

# MORPHOLOGICAL PROCESSING DIFFICULTY OF THAI LEARNERS OF ENGLISH WITH DIFFERENT LEVELS OF ENGLISH PROFICIENCY<sup>1</sup>

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## บทคัดย่อ

หน่วยคำในภาษาอังกฤษนับเป็นข้อมูลทางภาษาที่มีความยากในการเรียนรู้มากที่สุดอย่างหนึ่งสำหรับนักเรียนชาวไทย การศึกษานี้มีวัตถุประสงค์เพื่อสำรวจผู้เรียนภาษาอังกฤษชาวไทยที่มีสมรรถภาพภาษาอังกฤษในระดับที่แตกต่างกันในด้าน 1) ความรู้ด้านหน่วยคำ 2) พฤติกรรมการประมวลผลหน่วยคำ โดยได้ออกแบบการทดลองขึ้น 2 ชุด เพื่อใช้ในการทดสอบกลุ่มตัวอย่างนักศึกษามหาวิทยาลัยแม่ฟ้าหลวงจำนวน 200 คน ผลการศึกษาพบว่า นักศึกษาที่มีสมรรถภาพทางภาษาต่ำ (กลุ่ม LL) มีความรู้ด้านหน่วยคำน้อยกว่ากลุ่มที่มีสมรรถภาพทางภาษา

ระดับกลาง (กลุ่ม IL) อย่างไรก็ดี ยังพบหลักฐานที่ชี้ให้เห็นถึงอุปสรรคในการทำความเข้าใจเรื่องหน่วยคำในนักศึกษากลุ่ม IL อยู่ด้วย แม้ว่านักศึกษากลุ่มนี้จะมีทักษะทางภาษาอังกฤษที่ดีกว่าก็ตาม ในส่วนของพฤติกรรมการประมวลผลภาษาด้านหน่วยคำพบว่า นักศึกษากลุ่ม LL ซึ่งมีความรู้ที่น้อยกว่ามักจะใช้วิธีการจับคู่คำแบบคำต่อคำ ในขณะที่นักศึกษากลุ่ม IL มักใช้วิธีการจับกลุ่มคำในข้อมูลเป็นกลุ่ม ด้วยพฤติกรรมดังกล่าวทำให้นักศึกษากลุ่ม LL ไม่สามารถผลิตรูปภาษาที่เป็นระบบระเบียบเท่ากับนักศึกษากลุ่ม IL

## Abstract

*English morphology is said to be one of the most difficult subjects of linguistic study Thai students can acquire. The present study aims at examining Thai learners of English with different levels of English language proficiency in terms of their 1) morphological knowledge and 2) morphological processing behaviors. Two experiments were designed to test 200 participants from Mae Fah Luang University. The results showed that students with low language proficiency (LL group) have less morphological knowledge than those with intermediate language proficiency (IL group). However, those in the IL group still show some evidence of morphological difficulty, though they have better skills in English. For morphological processing behavior, it was found that, with less knowledge, participants in the LL group employ a one-by-one word matching technique rather than chunking a package of information as do those in the IL group. Accordingly, unlike those in the IL group, students in the LL group could not generate well-organized outputs.*

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## **Introduction**

### **English learning situation in Thailand**

It cannot be denied that English is today a significant communicative tool worldwide. There is no exception even in the Kingdom of Thailand where Thai is the official language, acquired as the first language by most Thai people. English is given top priority as a foreign language beginning in Grade 1. This means that Thai children are exposed to English since they are six years of age. Although they spend many years studying English, students' English proficiency remains generally low. According to a report by the National Institute of Educational Testing Service (NIETS) in 2014, students in Grade 12 from every region of the country scored an average of 30% in English on the Ordinary National Educational Test (ONET). Moreover, Education First (2014), an educational organization in Switzerland, which studied the level of English proficiency by people in 60 countries, reported that Thailand is in the 'very low proficiency group', ranked No.55. Many years of English education in school seem to be ineffective due to many factors: the quality of teachers and the curriculum, teaching materials, learners' attitude towards English, and Thai language interference, etc. Reading skills are especially poor. The National Statistics Office (2013) reported that, although Thai people tended to spend more time for external reading compared to the previous year, their interest in reading was still low, and time spent reading averaged 37 minutes per day. While the report focused only on reading in Thai, it can be assumed that English language reading behaviors were likely lower. Given the importance of reading, it

is difficult to see how students who read so little can improve their language proficiency? One needs to learn how to read because reading is not an innate skill and the reading process is complex (Rayner and Pollatsek 1989).

### **The significance of morphology in reading**

Verhoeven and Perfetti (2003) claimed that learning to read a language such as English, which uses an alphabetic writing system, involves the mapping between phonemes (sounds) and graphemes (letters). However, Frost and Grainger (2000) pointed out that semantic information should be included because the readers' fundamental aim in reading is to comprehend what they read. Moreover, Verhoeven and Perfetti (2003) stressed the important role of morphological awareness for successful reading. In other words, the reading process is much more effective if a reader is aware of the morphological constituents of complex words, together with morphological inflections signifying a grammatical relationship between words in sentences. In addition, Kirby, Deacon, Bowers, Izenberg, Wade-Wooley, and Parrila (2012) reported in their study of 103 English native speakers from Grades 1 to 3 that morphological awareness can be observed from the children's use of analogy (comparing words with similar spelling in order to decompose morphological constituents such as *beauty*, *beautiful*, *beautify*). Accordingly, children with a high degree of morphological awareness seem to have a high level of reading accuracy and reading speed. Therefore, morphological awareness should not be neglected in reading instruction.

### **Morphological acquisition and morphological processing**

Verhoeven and Perfetti (2003) said that the study of morphological acquisition especially in reading both in L1 and L2 has paid attention to the decomposition of complex words (words with prefixes or suffixes) into their constituent morphemes. Researchers basically retrieved learners' morphological knowledge from the learners' production/reaction towards text containing complex words. This implies the existence of morphological structures in the mental lexicon. Accordingly, a number of experiments have been conducted in order to clarify the characteristics of morphological knowledge stored in the mental lexicon. According to Field (2003), the storage of data in the human brain is of three types of memory stores: sensory storage, short term storage, and long term storage. The sensory storage usually works directly with current external stimuli such as sounds and texts. Short term storage involves the information received from sensory storage at the moment. Long term storage is believed to be used as the storage of linguistic knowledge one has experienced and is divided into different levels. Morphological knowledge is one of them (Rungrojsuwan 2007). In relation to acquisition, the 'Processability Theory' (PT) proposed by Pienemann in 1998 is a mainstream theory of language learning that explains general characteristics of learning and the order of acquisition. Pienemann (1998) claimed that L2 learning is the consequence of processed experiences of individual learners. In other words, a learner learns language from his/her exposure (either in the classroom or natural settings or both), and what they have learned would be 'acquired' when it is processed. Also, the acquisition order is

strict, and the developmental stages cannot be skipped. This theory is supported by a number of cross-linguistic studies in L2 such as German, Japanese, Chinese, Italian, English, and Swedish. In 2005, Pienemann introduced the developmental sequence of English morphological acquisition, divided into 4 stages: Lemma (the use of single words without morphological variation such as *station here*); Category (the attachment of some inflections to the noun or verb bases such as *Mary jumps, I like apples*); Phrasal (the use of inflections in noun or verb phrases such as *These girls, I have walked, I am cooking*); and S-procedure (the use of inflections in sentences to show relationship with other words in sentences such as *Peter loves rice*). Each stage deals with different levels of linguistic forms in relation to morphology and they are said to be acquired in order (Pienemann 2005).

In terms of inflections, Jia (2003) found from her study of English plural morphemes acquisition of L2 Chinese learners that learners made numerous errors with regular plural morphemes, but could use the irregular plurals correctly. Later in the development, they could not only produce more accurate regular plural morphemes, but also produced more overgeneralization errors (adding -s to any nouns such as *bushs, peachs*, etc.). At the final stage of acquisition, they could master the morphological rules of plural formation and the number of errors decreased. Again, the developmental path is the same for all learners and this also happens for L1 learners (native speakers of English) as well.

Similarly, Bliss (2006) tried to explain morphological acquisition using the 'Failed Functional Features Hypothesis' (FFH). It is hypothesized that advanced L2

learners apply internal inflectional rules for complex word formation, comparable to that of the native speakers. In addition, learning experience from both the classroom and naturalistic environments plays an important role in the acquisition of English inflectional morphemes.

In terms of processing morphological knowledge, Pinker (1999 cited in Pliatsikas and Marinis 2012) proposed the 'Dual-system Model,' saying that there are two ways of language processing. On the one hand, some linguistic information which has been completely stored in the long-term memory is directly retrieved by the mapping process between the external stimuli (sounds or texts in the sensory storage) and the morphological knowledge (lexical items in the long-term memory) by the working memory (or the short-term memory). On the other hand, morphological information in long-term memory is said to be divided into lexical base and morphological rules, which can be applied to the appropriate base, according to the experience of the user.

Studies in morphological processing support this model. Using the eye-movement technique, Kuperman and Van Dyke (2014) found from their study of morphological processing of complex words that even language users under high school age had the ability to segment words as well as to comprehend reading passages. In addition, they reported two morphological processing strategies during the experiment: recognizing words as a whole (such as *tucker*) and decomposing constituent morphemes (such as *tuck* + *-er*). It has also been found that reading proficiency affects the strategies that readers use when processing morphology. Good readers usually mix the two

strategies while poor readers encounter only the whole-word strategy.

For inflections, Pliatsikas and Marinis (2012) also found evidence to support the dual-system model in their study of past tense morpheme processing. They found that Greek learners of English employed two processing routes: rule application for regular verbs and memory retrieval for irregular verbs. It was also noted that proficient L2 learners preferably apply rule-based processing for past tense inflections of English verbs. This is interpreted from the delay of reaction time that proficient learners use when applying the past tense morpheme *{-ed}* to the verbs. In line with the 'Processability Theory', it was also found that all learners in this study follow the same developmental sequence, regardless of the order of contents they are taught in school.

### English and Thai Morphology

In terms of linguistic typology, languages can be classified according to their morphological complexity. In other words, different languages possess different degrees of complexity in the internal structure of words: the least complex internal structure (Isolating Language), easily separated between base and affixes (Agglutinative Language), and very complex or having no clear boundary between base and affixes (Inflectional Language). Thai language is classified as an isolating language while English is an inflectional language. For example, it is not necessary in Thai to express the 'number' concept on nouns or 'tense' on verbs as shown.

- |                                  |   |
|----------------------------------|---|
| 1) <i>mǎa</i><br>dog<br>'a dog'  | 2) <i>mǎa sǎɔŋ tua</i><br>dog two CLF<br>'two dogs'                   |
| 3) <i>kin</i><br>eat<br>'to eat' | 4) <i>kin k<sup>h</sup>āaw</i><br>eat rice<br>'eat/ate/will eat rice' |

From the above examples, it can be seen that the noun *mǎa* (dog) and the verb *kin* (eat) neither receive any affixes nor change their forms. Alternatively, in some cases, Thai uses additional lexical items to show grammatical categories as shown:

- |   |   |                   |
|---|---|-------------------|
| 5) <i>kin léew</i><br>eat PERFECT/PAST<br>'ate/ have eaten' | 6) <i>cà</i><br>FUTURE<br>'will eat'                | <i>kin</i><br>eat |
| 7) <i>?àatcà kin</i><br>maybe eat<br>'may/might eat'        | 8) <i>t<sup>h</sup>uuk</i><br>PASSIVE<br>'be eaten' | <i>kin</i><br>eat |

In examples 5-8, markers of grammatical categories *léew* (perfective aspect/past tense), *cà* (future tense), *?àatcà* (epistemic modality), and *t<sup>h</sup>uuk* (passive voice) are in the forms of lexical items separated from the base morphemes.

However, it should be noted that Thai employs some 'prefixes' to change the parts of speech of the base words as shown.

- |  |   |                    |
|--|---|--------------------|
| 9) <i>kin</i><br>eat<br>'to eat' (V)   | 10) <i>kaan</i><br>NOUN-forming prefix<br>'to eat' (N)              | <i>kin</i><br>eat  |
| 11) <i>taaj</i><br>die<br>'to die' (V) | 12) <i>k<sup>h</sup>waam</i><br>NOUN-forming prefix<br>'to die' (N) | <i>taaj</i><br>die |

Examples 9-12 show the use of nominal prefixes *kaan* or *k<sup>h</sup>waam* with base verbs.

On the other hand, in addition to lexical items in isolation, English possesses both derivational and inflectional morphology. According to Lieber (2010), derivational morphology deals with the formation of new lexical items with additional meanings or new parts of speech or both. Word formation processes, usually affixation, result in the change of internal structures/forms of the base words (such as *print* > *reprint*, *engine* > *engineer*, *heat* > *heater*, *nice* > *nicely*). Inflectional morphology, however, mainly involves the attachment of suffixes to the base words in order to show the grammatical relationship between the inflected words and other words in the constructions such as the -s ending showing plurality in nouns as in *many dogs in the field* and the -s ending marking the agreement between the inflected verb and the third person singular subject as in *He plays guitar*.

In the Thai context, Rungrojsuwan (2007) studied linguistic information processing of Thai learners of English. In his study, the participants were asked to copy an English text. Their behaviors during the task were recorded in terms of "pause-defined units" (PDU). The study found that, although students with high language proficiency could memorize longer chunks of linguistic information than those with low language proficiency, both groups of participants tended to ignore inflectional morphemes attached to the base words (both nouns and verbs). Accordingly, it is uncertain whether learners with a higher level of language proficiency have more morphological knowledge than those with lower proficiency, and how both groups of learners process morphological information from the input. These questions lead to two major objectives of present study: 1) to examine morphological knowledge of English in

Thai learners with intermediate and low language proficiency and 2) to investigate morphological processing behaviors of L2 learners with different levels of language proficiency.

## Methods

### Participants

Participants for the present study were 200 Mae Fah Luang University (MFU) students. They were divided into two groups, according to the period of time they have been exposed to English<sup>3</sup>: first-year and third-year students, each group consisting of 100 students. The first-year students consisted of students from various majors such as Business Administration, Tourism Management, Law, Applied Thai Traditional Medicine, Business Chinese, Nursing, Computer Engineering, and Information Technology. This group of students started their studies at the university only three months prior to their participation in the study. On the other hand, the third-year students were all English majors from the School of Liberal Arts, with have approximately two and a half years of experience with English at MFU. The English language proficiency of these two groups of students was assessed by Oxford's Quick Placement Test (Quick Placement Test, 2013). The results of the placement test conformed to students' experience with English. The average score of the first-year students was 20.67 while that of the third-year English majors was 30.72 (out of 60). It is true that students with a score of 30.72 out

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<sup>3</sup>It should be noted that Mae Fah Luang University is a Thai public university with classes conducted in English. Therefore, students will be exposed to English since the first year.

of 60 on the English proficiency test cannot be considered as advanced language learners. However, because of their higher score compared to the first-year students together with their longer exposure to English in the university, the second group of students was classified as intermediate English language learners (IL) while the first group of students—the first year students—was considered low-proficiency English learners (LL). In order to examine levels of morphological acquisition in English L2 learners, two experiments were designed.

### Experiment 1: Error Identification Test

#### The Design

Twelve English sentences were prepared for Experiment 1. Each sentence contained one morphological-related grammatical mistake. The mistakes were of two types: inflectional and derivational morphology. Six sentences contained mistakes in terms of inflectional morphology—such as the misuse of verb tense and singular-plural noun '*Sound are made...*', '*...those six horse*', etc.—whereas the other six sentences contained incorrect use of derivational morphemes—such as the misuse of word forms in relation to parts of speech '*...asked for the permitting*', '*She prompt began clearing the rubble...*', etc (see test items in Appendix A).

#### Purpose of Experiment 1

Experiment 1 was designed to test how much morphological knowledge participants have. In order to successfully complete the task, participants required not only morphological knowledge of the internal structure of words, but also syntactic knowledge in being able to

recognize the relationship between the word in question and the word/s nearby. In other words, morpho-syntactic processing was being tested at the same time. If either types of knowledge was insufficient, the task could not be completed.

### **Participants' Tasks**

In this experiment, the ungrammatical sentences were shown one by one with a 30-second interval in between. The participants were asked to identify the incorrect word in each sentence by writing them down on the answer sheet. Moreover, the correct word form was also expected. If the participants could identify the incorrect word and provide the correct form, two points were given. If only the incorrect word was identified, they would get only 1 point. However, if no answer was given, student would be given a 0.

### **Analysis for Experiment 1**

Overall scores and type-separated scores—for inflectional and derivational morphology—were reported. Results from the LL and IL groups were then compared. Qualitatively, the corrections of participants in both groups were shown and compared.

## **Experiment 2: Memory Retrieving Test**

### **The Design**

A study by Rungrojsuwan (2007) on English text memorization by Thai students while copying reported that the English memory span of Thai learners of English is generally about 7 words long. Accordingly, the second experiment contained 10 English sentences of varying length ranging from six to ten words. For

each length there were two sentences. The sentences were arranged according to their length as follows: 6, 7, 8, 9, 10, 6, 7, 8, 9, 10. One more word was added in order to test the extent to which participants in each group could retrieve them (see test items in Appendix B).

### **Purpose of Experiment 2**

Experiment 2 was designed to measure L2 learners' memory span, which reflects the capacity of learners' working memory. In addition, in terms of morphological processing, it was used to test learners' recognition of the inflectional morphemes appearing in the test sentences. Some learners might recognize only the base morphemes, but ignore the grammatical related elements—such as *call* instead of *called*—because Thai does not possess such a morphological system.

### **Participants' Tasks**

In this experiment, sentences were shown one at a time. The participants had 15 seconds to memorize each sentence. Then, they wrote the sentence on pieces of paper.

### **Analysis for Experiment 2**

Quantitatively, the number of correct words that learners could memorize (words written on the answer sheet) were counted and compared between the two groups of participants. Qualitatively, only the misspelled word forms were classified according to types of mistakes. Results from the two groups of participants were also analyzed. It should be noted that the answers not appearing in the stimuli were not included for analysis.

## Results and Discussion

### Experiment 1

The Error Identification Test in Experiment 1 tested whether the participants could recognize morphology-related grammatical errors in the test sentences. Table 1 shows maximum, minimum, and average scores for the IL and LL groups.

Table 1 Maximum, average, and minimum scores for error identification test of IL and LL groups (total of 24 points)

	IL	LL
<b>Maximum</b>	18	9
<b>Average</b>	7.14	2.9
<b>Minimum</b>	0	0

From Table 1, it can be seen that the participants in the IL group received higher scores than those in the LL group, with a maximum of 18 and 9 (out of 24), respectively. However, the average scores for both groups were far lower than the maximum scores (7.14 and 2.9). Compared with the full score of 24, they received less than 30%, which is considered very low. In the case of the IL group, although classified as high proficiency students, the results indicate that morphological knowledge remains a significant problem for Thai learners of English in general. In addition, it should be noted that some participants in both groups received 0, meaning that morphological knowledge should be taken more seriously in English language education.

Apart from the overall picture in Table 1, results were divided according to types of morphological elements: inflectional and

derivational morphology as illustrated in Table 2.

Table 2 Maximum, average, and minimum scores for error identification test (divided into inflectional and derivational morphology) of IL and LL groups (total of 12 points)

	Inflectional Morphology		Derivational Morphology	
	IL	LL	IL	LL
<b>Maximum</b>	12	6	10	3
<b>Average</b>	5.07	2.18	1.96	0.72
<b>Minimum</b>	0	0	0	0

Table 2 obviously shows that participants in the IL group received higher scores than those in the LL group in both types of morphological elements. Some students in the IL group received a full score (12) while some in the LL group received almost a full score (10).

However, comparing the two types of morphemes, it can be observed that the students, regardless of language proficiency, received lower scores in detecting errors of derivational morphemes than those of inflectional morphemes. It seems that between the two types of morphemes, inflectional ones are easier to acquire. The explanation for this might be that English inflections are fixed additional forms attached to the base, such as *-s* and *-ed*, and can be easily recognized. On the other hand, in order to be able to use derivational morphemes correctly, it is necessary to know (understand) the relationship between

words in a sentence and also how to change their forms to the appropriate parts of speech, such as *'protect'*, *'protective'*, or *'protection'*. Moreover, English derivational morphemes have greater variety of form, compared to inflectional morphemes. Take noun-forming suffixes, for example. In English, there are different noun suffixes, e.g. *-ion*, *-ness*, *-ship*, *-ity*, *-dom*, and *-logy*, etc. Because this does not occur in Thai, it is usual for Thai students to be confused when they have to form a noun using the derivation process.

According to the data, it was found that the detection of derivational morphology errors is very high. Students were unable to recognize this type of error. As a result, they did not identify the target mistakes (concerning derivational morphology) in their answers. There is not insufficient data for further analyze of morphological processing. However, the data on inflectional morphology is very rich. The participants could sense that there was something wrong with the words with inflectional morphemes, but most were still unable to provide the correct answers. Accordingly, the analysis in terms of morphological processing was based on inflection mistakes. Primarily, results from Experiment 1 were analyzed in types and token manners.

Types of errors illustrate a variety of mistakes that both groups of participants made in the experiment as shown in Table 3. Note that the numbers in parentheses show the total number of mistaken word types found in each box—for example *ear*, *hears* are counted as two mistaken word types.

From Table 3, students' answers on inflectional morphology can be seen to be of four major types. First, students

produced errors in similar or partial forms to the target words; for example, the target *'is called'* could be *'is call'*, *'is'*, or *'called'*. Second, some students misspelled the target words; for example, the target *'star'* could be *'staar'* and the target *'cat'* could be *'com'* or *'cate'*. Third, in some cases, totally different words were found; for example the target *'gave'* were found as *'took'* and the target *'sound'* were replaced with *'voice'*. Fourth, some students, mostly in the LL group, left the answers blank.

In terms of variation, it can be seen that participants in the LL group produced a higher variety of errors than those in the IL group. Boxes highlighted in gray show that in most cases students with low proficiency were frequently confused with the correct forms of nouns and verbs containing inflections. As a result, a number of different ungrammatical variants (ranging from 3-14) were given. Such confusion in the formation of inflectional morphemes is further evidence that students in the LL group cannot process this morphological knowledge. Actually, this problem can also be seen in the IL group as well, though it is smaller in number. In other words, students could sense some ungrammaticality of the target words but they were unable to make accurate judgment on what the correct word forms should be, especially students in the LL groups who have a lower degree of morphological knowledge.

In terms of frequency, the variants (mistakes) with highest frequency for all targets between the two groups of participants are listed. They are also classified into 4 types as shown in Table 4.

Table 3: Varieties of inflectional morphology errors done by Thai students with different levels of language proficiency (IL and LL)

Target Words	IL	LL
runs	(1) run	(9) NA, run, ran, runs, runed, rend, rus, rans, runy
ears	(2) ear, hears	(8) NA, ear, eera, eaes, eear, ei, esn, eare
sounds	(3) NA, sound, voice	(4) NA, sound, round, sofe
is called	(6) NA, is call, are call, called, are called, call	(17) NA, is call, called, is calling, can call, is, is collect, are called, were called, can called, in called, is calleg, is calls, are is corred, cell, can call, call
was playing	(7) was, playing, is play, is playing, was falling, play, was play	(9) NA, playing, is play, is playing, walking, was paying, was plaing, play, were playing
gave	(4) give, gives, took, has give	(8) NA, give, gver, take, great, took, grave, have
took	(4) NA, take, bring, look	(3) NA, take, look
started	(3) start, stared, starts	(13) NA, stared, sanded, staring stated, stand, strating, stard, stars, strtted, start, steyed, startind
are	(1) is	(3) NA, is, a
was sitting	(4) sitting, was setting, is sitting, was siting	(13) NA, sitting, was, siting, is siting, was satting, is satting, was satting, setting, sit, was setting, is sitting, was siting
dogs	(1) dog	(3) NA, dog, dos
cat	(4) NA, cats, com, cate	(3) cet, car, cats
were growing	(6) were, are, was growing, are growing, were going, were gowing	(14) NA, were, are, was growing, are growing, growing, are going, are to growing, were grow, is growing, grown, going, a grows, grow
star	(5) NA, stars, stare, starts, staar	(3) NA, stars, start
stands	(11) NA, stand, are stand, standing, were stand, standed, is stands, is stand, are standin, was stand, stay	(4) NA, stand, staned, strand
states	(3) NA, age, state	(4) NA, state, stage, start

Table 4 Types of inflectional errors and the variants with highest frequency  
(target > variant (frequency/total))

Types of errors	IL	LL
Inflection Deletion	runs > run (6/6), ears > ear (3/4), sounds > sound (33/35), is called > is call (10/16), started > start (5/8), dogs > dog (8/8), stands > stand (53/84)	runs > run (12/22), dogs > dog (26/28)
Inflection Addition	star > stars (26/31), cat > cats (11/14)	-
Word Form Change	was playing > is playing (10/19), was sitting > is sitting (8/13), were growing > are growing (16/30), took > take (7/14), gave > give (11/14), are > is (1/1)	gave > give (21/44)
Whole Word Omission	states > NA (42/64)	ears > NA (14/28), sounds > NA (43/74), is called > NA (26/74), took > NA (49/56), started > NA (11/24), are > NA (32/36), were growing > NA (35/81), star > NA (30/38), stands > NA (57/93), states > NA (79/93)
Grammatical Word Deletion	-	was playing > playing (16/37), was sitting > sitting (13/46)

In terms of language processing, the types of errors show what language learners usually do when they have to generate words inflected with grammar-related elements that they do not know. The first strategy is deleting the inflection such as, 'runs' > 'run' and 'started' > 'start'. Secondly, they might add some inflections to the bases which in fact need no addition such as 'star' > 'stars' and 'cat' > 'cats'. Thirdly, they might change the forms of the target words to others which are not grammatical such as 'took' > 'take' and 'are' > 'is'. The fourth strategy is simply

to omit/drop the whole word. Lastly, sometimes they delete a word with grammatical meaning and leave only the word containing content such as, 'was playing' > 'playing'.

In addition, considering the number of variants between the two groups of participants, it is obvious that students with higher proficiency usually employ "Inflection Deletion", "Inflection Addition" and "Word Form Change" strategies. These strategies imply that the students process morphological

information by relating different types of inflection and rules in their long-term memory with the input. Still, they might have some confusion on the selection of the appropriate inflection. As a result, they come up with words with wrong inflections/forms. However, it is clear that students in this group have stored some particular morphological knowledge in their memory, but it cannot be said that they have fully acquired the grammatical rules of the particular morphemes.

On the other hand, students with low language proficiency frequently use “Whole Word Omission” and “Grammatical Word Deletion” strategies when they have problems with morphology. The use of these strategies indicates that students in this group have almost no knowledge of inflection in their long-term memory. The majority of LL students decided to drop words in question (inflected words they thought were ungrammatical) because they did not pay attention to English grammatical rules, which are totally different from those of Thai (Thai has no grammatical inflection.). In some cases, they kept the element with content meaning, but dropped another which carried grammatical meaning (*‘was sitting’* > *‘sitting’*). This had nothing to do with inflectional knowledge, but rather, the students focused mainly on lexical meanings.

## Experiment 2

Rungrojsuwan (2007) found in his experimental study between students with different levels of English proficiency that students with higher proficiency tend to have longer memory span than those with lower proficiency. However, the study viewed memory span on a simple task (during text copying) without any specific

attention on morphological processing behaviors as in this study. In Experiment 2, students were asked to memorize 10 sentences of different lengths (from 6-10 words) in a limited time. Then, they had to write those sentences on paper. This experiment mainly tested participants’ memory span. In relation to morphological processing, the number of words students could memorize would reflect their ability to link words into a sentence. Moreover, the investigation on whether the students could memorize items with inflection would help clarify whether Thai students ignore the existence of inflectional morphemes in English.

Table 5 illustrates the memory span of participants in the IL group. Note that the gray boxes indicate the number of words that most students in each group could memorize.

Table 5 Memory span of intermediate proficient English language learners

NO	No.of words	No. of words memorized											
		0	1	2	3	4	5	6	7	8	9	10	
1	6	-	-	-	1	2	18	80					
2	7	-	-	-	1	4	9	11	44				
3	8	-	-	-	2		3	10	30	55			
4	9	-	-	2	7	8	15	20	14	28	6		
5	10	-	-	1	1	2	3	4	8	21	32	28	
6	6	-	-	2	1	1	12	84					
7	7	-	-	-		2	2	12	82				
8	8	-	-	-	2	2	6	21	26	42			
9	9	-	-	-	1	1	7	11	26	34	20		
10	10	1	3	12	29	26	5	15	4	4	1	-	

Table 6 Memory span of low-proficient English language learners

NO	No.of words	No. of words memorized											
		0	1	2	3	4	5	6	7	8	9	10	
1	6	-	4	6	10	14	29	32					
2	7	9	12	17	13	18	13	10	3				
3	8	1	-	14	11	22	18	11	11	7			
4	9	2	5	14	17	17	15	10	10	3	2		
5	10	5	3	10	16	18	9	8	6	9	9	-	
6	6	3	9	15	10	11	23	25					
7	7	1	-	1	8	10	18	19	37				
8	8	2	8	10	16	11	11	21	6	10			
9	9	-	-	1	4	8	18	31	21	8	5		
10	10	8	19	22	25	11	6	3	1	-	-	-	

Considering the gray boxes in Table 5, it can be seen that the majority of students in the IL group could memorize the whole sentences correctly. This means that the input information the students received in their working (short-term) memory could be matched very well with morphological information in their long-term memory. This is because students in the IL group have already acquired, although partially, some morphological knowledge. Therefore, when they saw the tested sentences, they could recognize and retrieve the information very well. It should be noted that sentence number 10 shows a regressive result. Most participants (29) could memorize only 3-4 words in the 10-word sentence. This may be because that they were tired of the tasks, which forced them to process input information continuously in a limited time.

For the results of the LL group, Table 6 illustrates different patterns of memory span as shown.

From Table 6, it can be seen that students in the LL group could retrieve the sentences they had seen less successfully than those in the IL group. No matter how long the target sentence was, the range of students' output was between 4-6 words in length. There are two possible implications from this result. First, because students have a low level of English proficiency, their memory span is short and limited to not more than 6 words. Second, considering in detail, it was found that the words students usually produced were those at the beginning of the sentences—starting from the first words of the sentences—instead of the last words of the sentences, which they should have read/seen last. Surprisingly, they did not ignore morphological inflection as much as expected. Examples are shown below.

Target sentence *Ears can hear soft or loud sounds*

Students' output *Ears can hear soft or loud sound*  
*Ears can hear soft*  
*Ears can bens*  
*Ears can*  
*Ears*

From the examples, it can be explained that students with low language proficiency could not recognize all the words in the stimuli in the limited time given. With limited morphological/lexical knowledge, they seem to have matched the input with their long-term memory slowly in a word-by-word fashion. Moreover, they may have been concerned more with spelling and meaning, and this took more time than for the students in the IL group, who process the input information as one or two chunks of phrases and recognize those chunks in terms of concepts rather than forms because they have more perfect information about words in the input. The quicker they understand the meaning of the whole sentence, the more perfectly they can produce the output.

## Conclusion and Discussion

From a cross-linguistic perspective, morphology seems to be an issue in English language education in Thailand owing to differences in morphological complexity between Thai and English, making English language learning different for Thai students. Many studies on morphological acquisition suggest that language learners usually process morphological information in two possible ways (Pinker 1999 cited in Pliatsikas and Marinis 2012, Kuperman and Van Dyke 2014). First, they just simply match the input information with the morphological knowledge stored in the long-term memory. Second, they might apply morphological rules in the long-term

memory with the lexical input in order to recognize the particular inflected lexical items. Accordingly, this paper asks whether language proficiency affects these processing behaviors. Two experiments—Errors Identification Test (Experiment 1) and Memory Retrieving Test (Experiment 2)—were conducted to find the amount of morphological knowledge and language processing behaviors of Thai learners of English at two different levels of English proficiency (IL and LL groups).

In relation to morphological knowledge, as expected, participants with low language proficiency possessed less knowledge than those with intermediate proficiency. They scored an average of 2.9 out of 24 points in the Error Identification Test. This means that they had too little knowledge of English morphology to correct the morphological mistakes. An additional reason might be that Thai has no such morphological system. However, although participants in the intermediate language proficiency group had higher scores than those in the low proficiency group, their average score was still relatively low (7.17 out of 24). This indicates that acquiring morphological knowledge of English is not an easy task for Thai learners in general. This might be a result of different morphological systems between Thai and English. That is, in English, word forms need to be changed according to their functions and positions in sentences. However, in Thai, language users are not concerned with the form of words in a sentence because there are no inflectional and derivational morphemes in Thai.

Moreover, comparing the two types of morphemes, it was found that derivational morphemes are more difficult to acquire than inflectional morphemes. It is claimed that this is due to the nature of these two

types of morphemes. Derivational morphemes deal with words' internal structures resulting in the change of forms. For language learners, it is quite complicated to decide, for example, which suffix should be used to form a particular noun because there are many noun-forming suffixes in English, *i.e.* *-ness*, *-dom*, *-ment*, *-al*, *-tion*. On the contrary, inflectional morphemes seem to be more predictive, because there are default endings for each particular inflection such as *-s* for plural, *-ed* for past tense, and *-ing* for progressive aspect. These inflections normally occur with regular nouns and verbs with higher frequency compared to those of derivational suffixes.

In relation to morphological processing behaviors, it was found that students with different levels of language proficiency employ different strategies when processing morphological inputs. The IL participants usually employ “Inflection Deletion”, “Inflection Addition”, and “Word Form Change” strategies when dealing with words with inflectional morphemes. This implies that the IL participants possess, to some extent, morphological rules and tried to apply these rules in order to figure out if the sentences in the test were grammatically correct or not. The results seem to conform to those of Jia (2003), Bliss (2006) and Pliatsikas and Marinis (2012) where proficient language learners could apply rule-based processing for inflected words.

On the other hand, the LL participants tend to employ primarily “Whole Word Omission” and “Grammatical Word Deletion” strategies. This implies that this group of participants does not apply any morphology-related device to the task, but rather, takes lexical meaning as primary

concern and ignores all grammar-related elements in the sentences. This is also evidence to confirm that the LL participants have very little knowledge of English morphology.

In addition, the patterns of memory span from the Memory Retrieving Test indicate different patterns of morphological processing behaviors related to the findings from past research. It was found that the IL participants can memorize linguistic information given in a limited time almost perfectly while the LL participants cannot—their memory span is about 4-6 words. It is claimed that, on the one hand, language learners with intermediate language proficiency used rule-based technique by applying morphological rules to words in the sentences they saw. Accordingly, they did not have to memorize all the letters on the screen, but instead, they just read through and got the overall idea of the sentence before applying the rules to some particular words. On the other hand, language learners with low language proficiency used a word-by-word matching technique when they memorized the sentences in the test because they have limited morphological knowledge. Accordingly, they were unable to memorize all the words in the sentences within the given time. As a consequence, their outputs consisted of about 1-4 words from the beginning of the sentences instead of the last group of words, which they should have read last. This implies that, in reading a text, this group of learners had to match the input with their long-term memory one by one. This took time and affected their task completion. Once the input information cannot be matched with the stored information in the long-term memory, they have to memorize

that particular word letter by letter and the information might risk being forgotten.

Results from the two experiments of this study support the Dual-system Model which states that English language learners employ two processing methods when dealing with morphological information: whole-word and rule-based methods. However, the whole-word method seems to be basically used by language learners with low language proficiency while the rule-based method tends to be used by intermediate and advanced learners as shown in Figure 1.

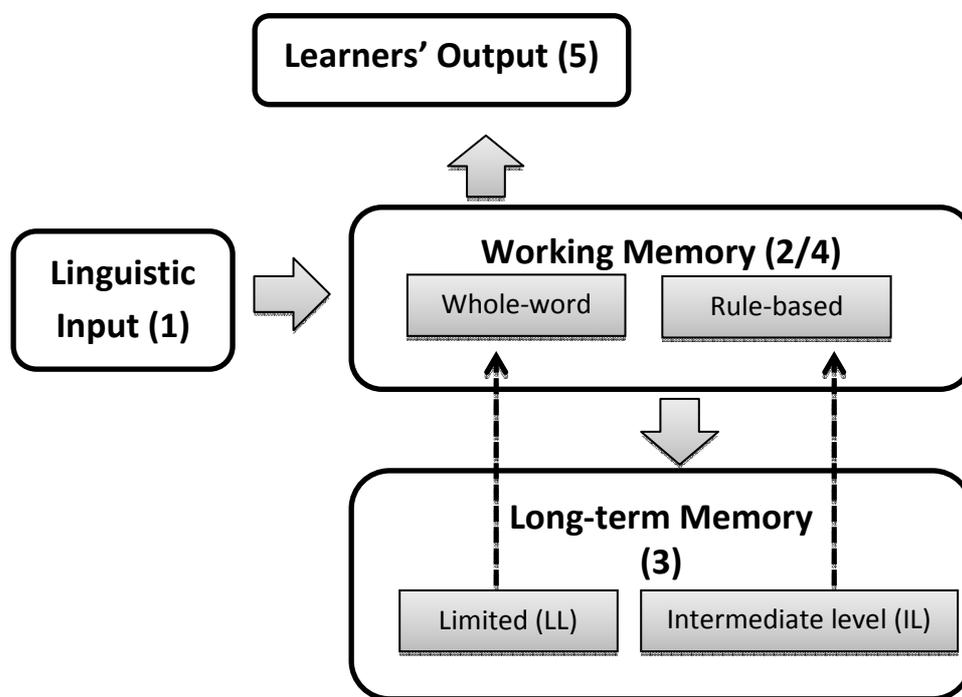


Figure 1 Morphological processing model for English language learners with different levels of language proficiency

From Figure 1, it can be explained that a linguistic input (1) is usually passed into the working/short-term memory (2) through the perception of sensory motors (visual/audio). Once the information has been realized in terms of sounds or images, it will be further matched with morphological information stored in the long-term memory (3). If the information in the long-term memory is limited (as in the case of the LL group), the working memory will process the input information by using the whole-word method (4). On the other hand, if the long-term memory contains intermediate-level morphological information, the working memory will process the input information using the rule-based method. It is also claimed that

the Dual-system Model is supported in terms of morphological processing. However, in terms of morphological storage, it is believed that even the students with low language proficiency could have some morphological rules stored in their long-term memory. This is because, in the teaching situation, it is possible that word-formation rules are taught in class. Accordingly, it is not that students were not exposed to rules, but rather, they could not apply the rules with real input information. In addition to their limited English knowledge, it is partly because Thai does not employ word internal information in producing grammatically correct sentences.

Findings from this study can be applied to EFL learning and teaching in many aspects. Firstly, from the two experiments it was found that students with different levels of language proficiency have different morphological processing behaviors. Although morphological rules are normally taught in class, students with lower language proficiency tend to learn and memorize words with inflectional and derivation morphemes as totally new words, ignoring the decomposition of the derived/inflected words. Accordingly, teachers of English should be aware of this and pay much more attention to any kind of practice leading to students' awareness of the existence of these derivational and inflectional morphemes. Moreover, the order of content to be taught in relation to morphology for this group of students might be irregular forms of verbs and nouns (because low-proficiency students tend to memorize whole words at the beginning) > inflectional morphemes (because default forms are most often used) > derivational morphemes (this type of morpheme is quite complex in English).

For students with higher language proficiency, the results found that this group of students processes morphological information better than the lower group. However, it is suggested that teachers focus more on their fluency in using derivational and inflectional morphemes because the Thai language system—which has no derivational and inflectional morphemes—still interferes during processing. In addition, having students with different levels of language proficiency in the same class/group might be helpful. In other words, poor students can make use of better students in detecting morphological rules during practices or exercises. On the other hand, better students are automatically forced to

help explain to poor students and this would make the better students be more active and work further to examine what they is not clear. Lastly, this also promotes interactive learning and helps develop a good attitude toward English language learning.

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## Appendices

### Appendix A: Test Items for Experiment 1

1. Sounds are made if someone hits a drum or shakes a paper.
2. Judy was so worried that she had to stay in the barn all day to take care of those sick horse.

3. Where is the sounds of the sickly breathing?
4. The people's house were much different from our houses.
5. American colonists became more and more unhappy with the king of England. They do not feel happy because he took away their right to freedom.
6. During 1600s, the French settled in much of eastern Canada. They call this land New France.
7. I built a small protect brick wall around the area.
8. Not many people know how a horse and a donkey are difference.
9. Malinda asked for the permitting from the city government to create a neighborhood Victory Garden.
10. She prompt began clearing the rubble and cultivating the soil.
11. What good was a small pony when there was heavily farm work to do?
12. Only a small number of salmon, eventual, returned to their birth place in order to lay eggs.

Appendix B: Test Items for Experiment 2

1. He runs down the soccer field.
2. Ears can hear soft or loud sounds.
3. The moving air is called a sound wave.
4. Jake was playing all by himself outside his house.
5. Jimmy gave me his rabbit, and I took it home.
6. They started rolling down my face.
7. A rock, milk, and air are matter.
8. Kate was sitting in her senior biology class.
9. The two dogs and the cat were growing tired.
10. Each white star stands for one of our fifty states.