THE EFFECT OF INCIDENTAL LEARNING ON THE COMPREHENSION OF ENGLISH AFFIXES BY ARABIC-SPEAKING EFL LEARNERS: ACQUISITION AND APPLICATION

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Abstract
This study aims to examine the effect of incidental learning on the comprehension of 30 English affixes by 50 Arabic-speaking EFL learners in an attempt to determine which affixes are more easily comprehended. We adopt the experimental design of a pre- and post-test to measure the participants' knowledge of English affixes before and after the treatment, which involved taking part in the prediction of the meaning of English affixed words in context for one academic semester. To this end, we divided the 50 participants into two groups: treatment and control. We administered a 30-item multiple choice test as the pre- and post-test to determine whether the treatment helped the participants expand their knowledge of English affixes.

Keywords: Linguistics, affixes, second language acquisition, incidental learning, Arabic-speaking EFL learners, morphological awareness.

1. Introduction

Knowledge of English affixes is regarded as a crucial aspect of vocabulary knowledge by EFL learners. This knowledge facilitates reading comprehension of material, especially that containing unfamiliar words making the comprehension of these words much easier. Knowledge of English affixes also helps EFL learners expand their vocabulary repertoire, in particular, their knowledge of derivatives. This knowledge also contributes to determining how well an EFL learner reads and understands new words (Nagy et al. 1993). According to Nagy and Herman (1987), in L1 acquisition studies, it has been observed that children learn new words quite rapidly, i.e. 3000 words a year, starting from the fourth grade. This remarkable ability has been attributed to incidental vocabulary acquisition and children's knowledge of affixed words. In L2 acquisition, teachers pay special

attention to vocabulary development skills, especially affixed words. They stress the importance of learning English prefixes and suffixes to help learners expand their vocabulary in derivatives. In fact, McCarhty and O'Dell (1994) indicated that textbooks dedicate whole chapters to illustrate the role of affixes in vocabulary expansion.

The significance of examining vocabulary acquisition processes has been the subject of debate since the 1960s (Ellis 1994: 1-3). The role of lexical units and affixes has been highlighted as an essential aspect of vocabulary acquisition in L2 contexts. Several approaches have been advanced and described in the relevant literature, which consider vocabulary and lexical units as the backbone of learning and teaching (Richards and Rodgers 2001: 132). This is due to the fact that words, specifically morphemes, or the smallest units of meaning are viewed as a pre-requisite for language learning as well as language communication. Several studies have been conducted to determine the extent to which EFL learners are familiar with the meaning and/or function of affixes in English (e.g. Bauer and Nation 1993; Schmitt and Meara 1997; Mochizuki 1998; Mochizuki and Aizawa 2000; Schmitt and Zimmerman 2002; Hay 2002; Ward and Chuenjundaeng 2009). However, little attention has been given to the acquisition of affixes by Arabic-speaking EFL learners. In particular, to the best of our knowledge, the effectiveness of incidental learning of English affixes on the comprehension of these affixes by Arabic-speaking EFL learners has not been examined yet, taking into consideration the non-concatenative nature of the Arabic morphological system (Altakhaineh 2014). Thus, this study aims to bridge this gap. Specifically, it aims to test the extent to which 50 students, Arabic-speaking EFL learners, studying at Al Ain University of Science and Technology, UAE, are familiar with affixes in English. In particular, this study measures whether the treatment, i.e. activities involving the prediction of the meaning of English affixed words in context, has improved the participants' incidental knowledge of English affixes.

2. Literature review

2.1. Morphological awareness

According to Charlisle (1995), morphological awareness could be defined as the ability to combine familiar morphemes to create new meanings, which can be viewed as an indicator of reading comprehension improvement. From a somewhat broader viewpoint, morphological awareness deals with learners' understanding of morphological structure and their ability to employ that knowledge when processing visual words (Koda 2000). Many researchers believe that morphological awareness is essential to vocabulary expansion. In this regard, Charlisle (1995) suggested that morphological awareness is vitally important due to the fact that morphological decomposition as well as problem-solving skills are considered indispensable methods to comprehend and learn a significant number

of derivatives that appear in the books EFL learners study. Therefore, it is argued that increasing knowledge of derivatives probably reflects a process of the acquisition of these derivatives, which relies extensively on morphological analysis.

Research on the organisation of the mental lexicon and other factors related to the means by which lexical items are accessed has shifted the focus of morphological processing towards the retrieval of meaning from constituents (Schreuder and Bayen 1995). In this way, morphological analysis maybe misleading on its own, since words can be homophonous without being related morphologically. Thus, semantic similarity could be more important than phonetic similarity even though the latter is more likely to affect the judgments of relatedness by children as opposed to adults (Schreuder and Bayen 1995). Morphological awareness enhances reading comprehension, since it involves the ability to combine words and analyse morphemes in order to construct meaning. Therefore, studies that examined the link between increasing awareness of the morphology of words, on the one hand, and word meaning, on the other, have started to gain momentum lately (Schreuder and Bayen 1995). In light of these observations, it can be argued that lack of morphological awareness makes the task of extracting information from unfamiliar words while reading extremely difficult. Put simply, the absence of morphological awareness limits learners' ability to infer the meanings of words; thus, restricts vocabulary retention. Therefore, one may conclude that if EFL learners become morphologically aware of the structure of words, their reading skills are likely to improve.

2.2 Previous studies on L2 learners' acquisition of English affixes

Researchers in L2 acquisition studies have puzzled over the mechanism by which L2 learners develop their knowledge of affixes for decades. In this regard, Schmitt and Meara (1997) conducted a study to investigate the relationship between different aspects of vocabulary knowledge together with vocabulary size, on the one hand, and language proficiency, on the other. Over the course of one academic year, the two researchers measured learners' knowledge of suffixes and word association using two types of tasks, namely, productive and receptive. On the former task, the participants were asked to provide three word associations along with their allowable suffixes for every twenty prompt verbs. On the latter task, they were required to choose three word associations out of four choices along with all allowable suffixes. The results of the study reveal that at the end of the research period, the participants' knowledge of suffixes increased up to 66% on the receptive task and up to 47% on the productive task. The two researchers estimated the annual increase as 4% on the receptive task and 5% on the productive task. Schmitt and Meara (1997) viewed these increases as modest and arrived at the conclusion that the participants have a weak awareness of derivational suffixes when they are used in combination with words. The two researchers also discovered that there was a weak correlation between suffixes and

word association knowledge as well as between knowledge of suffixes and vocabulary size. From their viewpoint, they indicated that such results can be accounted for by assuming that the more the learners are aware of suffixes, the greater their vocabulary size. This, in turn, would indicate that the participants would have an extensive range of word associations. Even though Schmitt and Meara's (1997) study yielded valuable results, their methodology had some drawbacks. Their methodology relied more on the knowledge of a verb and its associated derivatives rather than knowledge of suffixes *per se*. This drawback has been taken into account in developing the research methodology of the current study.

Another study that focused on the knowledge of affixes in L2 was that of Mochizuki (1998). He examined the comprehension of English affixes by 127 Japanese learners in order to decide which affixes were easier for the participants. He viewed the attachment of a lexical meaning to a base as the main function of prefixes, whilst he regarded the change of syntactic category as the main function of suffixes. In order to test the participants' knowledge of English affixes, Mochizuki (1998) utilised a multiple-choice test, in which the participants were given three familiar words with 26 prefixes and four choices of their possible meaning provided for the students in Japanese. With regard to suffixes, the participants were provided with three low frequency affixed words and they were asked to choose their correct word class. The results reveal that the participants understood the affixes to different degrees, depending on their order of accuracy. Mochizuki's (1998) method was partially adopted in the current study. This is due to the fact that Mochizuki (1998) utilised real words in his test; thus, one may argue that the participants may have inferred the meaning of a prefix from the words they knew. Therefore, in the current study, we opted for pseudowords in order to test the participants' knowledge of the affixes themselves, following Mochizuki and Aizawa (2000). In their study, Mochizuki and Aizawa (2000) examined the relationship between EFL learners' vocabulary size, on the one hand, and their knowledge of suffixes, on the other. The main focus of the study was on identifying the order of acquisition of suffixes. The results of the study demonstrate that there was a strong correlation between EFL learners' knowledge of suffixes and their vocabulary size. The two researchers concluded that affixes can be ranked according to their accuracy order.

In another recent study, Chen (2011) examined EFL Taiwanese students' knowledge of both derivational and inflectional affixes, taking into account that the nature of word formation of Chinese (i.e. an analytic language) is quite different from that of English (i.e. a synthetic language). Bearing in mind that the participants had received morphological instruction, the researcher explored the possibility that morphological awareness could be acquired by EFL learners whose first language was Chinese. The study also attempted to investigate whether morphological awareness can predict the participants' vocabulary knowledge as well as reading comprehension capabilities. The study sample included two groups of Taiwanese college students. The results reveal that the participants who

received morphological instruction obtained higher results than the other group that did not, especially when they were required to make a distinction between the meanings and functions of morphemes, identify words that were derivationally complex and choose the correct form of the word to fill in the blank. The results also show that morphological instruction improved the participants' reading comprehension substantially. The study concluded that morphological awareness is an aspect of scaffolding cognition, which is independent from the learners' mental L2 lexicon, especially in predicting measured receptive skills of morphologically-complex words.

On the basis of the above literature, it is evident that knowledge of affixes in English is an indispensable ingredient of vocabulary expansion and retention as well as enhanced reading comprehension by EFL learners. Therefore, studies that explore the most effective teaching methods to develop L2 learners' knowledge of vocabulary in general (see Altakhaineh and Zibin 2014; Zibin and Altakhaineh 2016) and affixes in particular are needed. Several studies have addressed this issue in the relevant literature (e.g. Meara 1997; Chen 2011). However, no study has been conducted to test the effectiveness of incidental learning (the learning that happens incidentally without an intention to learn Lyster 2007: 27) of English affixes on the comprehension of these affixes by Arabic-speaking EFL learners, taking into account the non-concatenative nature of Arabic morphological system. Therefore, the current study aims to bridge this gap. In particular, it aims to provide answers to the following research questions:

(1) To what extent are 50 Arabic-speaking EFL learners aware of the meaning/grammatical function of affixes in English?
(2) Does the treatment, i.e. engaging in activities involving the prediction of the meaning of English affixed words, enhance the participants' knowledge of English affixes?

The next section discusses the methodology adopted in the current study.

3. Methodology

3.1. Sample

The participants in the current study included 50 Arabic-speaking EFL learners, studying at Al Ain University of Science and Technology in Al Ain, United Arab Emirates (UAE). The participants were first year students, enrolled in English 1 Course and their mean age was 23 years old. The participants took the IELTS exam prior to registering at the University and scored between 4.5-5.5. We believe that students at this level of English proficiency are more suitable, since they would have the necessary skills to take part in the task administered. For the purpose of the study, the 50 participants were divided equally into two groups,

namely group A and group B. The participants in group A engaged regularly in activities involving the prediction of the meaning of affixed words throughout the semester (i.e. the first semester of the academic year 2016–2017); hence, they acted as the treatment group. On the other hand, group B did not take part in these activities; thus, they acted as the control group (cf. Zaid 2011; Song and Sardegna 2014). The participants were divided into two groups in order to determine whether incidental learning of English affixes has any effect on the participants' achievement on the post-test, which measures their knowledge of English affixes.

3.2. Treatment

Group A, the treatment group, engaged regularly for one semester in activities in which they had to predict the meaning of affixed words in context. These activities took place two times a week for one semester. We did not explain to the participants that we were interested in the meaning of the affixes themselves, since the idea behind the experiment is to determine whether EFL learners can acquire English affixes incidentally. Nevertheless, the majority of the words whose meanings the participants were required to guess were affixed words. Not all of the affixes we selected were very frequent; some of them were not very frequent. This was done in order to test whether the frequency of the affixes has an impact on the participants' ability to guess their meaning and/or syntactic function. The frequency of the affixes used in this study was checked in the Corpus of Contemporary American English (COCA). While several affixes which the participants were asked to guess their meaning were frequent, the words themselves were not. The rationale behind these exercises was to make the participants aware of the affixes themselves, without explicitly pointing that out to them (cf. Mochizuki and Aizawa 2000). The atmosphere we created in the classroom was rather competitive. Every student who was able to guess the meaning of the word was given an award/praise. We believe that the competitive atmosphere encouraged students to take the exercises seriously and engage in them more effectively. The control group, i.e. B were not involved in these activities for the purpose of the study.

3.3. Instrument and procedure

In order to assess the participants' L2 knowledge of English affixes, we used an affix knowledge test as the pre-test and the post-test. We administered the same test as a pre- and post-test to determine whether the treatment had helped the participants expand their knowledge of English affixes (see section 3.2). Two tests were administered to test the participants' knowledge of English affixes. Of note here is that the pre-test was administered at the beginning of the semester, whereas the post-test was conducted at the end of the semester in order to compare the results of the treatment group and control group. Group A engaged in activities in which they were asked to predict the meaning of English affixed words in context

throughout the semester, whereas group B did not. The test was designed in a way to evaluate the participants' knowledge of English affixes. In particular, we administered a 30-item multiple choice test in order to test the participants' comprehension of English affixes. This instrument has proven its validity in measuring the participants' knowledge of various phenomena in EFL contexts, e.g. euphemistic expressions and metaphorical and metonymical expressions (see Altakhaineh and Rahrouh 2015; Zibin 2016b), including affixes (see Mochizuki 1998; Mochizuki and Aizawa 2000). Concerning English prefixes, the participants were given 15 prefixes used in pseudowords. The logic followed in forming these pseudowords was based on changing the consonants of real words. The participants were asked to choose the correct meaning of the prefix out of three choices, which was provided for them in Arabic (see Mochizuki and Aizawa 2000). The idea behind this test was to measure the participants' understanding of the meaning of the selected English prefixes. We made sure to provide a clear meaning equivalent of the English prefixes in Arabic to avoid any confusion. With respect to the suffixes, again we used pseudowords whereby the participants were asked to choose the correct word class of 15 affixes out of four choices, i.e. verb, adjective, noun and adverb (see Appendix 1). If the participants were able to choose the correct equivalent of the English prefix in Arabic, then we assumed that the participants know that particular prefix. On the other hand, the participants were considered to know a suffix if they were able to understand its syntactic function, which was provided in English. The results provided by the participants on both the pre- and post-test were measured by assigning one mark for each correct answer. Following the administration of the post-test, we conducted an introspective session with the participants in the treatment group to obtain more insight into their experience during the test and whether they found certain items more difficult than others.

3.4. Statistical Analysis

In order to determine whether the differences between the results of the treatment group and the control group were statistically significant on both tests, a paired sample *t*-test was conducted. According to Hsu and Lachenbruch (2008), a paired *t*-test is used to make a comparison between the means of two groups. In this type of experiment, the researcher would have two samples where the observations in one sample can be paired with the observations in the second sample. In this kind of test, each group is measured twice, resulting in *pairs* of observations (Hsu and Lachenbruch 2008). The most common applications of paired sample *t*-tests are studies based on a pre- and post-analysis. For instance, the researcher administers a pre- and post-test to examine the effect of a certain treatment on the performance of a group of participants (Horst et al. 1998; Ionin and Wexler 2002). Other common applications of the paired sample *t*-test are repeated-measure designs (see Zibin 2016a). This type of test is ideal for the purpose of the current study, since it tests the effect of a treatment on the performance of the participants in

both groups (i.e. control and treatment) on the comprehension of affixes in English. The results of the paired sample *t*-test together with their interpretations are presented and discussed in the following section.

4. Results and discussion

4.1. Quantitative analysis

In order to provide an answer to the first research question, which is concerned with the extent to which 50 Arabic-speaking EFL learners are aware of the meaning/grammatical function of affixes in English, the results of both groups on both types of affixes need to be calculated .Table 1 presents the results of both groups on the pre-test and post-test using a paired sample *t-test*, which compares the mean difference between two sets of observations. In this study, the two sets of observation are the results of both groups on the pre- and post-tests.

Table 1. Paired samples statistics of the correct answers on both pre- and post-tests

Sample		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Group A pre-test (prefix)	8.6667	15	3.77334	.97427
	Group A post-test (prefix)	15.4667	15	5.98649	1.54571
Pair 2	Group A pre-test (suffix)	10.0000	15	5.12696	1.32378
	Group A post-test (suffix)	17.2667	15	6.26175	1.61678
Pair 3	Group B pre-test (prefix)	10.3333	15	4.67007	1.20581
	Group B post-test (prefix)	11.5333	15	4.30725	1.11213
Pair 4	Group B pre-test (suffix)	7.7333	15	4.18273	1.07998
	Group B post-test (suffix)	9.0667	15	4.55861	1.17703

Table 1 shows that both groups (i.e. treatment and control) may not be fully aware of the meaning/grammatical function of English affixes based on the mean of the correct answers of these groups on the pre-test. However, comparing the means of the correct answers provided by both groups on the post-test, it seems that it is higher than that of the pre-test. To provide a clearer picture of the results of both groups on the pre- and post-tests, Table 2 below shows the total number of correct answers provided by both groups on the pre-test and the post-test out of 375 (i.e. this number was calculated as follows: 25 participants in each group is multiplied by 15 items in each test).

Table 2. Number of accurate answers of groups A and B on the pre-test and post-test out of a total of 375 answers in each test

Type of test	Group A (the treatment group)	Group B (the control group)
Pre-test (prefixes)	130	155
Pre-test (suffixes)	150	116
Post-test (prefixes)	232	173
Post-test (suffixes)	259	139

Comparing the total number of correct answers provided by group A on the pre-test, i.e. prefixes (130) and suffixes (150) and on the post-test (232) prefixes and suffixes (259), it appears that the participants' results have improved noticeably. Table 2 shows that the treatment group outperformed their control group counterpart on the post test on both the prefixes and the suffixes. Comparing the results of group B with group A on the pre-test and on the post-test, Table 3 shows a noticeable change in the achievement of the treatment group as opposed to that of the control group, suggesting that the treatment has yielded positive outcomes.

In order to determine whether the mean differences between the two groups were statistically significant on the post-test alone, another paired sample *t*-test was conducted. Testing these differences provides an answer to the second research question, which is concerned with whether the treatment, i.e. engaging in activities involving the prediction of the meaning of English affixed words, enhances the participants' knowledge of English affixes. The results are presented in Table 3 below:

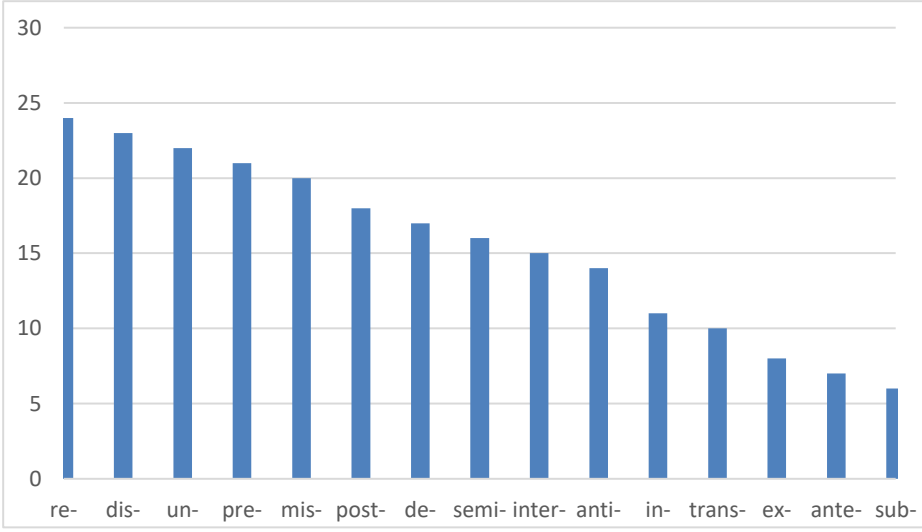
Table 3. Paired differences between the results of group A and group B on the post-tests

Sample	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1 (group A prefix post-test vs. group B prefix post-test)	3.93333	1.98086	0.51146	7.690	14	0.000
Pair 2 (group A suffix post-test vs. group B suffix post-test)	8.20000	2.07709	0.53630	15.290	14	0.000

Table 3 shows that the differences between the total number of correct answers provided by the two groups on the post-test were statistically significant (p value $0.00<0.05$), suggesting that the treatment may have had a positive impact on the performance of the treatment group on the post-test (on both prefixes and suffixes). Even though the results of the treatment group on the post-test were higher than those of the control group, the results reveal that the former group found certain affixes to be more challenging than others. For instance, the

treatment group produced more accurate answers on the prefixes *re-*, *dis-*, *un-* and *pre-* compared to other prefixes, i.e. *mis-*, *post-*, *de-*, *semi-*, *inter-*, *anti-* and *in-* which the participants understood better than *trans-*, *ex-*, *ante-* and *sub-*. With respect to the suffixes, the treatment group found *-ation*, *–ment*, *-ful*, and *-able* easier than *–ly*,*-ous*, *-ness*, *-ish*, *-less*, and *-al* which were more recognisable than *–er*, *–ism*, *-ize*, *-ity* and *-fy*. Figures 1 and 2 show the accuracy order of the affixes based on the correct answers provided by the treatment group on each item on the post-test:

Figure 1. Accuracy order of the prefixes on the post-test



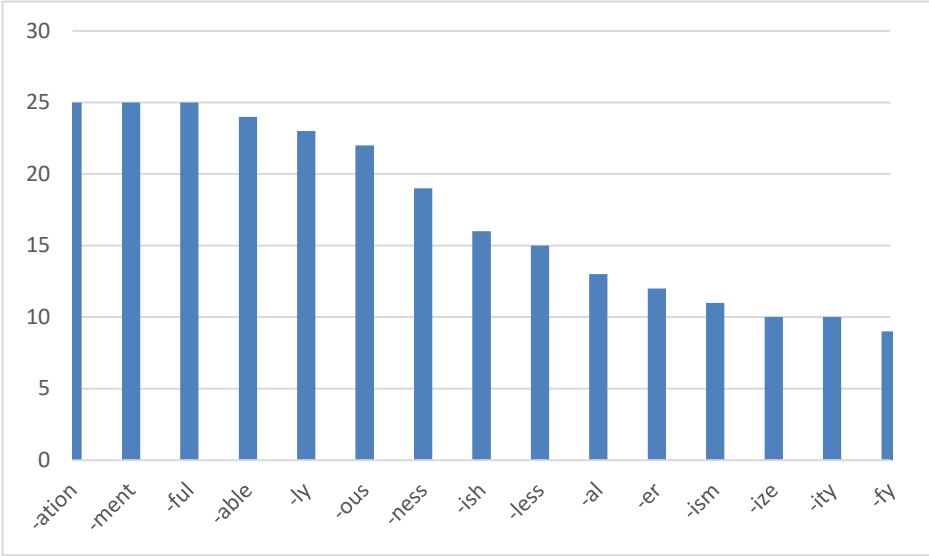


Figure 2. Accuracy order of the suffixes on the post-test

4.2. Discussion of the results

Drawing on the results in the previous section, it can be suggested that incidental learning can be helpful as far as the comprehension of English affixes is concerned. Examining the results of the current study lends support to the notion of effectiveness of incidental learning on the acquisition of various phenomena in English (see Sheu 2003; Nishino 2007; Song and Sardegna 2014). A study of the affixes' levels of difficulty based on the participants' answers (see Figure 1 and 2) suggests that the participants provided more correct answers on the items that exhibited high frequency occurrences in the COCA. For example, the prefixes *re-*, *dis-* and *un-* yielded higher number of correct answers than *semi-* and *sub-*. This proposes that the frequency of the affix plays a major role in the acquisition of affixes in L2. Interestingly, the affixes which scored the highest number of correct answers were the most common ones used in the material to which the treatment group was exposed during classes. Even though we did not reveal the purpose of the activities during class, so that the learning process would be incidental rather than direct, the results show that the participants in the treatment group obtained higher scores on the post-test (see Table 2). In this regard, researchers, such as Sadoski (2005), argue that effective vocabulary acquisition can be achieved via two main methods: direct teaching and incidental learning of words in context. While the former refers to systematic instruction of methods used to determine the meanings of words unknown to them, the latter refers to the acquisition that occurs incidentally (Lyster 2007: 27). According to Min (2008), in line with input-oriented language acquisition theory, if the input is contextualised, the learner will

be able to associate the meaning with the form. Thus, vocabulary is best acquired incidentally through extensive reading (Krashen 2004).

In accordance with Krashen's (2004) argument, the results of this study demonstrate that the activities in which the treatment group was engaged have helped them recall the meaning and the function of affixes in English even though their learning was incidental. In other words, it can be proposed that these exercises have improved the participants' awareness and intuition about English affixes. Thus, when faced with pseudowords on the test, the participants were able to activate this intuition and make a connection between the prefix used and its meaning and between the suffix and its syntactic function. But one may wonder about the method through which such a connection was established. The introspective session conducted with the treatment group following the administration of the post-test revealed that as far as the prefixes are concerned, the participants recalled English words to which the prefixes are attached and then translated their meanings into their first language (L1), i.e. Arabic. Through this process, the participants were able to establish a connection between the prefix and its meaning. The same procedure was followed by the participants when analysing the suffixes, through recalling English words they encountered through the exercises they engaged in during the semester, the participants translated the meaning of these words into Arabic and worked out the syntactic function of the suffixes. This procedure reveals that Arabic-speaking EFL learners think in L1 while processing English affixes, using translation to guess the meaning of prefixes and the syntactic function of suffixes in English. Nonetheless, being able to recognise that affixes in English can be separated from free morphemes may reflect a process of the acquisition, which relies heavily on morphological analysis (cf. Charlisle 1995). During the session, the participants also indicated that their knowledge of bound morphemes and the fact that they can be attached to English words and can be easily separated from them made the multiple-choice test easier. This knowledge, according to the participants, is very important since the word formation processes in Arabic are different from those in English (see Altakhaineh 2014; Altakhaineh, 2017). That is, Arabic has a non- concatenative morphological system in which morphemes are inserted inside the root, rather than a concatenation of affixes and roots (McCarthy 1981). The instruction the participants have received at school with regard to the English morphological system has made the task easier. Thus, this may suggest that direct instruction of the morphology of English words, especially if the learners' first language is typologically different from English, is important at an early stage to make EFL learners understand that English utilises affixation as a word formation method, which may not apply to their L1. This can also help EFL learners realise that rules of L1 do not always apply to L2 and that the rules of the latter should be learned and analysed independently from those of L1. In addition, this type of instruction can enhance EFL learners' morphological awareness (cf. Schreuder and Bayen 1995).

In addition, the participants' ability to maximise their vocabulary retention has increased via repetition. According to Coady (1993), the probability that a word is acquired from first exposure ranges from 5%-15%; hence, repetition is fundamental for L2 vocabulary acquisition. The treatment which we followed in this study was focused on guessing the meaning of affixed words. Therefore, the participants were exposed to words marked with the same affixes repeatedly. As a result, we suggest that through repetition, the participants in the treatment group were able to make a connection between the prefix and its meaning and between the suffix and its syntactic function. This result confirms the results reported by Chen (2011); the results of his study show that the participants (i.e. Taiwanese EFL learners), who received morphological instruction, scored higher than the other group that did not, especially in making a distinction between the meanings and functions of morphemes, identifying words that are derivationally complex and choosing the correct form of the word to fill in the blank.

On the other hand, as mentioned before, the participants encountered difficulty with certain prefixes and suffixes. Examining Figure 1, the participants produced erroneous answers on certain prefixes, e.g. *ante-*, *sub-*, *trans-*, etc. Such prefixes are not frequent compared to other prefixes, e.g. *re-*. This may indicate that the frequency of the affix plays a role in the participants' ability to guess the meaning of English prefixes. Another factor that played a role in the participants' results on the post-test in relation to the prefixes is their polysemous nature. During classes, the treatment group was exposed to many frequent prefixes in English. However, some participants were aware of the fact that some prefixes have more than one meaning. For instance, the participants produced incorrect answers on the prefix *in-* due to its polysemous nature, i.e. it has two meanings 'inside' and 'not'. However, on the test, the former meaning was not tested (i.e. the latter meaning is more frequent). This may also explain why the participants found the prefix *inter-* more challenging (see Figure 1). It can be suggested that such a factor had an impact on the participants' acquisition of prefixes. During the introspective session, the participants explained that the idea of two prefixes with similar meanings or one prefix with more than one meaning is quite challenging to comprehend. This is due to the idiosyncratic nature of the English morphological system (see Altakhaineh 2014), which makes the acquisition of affixes quite difficult for EFL learners. The participants explained that in order to produce correct words in English, one needs to memorise the affixed words so that they do not produce ungrammatical words such as **uncorrect* instead of *incorrect.* In this regard, ESL/EFL teachers need to pay attention to polysemous prefixes during class, making EFL learners aware of such a phenomenon. We suggest that direct teaching of polysemous affixes may yield better results in comparison with incidental learning. However, such a study requires empirical testing.

With regard to the suffixes, certain suffixes were found to be easier than others, relying on their frequency and whether the suffix performs more than one function (i.e. *–al* and *–ly*). A look at Figure 2 shows that the suffixes *-ment* and *-ation* were found to be the easiest to recognise by the treatment group. All 25 participants

were able to guess their function. On the other hand, the suffixes *-ity* and *–fy* yielded a low number of correct answers. In comparison with the previous suffixes, *-fy* and *–ity* are not that frequent, which explains the poor performance of the treatment group on the post-test. Even though these suffixes were encountered repeatedly during treatment, the treatment group still found it challenging to recognise their grammatical function. This may indicate that repeated exposure to the suffixes during classes may not be enough for the EFL learners to comprehend their function. The fact that some suffixes have more than one syntactic function may have presented a challenge to the participants. For instance, the suffix *–al* changes a noun into an adjective and a verb into a noun, but only the former function was tested since it is more frequent. However, some participants selected *noun* rather that *adjective*. This is similar to the result obtained by Mochizuki and Aizawa (2000), in which they reported that suffixes that have more than one syntactic function were found difficult by Japanese EFL learners. In addition, during the introspective session, the participants explained that resorting to literal translation of the words attached to the suffix helped them determine the function of the suffix, as mentioned previously. However, when the suffix has more than one function, e.g. *-al*, literal translation does not work unless the word in question is used in context. Therefore, it can be proposed that ESL/EFL teachers need to pay more attention to multifunctional suffixes in English, explaining that such a phenomenon occurs in English. Again, this may require direct instruction, rather than indirect or incidental learning.

Another factor may also have had an influence on the participants' ability to recall the function of suffixes. That is, the occurrence of the suffix attached to many words which are themselves frequent can play a role in the participants' ability to recall the function of the suffixes. For instance, words such as *agreement*, *advertisement*, *excitement*, etc. are quite frequent themselves; the participants frequently encounter them in the material they study and in TV shows and movies. Therefore, the participants possibly find it easy to remember the meaning of such words and recognise that all these words are nouns. On the other hand, words such as *clarify*, *testify*, etc. may not occur as frequently as the previous words; hence, EFL learners may find it difficult to establish a connection between the suffix and its function. Based on this discussion, it can be suggested that L2 morphological awareness could be independent from L2 mental lexicon, it can be viewed as cognitive scaffolding (cf. Chen 2011). Yet, this process relies heavily on whether the learners receive morphological instruction in L2 at an early age. If not, then they would possibly store the affixed words they learn in L2 as one unit in the mental lexicon, which means that they would lack morphological awareness in L2. However, this requires further investigation.

5. Conclusion and recommendations

This study has investigated the comprehension of 30 English affixes by 50 Arabic-speaking EFL learners in order to determine which affixes are more easily comprehended. We adopted the experimental design of a pre- and post-test to measure the participants' knowledge of English affixes before and after the treatment. The participants, 50 Arabic-speaking EFL learners, were divided into two groups: treatment group, who engaged in activities involving the prediction of the meaning of English affixed words in context for one academic semester, and a control group who did not. Through a 30-item multiple choice test, we measured the participants' comprehension of English affixes, employing pseudowords. The results show that the treatment group outperformed their control group counterpart on the post-test on both the prefixes and suffixes, suggesting that the treatment that involved incidental learning possibly played a major role in the former group's remarkable achievement. Many factors influenced the answers of the treatment group on the post-test: incidental learning of affixes, the frequency of the affix and the frequency of the words attached to a certain affix, and repetitive exposure to the meaning and/or function of affixes to ensure maximum retention had a positive impact on the performance of the participants. On the other hand, the idiosyncratic nature of the English morphological system, the polysemous nature of prefixes and the existence of multifunctional suffixes in English impacted negatively on the participants' performance. A subsequent introspective session showed that the treatment had a positive impact on the participants' knowledge of affixes even though their acquired knowledge of English affixes has been incidental. Based on these results, it is recommended that ESL/EFL teachers need to utilise activities that can familiarise learners with the most frequently used affixes in English, explaining to them directly the fact that prefixes in English can be polysemous and that suffixes can be multifunctional. This can help them improve their morphological awareness and, in turn, enhance their vocabulary size and reading skills. It is also recommended that studies which test whether direct teaching of polysemous prefixes and multifunctional suffixes yields better results in comparison with incidental learning are needed to shed more light on the acquisition of affixes by EFL learners.

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Appendix 1

Affixes knowledge test:

Part 1: Prefixes

Choose the correct equivalent of the prefix (in bold) which is attached to the three English words (in the test, the choices were provided in Arabic):

1. **Dis**afbice, **dis**krowm, **dis**far

a. Again b. extra c. opposite d. before

2. **Re**abbirm, **re**camm, **re**preag

a. Under b. over c. above d. again

3. **Anti**fote, **anti**kepric, **anti**nabber

a. Wrongly b. against c. after d. half

4. **Post**fave, **post**done, **post**nordem

a. After b. across c. before d. between

5. **Trans**faremd, **tarns**nif, **trans**akdion

a. Not b. lacking c. over d. across

6. **Un**baidly, **un**beem, **un**fesd

a. Cause to b. not c. between d. again

7. **Ex**serbf, **ex**bade, **ex**bek
a. Out of b. inside c. against d. later

8. **Semi**falp, **semi**kladdic, **semi**jarcnecc
a. Including b. out c. half d. following

9. **Pre**cshool, **pre**fale, **pre**afopd
a. Impossible b. before c. beyond d. favourable

10. **Mis**mear, **mis**grimt, **mis**borkume
a. Later b. only c. wrongly d. fairly

11. **In**adme, **in**konblede, **in**abbdobriade
a. Not b. causing c. have the quality of d. following

12. **Ante**fabt, **ante**dype, **ante**sete
a. Following b. opposite c. before d. again

13. **Inter**bene, **inter**mufe, **inter**kecd
a. Outer b. beside c. between d. only

14. **Sub**naride, **sub**komcsiod, **sub**nefke
a. Inside b. out c. ordinary d. under

15. **De**bdeese, **de**akdifade, **de**fad
a. opposite b. before c. extra d. both

Part 2: Suffixes
Choose the correct word class of the following English words:

1. meth**al**, ber**al**, matub**al**
a. noun b. verb c. adjective d. adverb

2. fave**ment**, bayb**ment**, nofe**ment**
a. noun b. verb c. adjective d. adverb

3. blag**ly**, bunp**ly**, cekomf**ly**
a. noun b. verb c. adjective d. adverb

4. mod**able**, dras**able**, lof**able**
a. noun b. verb c. adjective d. adverb

5. franat**ize**, tekofn**ize**, nimiv**ize**
a. noun b. verb c. adjective d. adverb

6. graf**ness**, barj**ness**, imm**ness**
a. noun b. verb c. adjective d. adverb

7. imbim**ity**, beroc**ity**, fur**ity**
a. noun b. verb c. adjective d. adverb

8. Cimpli**fy**, ifen**fy**, clari**fy**
a. noun b. verb c. adjective d. adverb

9. Shilt**ish**, fobb**ish**, celb**ish**
a. noun b. verb c. adjective d. adverb

10. Ain**less**, afe**less**, fare**less**
a. noun b. verb c. adjective d. adverb

11. Ceri**ous**, mervi**ous**, bam**ous**
a. noun b. verb c. adjective d. adverb

12. Are**ful**, goy**ful**, kare**ful**
a. noun b. verb c. adjective d. adverb

13. Meach**er**, enbloy**er**, akkount**er**
a. noun b. verb c. adjective d. adverb

14. Kritik**ism**, feal**ism**, pant**ism**
a. noun b. verb c. adjective d. adverb

15. caticb**ation**, fomin**ation**, meg**ation**
a. noun b. verb c. adjective d. adverb