words and word parts in them, and then you just had to remember the word. Do you think that that helped you, in your goals, in learning English? Was that a helpful-
I: I think it's helpful but the question behind the picture, the questions, I think the question are the same sentence as in the picture. So I don't have to think, I just select the correct one.
B: You think – what you're saying is that it's easy to pick the picture, you don't really have to think about the word within it. Is that what you're saying.

I: Not select the picture. I mean, the question at the back of the sheet, because the sentence are the same so I don't have to think the form. I just select what the word I saw in the (?).
B: What about the first part, listening and reading. Was that easy? It's okay if it was or it wasn't, I just want to know.
I: Not really. If I didn't know the word, maybe I would choose the wrong answer.
B: Let's think about – which section do you think was the most helpful? Part 1, part 2, part 3.
I: Part 2.
B: That was the reading, where you really got to see the meaning. If you had to make a change to – or change something about the way that things were presented, is there anything that you'd like to change or that you'd like to see added? Anything that you'd do differently, is the question I'm asking. What would you like to see in – so when you're learning about words and word parts, what would you like to see in the future in the ELI?
I: The part 3. We can change the question, not the same as the part 2.
B: What about something like writing sentences or something harder? You think that would be useful? Having to write your own sentences.
I: Maybe, but stressful.
B: Is this something that you'd like to get more practice with in the ELI? Do you want your teachers to do more training with words and word parts in your classes? Or is that enough?
I: I … Sure. I think that I need the practice in maybe more base form so we can use the base form to produce more words.
B: Would you recommend this practice to a friend?
I: [affirmative nod] I would, yeah.
B: That concludes the first part. I just wanted to get a sense of what you thought about the study and how you'd change it. Knowing about this is really helpful, going forward as I design actual activities and books for people learning English. Thank you for sharing that with me.

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