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Teaching English Polysemous Words to Iranian EFL Learners: Underlying Meaning Approach and Sense Selection in Comparison

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Abstract

The primary goal of this experimental research was to replicate Nakahara's (2005) experiment on Iranian learners' acquisition of polysemous words, and to see whether the underlying meaning approach is an effective strategy to teach polysemous words to low proficiency learners or not. The participants were 46 female first grade students with the age range of 14 to 15 studying in two intact classes of the same high school instructed by the same teacher (researcher). To achieve the research objective, the participants were taught 40 polysemous words using two distinct approaches: one traditional sense selection approach, and the other more modern reference specification approach through the presentation of the underlying meaning. To analyze the collected data, t- test was used. Results of the analysis indicated that the application of underlying meaning approach was more beneficial to Iranian learners than the traditional alternative; that is sense selection approach. The study ends with the pedagogical implications of this principled approach for teaching polysemous words that both EFL teachers in teaching and learners in learning have difficulty with.

Keywords: Teaching vocabulary, polysemous words, underlying meaning approach, sense selection approach

Introduction

Linguists, philosophers of language and psychologists have long been curious about the phenomenon of polysemy in that it is a challenging issue for theories of semantic representation, semantic compositionality, language

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processing, machine translation, and communication. According to *Longman Dictionary of Language Teaching and Applied Linguistics* (2002)**,** a word, phrase, or sentence, which has more than one meaning is said to be *ambiguous*. Traditionally, two kinds of lexical ambiguity are recognized: *polysemy* and *homonymy*. While polysemy is the ambiguity between various senses of a lexeme, which are in some way related to each other, homonymy is the ambiguity between completely unconnected or diachronically separate meanings (Rumshisky, 2009). Indeed, homonymy is an accidental phenomenon, and it is better to think of it not as a single word having two or more unrelated senses, but as two or more unrelated words incidentally having the same phonological form (Taylor, 2002). There is a bulk of research in this area that is generally presented under two general categories *psycholinguistics,* and *cognitive linguistics.* Psycholinguists' major concern is the effect of context on the processing of words with multiple meanings (either polysemy or homonymy) in order to resolve word sense ambiguity. In this regard, we can divide psycholinguists into two general groups:

- Psycholinguists who postulate a post-access effect for context: That is, all related meanings seem to be activated in the initial stage of access while the contextually appropriate meaning is selected afterwards (Swinney, 1979; Seidenberg. et al., 1982). In addition, Williams (1992) found in his semantic priming experiment that polysemous adjectives were able to prime targets related to their contextually irrelevant uses even at a long delay. It did not seem possible to suppress the irrelevant senses of a polysemous word.
- Psycholinguists who ignore the role of context in processing of meaning: In other words, these psycholinguists (Simpson, 1981; Tabossi, 1988 as cited in Li-szu Huang, 2003) claim that the dominance of meaning influence the processing of words in a way that the dominant meanings spring to the mind prior to subordinate meanings. Even if the context is more biased toward the subordinate meanings.

On the other hand, the basic contribution of cognitive linguistics to lexicology is the renewed attention to the structure of polysemy (Geeraerts, 1955). The perception of cognitive linguistics of polysemy is that it is a cognitive enterprise than a linguistic phenomenon, resulting from the way in which our conceptual categories are structured (Falkum, 2011). Taylor (2002) pointed to a paradox created by polysemy by saying that whereas polysemy raises all kinds of theoretical and methodological issues for semanticists, and practical issues for lexicographers and for specialists in natural language processing and automatic translation, speakers of a language rarely perceive polysemy as a problem at all. Even Srinivasan and Snedeker (2011) introduced polysemy as the major source of humor in social interactions and the basis of many jokes. “For instance, the following sentence is a humorous sentence by exploiting polysemy: *The Alpine Skiing competition started poorly and went downhill from there*” (p.246). The sentence is humorous because it benefited from different interpretations of *downhill* either as physically sloping

such paradox may lie in the fact that, when a word has a number of different senses, it does not imply that all of the senses are independently stored in the mind of the speaker. Then, since no special weight is given to primary meaning in semantic feature analysis, we need another way to talk about meanings, which can capture the notion that some meanings of a word seem to be more central than others (Croft & Cruse, 2004). Cognitive semantics adequately coped with this paradox by introducing *concepts* as units of meaning. According to this approach, each word symbolizes a concept (Croft & Cruse, 2004). In order to find out how cognitive psychologists and linguists assign meanings to words first it is essential to get familiar with the two concepts of *core* and *prototype*, respectively. Core, as opposed to periphery, is the meaning of a word that is more central and invariant. For instance, the core meaning of *break* is that of breaking an object such as a cup, not the breaking of one's heart. The *prototype*, on the other hand, is defined as the best instance of a concept. Thus, *robin* might be a prototype best instance of the concept BIRD and *oak* might be prototype best instance of the concept TREE (Hatch & Brown, 1995).

A large proportion of analyses in cognitive linguistics hypothesize that there are a certain 'core' set of glosses (i.e., senses or readings) which are the least marked, and the most prototypical of all glosses, and a set of 'non-core' or extended glosses, constituting the polysemous senses of words (Riemer, 1972). For example, Freeman Baker (1999) conducted a thorough semantic analysis of the polysemous word *see* and perceived that the participants almost unanimously agree that the core sense of *see* is EYE and RECOGNIZE served as sources for new extensions.

As Srinivasan and Snedeker (2011) admitted, there are two general categories of cognitive models. One category claims there is one single explicit representation for primary meaning (core) of a polysemous word, from which other meanings will be produced by the application of rules (Klepousniotou, 2001, Pustejovsky, 1995). While the latter postulates an underspecified representation for polysemous words, from which other meanings will be derived on-line by the help of contextual information. Parallel to this category of generative lexicon, Taylor (2002) appreciated the notion that various senses of a single item could be produced at the same time via the application of principals of meaning extension. He equalizes meaning extension principles to the morphological principles of past tense formation in that there is no need for a speaker to learn the past tense of walk is walked, and for him suffice to store the general rule. In accordance with morphological principles are two processes of meaning extension; i.e., *metaphor* and *metonymy*. The polysemous words created by means of these two principles are called 'regular polysemy' and the rest are called 'irregular polysemy'. Like irregular morphological forms, they have to be learned as exceptions.

In general, there are three types of polysemy. The first is resulted from metaphor and called *metaphorical polysemy*. In metaphorical polysemy, there

is some sort of analogy between the basic (or primary) sense and figurative (or secondary) sense. For example, in the sentence, *'I fell, and my leg broke'* the *'leg'* has basic or primary sense. On the other hand, *'leg'* in the sentence *'John started the second leg of his journey'*, has the figurative or secondary sense.

In generative linguistics, metaphor and metonymy are a matter of difference between two or more conceptualizations rather than different parts of language. So, for the identification of metaphor, one can benefit from two theories. The first is *substitution theory*, which posits for something to be termed as a metaphor, there must be a substitution of one concept for another. The second is *resemblance theory*, which is the further specification of the first. It required two concepts be similar to each other in some way (Riemer, 2005).

The second type of polysemy is created as a result of metonymy, and it is named *metonymic polysemy*. In metonymic polysemy, both of the senses are literal. *Oxford Advanced Dictionary the 8th* edition defines metonymy as the act of referring to something by the name of something else that is closely connected to it. As an example white *house* is used to refer to the *US president*. Cruse (2000) distinguishes between six types of metonymy:

- Producer/product: What is your opinion about *Beethoven*?
- Place for institution: The *parliament* refuted the bill.
- Part for whole: The best *minds* in Iran are trying to find a good solution to the problem.
- Whole for part: I am going to wash the *car*.
- Represented entity for representative: *America* vote for Obama.
- Container for content: *Room* 44 ordered a bottle of water.

Klepousniotou's (2001) investigated two basic types of polysemy, i.e., metaphorical and metonymic polysemy. She provided the participants with ambiguous words (either homonymy or polysemy) in the sentences, which were biased towards primary (dominant), or secondary (subordinate) meanings. In sum, the participants react faster to items containing polysemous words than homonymous words. Moreover, the reaction time was even faster for metonymic polysemy than metaphorical polysemy.

The third type of polysemy is conversion. *Converted polysemy* is created from basic underlying sense as a result of a shift in its part of speech. It often happens in the process of evolution of a natural language, to fill the communicative gap of the speakers of that language when there is no word in its lexicon to refer to the intended concept, action, or object. It is worthwhile to refer to Sullivan's (2006) elaboration on conversion: "For example, the word *closet* was converted from the use of the word as a noun referring to *a small room, cabinet,* or *recess* to the use of the word as a verb to describe *the act of shutting something up in a closet*" (p.12).

Taylor (2002) made use of the name *'radial model'* to refer to the notion of meaning extension. This model postulates that among any pairs of meanings of polysemous words, one is more 'basic' than the other is, and one functions as

the 'source' from which the other meanings are extended. This extension can be executed recursively, so we have a network created consequently, "with chains of extended senses radiating out from a single central sense" (p. 644).

Klepousniotou's (2001) findings also support generative lexicon assumptions about ambiguity in that her results confirmed the idea of having a single mental representation (i.e., a single basic sense) for polysemous words. Her results confirmed metonymy and polysemy are based largely on the process of sense creation whereby a lexical rule operates on a basic sense to generate extended senses of that polysemous item. In another experiment administered by Srinivasan and Snedeker (2011), the results revealed that early in development, the different meanings of polysemous words like *book* rely on a common lexical or conceptual representational base while the different meanings of homophones are represented independently overlapping only at the phonological level.

Nunberg (1979) asserted that the changes of meaning in metonymic extensions of polysemous words are systematic and regular. He elucidated this regularity by means of referring function (RF) concept. He explained RF as a linguistic process through which we use an identical expression to refer to different things. He asserted when one cannot refer to a thing (i.e., referent) itself, we find a substitute for it; which is called demonstratum (cited in Klepousniotou, 2001).

Nakahara (2005) conducted an experimental investigation on seventy low English proficiency level Japanese high school students to compare the core meaning approach to polysemy with the widespread sense selection approach. The experimental group taught by core meaning outperformed the control group. The researcher concluded that teachers should help students to realize the relationship between core and peripheral meanings of polysemous words based on cognitive linguists' analyses of metaphoric and metonymic relations. Accordingly, the present study centered on teaching basic level items with different related senses (i.e., polysemous words). Here the theoretical framework adopted is cognitive semantics, which offers a systematic treatment of polysemy by reviewing the various meanings of a polyseme as motivated extensions of a central meaning via the conceptual mechanisms.

By reviewing the related literature, one comes to the point that lexical ambiguity research has mostly focused on homonyms, and the literature of lexical ambiguity is fraught with research on homonyms (Klein & Murphy, 2001; Romero, 2004). Therefore, it is not surprising that homonymy is the most understood type of lexical ambiguity and there is lots of uncertainty about polysemy and its processing and representation (Durkin & Manning, 1989). To make the matters more complicated, polysemous words sometimes in the literature indifferently were named as homophones, homographs, or homonyms (Klepousniotou, 2001). Even Sullivan (2006) considered homonymy one sort of polysemy. To show the significance of polysemous words in language learning it is necessary to cite the words of Nation (2000) indicating that there

is a small group of high frequency words which are very important because these words cover a large proportion of running words in spoken and written texts and occur in all kinds of uses of the language. The high frequency words of language are so important that considerable time should be spent on these words both by teachers and learners, and the time spent on them is well justified by their frequency, coverage, and by the relative smallness of the group of words. Moreover, he argues that in listening and speaking, especially for the beginning stages, it is crucial to practice high frequency words to a high degree of fluency, since it is not either practical or cost-effective to teach all the existing words in the language. Nation (1990) mentioned three advantages for underlying meaning approach:

- The first is that by using underlying meaning, one can define a word in a way that captures most of its uses, and this reduces the number of items that must be learned by learners.
- The second merit is that one of the educational values of learning a foreign language is getting to know how the foreign language divides experience in different ways from the first language.
- Finally yet importantly, by introducing underlying meanings to the learners, every occurrence of the polysemous word is the repetition of the same item rather than encountering a different one.

Indeed, polysemy is a common phenomenon in daily language use not an exception. Since people are constantly trying to use a finite set of word forms to express an infinite set of ideas, so it is inevitable that some word forms may have to carry more than one meaning (Li-szu Huang, 2003). However, because of the polysemous nature, it is often difficult for learners to realize by their intuition how seemingly these far-apart senses are semantically related (Tyler & Evans, 2001, as cited in Loewen and Morimoto, 2007).

Nagy (1997) declares that there are two ways through which language learners can deal with related senses of polysemous words:

- **Sense selection**: As it is evident from its name, the language user may select the appropriate sense among those senses, stored in his/her, brain.
- **Reference specification**: There is a core or underlying concept for all the words, which is invariant in various contexts. For example, the word *fork* is best represented by a two ponged shape which covers the range of uses of *fork*, the *fork* you eat with, a *fork* in the road, *forked* lightening etc (as cited in Nation, 2000).

As declared by Nakahara (2005), whenever a teacher encounters the difficulty of teaching polysemous words in the classroom, he/she has two options available. The first is to present students with all the senses of polysemous words as separate and detached entities, or provide them with a unifying or organizing device (i.e., underlying meaning).

To fill a gap in the literature and to contribute to the research on the acquisition of L2 polysemy, this study intends to demonstrate if the core (or underlying) meaning approach to teaching polysemous words is more effective in comparison with the traditional approach of sense selection for low proficiency Iranian first grade of high school EFL learner's vocabulary achievement. The study aims to provide answers to the following questions:

1. Is teaching polysemous words through the underlying (or core) meaning approach effective?
2. Is there any significant difference between teaching core or underlying meaning of polysemous words and the current approach (i.e., sense selection) to teaching these words?
3. To what extent does the relationship between core and extended meanings become evident for students in the control and experimental groups?
4. How effective presentations of the underlying meaning of polysemous words (i.e., treatment) are concerning the generalization of students' inferential ability to other polysemous words?

Method

Participants

The participants are 46 female first grade high school students studying in two intact classes of the same high school instructed by the same teacher researcher. The age range of these students was between 14 to15. These students all had a 3-year-experience of language learning in guidance school.

Instruments

Pre-test

The pre-test which was used in this study was constructed by Nakahara (2005) and consisted of forty polysemous words. These words were going to be the target words of instruction. The reliability of pre-test was $\alpha = 0.65$. This figure was low because the items of pre-test were target words of instruction and most of the students could not guess the extended meanings. Consequently, the pre-test had little variance and this lessened the reliability coefficient. The allocated time to this test was 90 minutes. All the instructions delivered in Persian, and the participants were required to write the Persian equivalent of the extended meaning of polysemous words.

The following item reveals the format of the test:

Cloud ابـر in the sentence Strong anger toward her **clouded** her *judgment.*

judgment: قضاوت

In this example the extended meaning of the underlined word was meant to be acquired. To help the learner to understand the sentence including the polysemous word the Persian gloss followed the sentence, though just in case it was necessary. It should be added that one of the aims of administering the pre-test is to adopt two homogenous classes as control and experimental groups.

Questionnaire

A questionnaire which was used by Nakahara (2005) was administered to both control and experimental groups in order to assess the students' attitudes regarding the degree of relatedness between extended and core meanings of polysemous words.

The following explanations will make it clear how this questionnaire worked. The first sentence in this questionnaire exemplified the core meaning of the polysemous words. Take item 10, *short*, as an example. The first sentence was *'Mr. Mondale took a short break before resuming his schedule'*. This sentence was used in order to exemplify the core meaning of the polysemous word *short*. The second sentence *'We are short of water this summer'* exemplified the extended or peripheral meaning of the polysemous word. The respondents were asked to rate the degree of relatedness between the core and extended meaning of the polysemous words contextualized in the sentences on a five-point Likert scale from *'most clear'* to *'least clear'* (Nakahara, 2005).

Post-test

A post-test, *also* functioned as the pre-test, was distributed among the students in both groups in order to measure the effect of two different methods of instruction of 40 polysemous words on both the control and experimental groups. This test administered in order to see whether the students acquired extended senses of polysemous words.

The post-test *was* also constructed by Nakahara (2005) and consisted of two parts. The first part of the post-test consisted of 40 items. The second part was comprised of twenty more items, and its format was the same as the first part, but none of these words were going to be taught in the class to measure the influence of the instruction (i.e., treatment) on the students' inferential ability (Nakahara, 2005).

The allocated *time* to the first part and the second part was 90 and 30 minutes respectively. The reliability of the first part was $\alpha = 0.80$ and that of the second part of the post-test $\alpha = 0.58$. The format of the two parts of the post-test was the same. In both parts, the students are required to write the intended Persian equivalent of the extended or peripheral meanings.

An *example* is provided here to clarify the format of the test:

Mind ذهـن The best minds in Tehran are trying to find a *solution* solution: راه حل

Procedures

Data collection

As the first step, the researcher distributed the pre-test to all the participants in both control and experimental groups in order to discover if there was any difference between these two groups regarding the target words prior to the administration of treatment and to exclude the extreme cases in order to assemble two homogenous groups. The Japanese gloss of the tests was translated in Persian. The students were asked to write the Persian equivalents of the intended extended (peripheral) meaning of each of these forty items by using their prior knowledge. The questionnaires were then distributed among both the control and experimental groups in order to assess the students' opinions with respect to their perceived sense relation between core and extended meanings of the polysemous words.

This study adopted two different methods for teaching 40 high frequency polysemous words in the two classes. The 40 polysemous words were taught in eight 30- minute -sessions (5 words per session). The control group was taught all senses of polysemous words, and was supposed to come up with the peripheral meaning of these words in the context through the process of sense selection. The experimental group was provided with the underlying meaning of these words. In other words, some senses of a polysemous word were presented out of context to the students, and they were required to come up with the underlying meaning. In order to explain the core or underlying meaning of these words to the experimental group, the teacher researcher presented some of the extended meanings of these polysemous words in isolation and asked the students to think about their common underlying concepts, and to discover their core meaning through brainstorming. On the contrary, the control group was just presented with all senses of these polysemous words. They were given some example sentences, and were asked to select the appropriate peripheral sense according to the co-text.

After conducting the treatment, the post-test was distributed among both the control and experimental groups in order to measure the degree of students' progress regarding their perceived clarity of sense relation between core and extended meanings of each polysemous word.

Finally, in order to measure the degree of relatedness of peripheral (extended) meanings of polysemous words as perceived by the students after the administration of the treatment, the first questionnaire was given to the students in both groups again.

Data analysis

In order to analyze *the* collected data, this study made use of t-tests. First, a t-test was conducted between the results of part one of the post-test in both control and experimental groups to discover the degree of difference between the two groups. As the second step, a pair of t-tests was run between the pre-

test and post-test of the control and experimental groups in order to measure the degree of progress made in both groups separately. Then, two more t-tests were run between the results of the questionnaires administered before and after the treatment in both the control and experimental groups separately to gauge the perceived clarity of sense relation between core meaning and extended meanings of each polysemous word. Finally, in order to measure the students' progress concerning untaught words, a t-test was run between the results of part two of the post-test in both the control and experimental groups.

Results

Homogeneity of control and experimental groups before applying the treatment

In order to *demonstrate* that there is not any difference between the two groups on the outset an independent sample t-test was run between the pre-test scores of the two groups. The results (Table 1) reveal that there is no significant difference between the two classes regarding the tested items.

Table 1. ***Independent samples t-test between the pre- test scores of control and experimental groups***

	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	-.080	44	.937	-.043	.545
Equal variances not assumed	-.080	39.341	.937	-.043	.545

Progression of participants in control and experimental groups

In order to see whether the control and experimental groups benefited from the instruction, a paired samples t-test was run between the administered pre- and post-tests. The results of the paired sample t-test of the experimental group are presented in Table 2.

Table 2. ***Paired samples t-test between pre- and post-test scores of experimental group***

	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
				Lower	Upper
Pair 1 postT1 - preT	16.105	22	.000	21.667	28.072

It could be understood from Table 2 that there is a statistically significant increase in the scores of the experimental group.

The results of paired sample t-test of the control group are presented in Table 3.

Table 3. ***Paired samples t-test between pre- and post-test scores of control group***

	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
				Lower	Upper
Pair 1 postT1 - preT	10.271	22	.000	13.116	19.753

As evident, there is a significant difference between pre- and post-test scores of the participants' in of control group. Therefore, there is a significant increase in the scores of the students in the control group.

Comparison of post- test scores of control and experimental groups

In order to see *whether* there is any significant difference regarding the performance of the students of both groups in the post-test, an independent t-test was run between the scores of both groups obtained from the post-test. The results are displayed in Table 4.

Table 4. ***Independent samples t-test between the post- test scores of control and experimental groups***

	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
				Lower	Upper
Equal variances assumed	3.629	44	.001	3.731	13.051
Equal variances not assumed	3.629	43.985	.001	3.731	13.051

As Table 4 *shows*, the results confirmed that there is a statistically significant difference between the control and experimental groups.

Comparison of the two groups' responses to the questionnaire

Table 5. ***Independent samples t-test between the answers of both groups to the part 1 of post- questionnaire***

	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
Equal variances assumed	3.441	44	.001	11.168	42.746
Equal variances not assumed	3.441	43.598	.001	11.163	42.750

As shown in Table 5, the results of independent t-test (Table 5) run between the students' answers to the first part of the post-questionnaire suggest that there is a significant difference between the clarity of the relationship of senses of polysemous words as perceived by the participants of the control and experimental groups.

Comparison of two groups' responses to part two of questionnaire

To see whether the *type* of instruction had any impact on the students' inferential ability, an independent sample t-test was run between the participants' scores on the second part of the questionnaire.

Table 6. ***Independent samples t-test between the answers of both groups to the part 2 of post-questionnaire***

	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
				Lower	Upper
Equal variances assumed	1.158	44	.253	-1.127	4.170
Equal variances not assumed	1.158	43.968	.253	-1.127	4.170

The results in Table 6 suggest that there is no significant difference between the *control* and experimental groups with regard to the students' development of inferential ability.

Discussion

This research attempted to replicate Nakahara's (2005) experiment on EFL learners' acquisition of polysemous words in the EFL learning environment of Iran, and to see whether the underlying meaning approach is an effective strategy to teach polysemous words to low proficiency students.

The results of general statistics revealed that the mean of the two groups are relatively the same. Therefore, one group was assigned to control and to be *taught* by the traditional approach, i.e. sense selection and the other was assigned to the experimental group.

The comparison of students' scores in pre- and post-tests of both groups indicated *that* although both groups benefited from the instruction, the mean increase of scores of the participants in the experimental group (24.86) was higher than that of the control group (16.43). An independent t-test also confirmed that this difference was significant and the experimental groups out-performed the control group.

As Nakahara (2005) argued, the underlying meaning approach acts as a unifying force and creates a meaning network for the various senses of

polysemous words, and this helps students to learn and remember this kind of words more quickly and effortlessly in comparison with other approaches.

Additionally, Aitchison (1994) argues that learning new vocabulary is not equivalent to simply attaching new meanings to new word forms. It is a more *complicated* task. He stated three different tasks with which children acquire their first language. The first is the labeling task during which the child attaches a label to a particular concept or object. The second task is the packaging task, in which the child has to learn the exact extension of the meaning of words. In this task, the child learns a category of objects that can be referred to by a single label. In the last stage the task of network building would be applied, by means of which words would be fitted together in a semantic network. All these tasks happen in learning a second or foreign language as well.

Moreover, as Nakahara (2005) admitted, teaching only sense selection leads to teaching many exceptions; this hinders students' generalization and leads to creating learning hindrance. On the contrary, as Carter and Nunan (2001) asserted, although taking vocabulary out of context for more focusing speeds up the vocabulary learning procedure, vocabulary is better acquired when encountered in the context of use. In addition, Firth (1957) claimed that we know a word by the company it keeps. Thus, by taking a glance at these results one finds a compound approach comprising of both reference specification and sense selection more efficient. The results of this study are also in line with the study of Dufour and Kroll (1995) which support the premise that in fluent foreign language learners the connection between equivalent words of the first and foreign language is through *concept mediation*. It should be explained here that, there are two hypotheses regarding the association between words of L1 and L2 in general: *concept mediation* and *word association*. The *word association* hypothesis posits that a direct association exists between words in the two languages, whereas the *concept mediation* hypothesis proposes that the only connection between the two languages is via an underlying conceptual system. Word association claims that for a language learner to produce or comprehend words in a second or foreign language, first he/she has to retrieve its equivalent in his/her first language. In addition, Potter et al. (2004) concluded that more fluent language learners who can directly access meanings for their second language through their conceptual networks act faster in lexical decision tasks, while less-fluent bilinguals are slower. They argued that less-fluent bilinguals are able to access limited conceptual information from the second language, and are gradually progressing towards the full access. The results of the present research reveal that it is the teachers' role to accelerate this process by making such conceptual relations between the multiple senses of polysemous words clear for the students.

Consequently, the results of the present study can be accounted for by saying that the students in the experimental group were led to think about the relationship between various senses of a polysemous words without the aid of any context, while the participants in the control group made use of the context

to guess different meanings of polysemous words. This helped the students in the experimental group to see these words as parts of the language system rather than as parts of a communicative message. In addition, this study justifies the weak performance of participants in the control group due to the lack of impetus from the teacher to highlight the connections between core and peripheral senses of polysemous words. As a result, for the participants in the control group, various extensions of the core meaning of polysemous words were perceived as separate and unconnected entries, which were forgotten very soon. On the contrary, participants in the experimental group perceived different senses of polysemous words as a logical connected whole.

The results of our study contradict evidence from Klein and Murphy's (2001) study that adults represent polysemous meanings as separate and unrelated words. One argument against this claim is that in the early developmental stages children access the extended meanings via a more basic underlying meaning. Inasmuch as this process takes many logical inferences, it is more sensible and cost-effective to store the previously generated senses in order not to be required to be generated again. Consequently, it is more sensible to provide EFL learners having low competence in English with abstract underlying meanings as an appropriate starter. The present study adds to the body of research in that it has shown reference specification to be an effective strategy for EFL low-proficiency learners who are attempting to acquire multiple meanings of polysemous L2 words.

The comparison *of* students' answers to the pre- and post-questionnaire in both the control and experimental groups showed that the perceived transparency of relationship between core and extended meaning of polysemous words has been heightened after the instruction of these words. So both groups have benefited from the instruction. On the other hand, the results suggest that the experimental group outperformed the control group after the application of treatment by the mean difference of 26.95. These results are also in line with the results of a word estimation study conducted by Sullivan (2006). She concluded that although young school-aged native speakers of English can understand and use a small portion of converted and metaphorically extended meanings of polysemous words; it is not until adolescence that the connection between the main meaning and extended meanings of these words become differentiable for them. It can be argued that in later stages of cognitive development, students gain the essential cognitive capacities for grasping the intricate transformations of the basic meanings of polysemous words.

While the *experimental* group outperformed the control group concerning the taught words, the results show no difference between the two groups' performances regarding the untaught words measured in the post-test. This result is consistent with Nakahara (2005), and he justified it by saying that maybe the 10-class treatment time is not sufficient for developing students' inferential ability. In the same vein, this research expresses that the 8- class

period for teaching 40 polysemous words is not sufficient for the teachers to extend students' inferential ability so that they can grasp the sense relation between untaught polysemous words

Moreover, Boers (*2000*) in his experimental investigation came to the point that although the treatment was effective for the experimental group, it was not so strong to enable them come up with the extended meanings of untaught polysemous words. One more justification Nakahara posed is that students of the control group mastered the technique of guessing meaning from the context, and the post-test format helped this group a great deal, but the participants in the experimental group were not familiar with this strategy. Therefore, it could help the control group largely. Also referring to Schmitt's (1998) argumentation of *incremental* acquisition of words one infers that words are acquired gradually as the learner encounters them in the novel contexts of use. Therefore, a learner can internalize the abstract underlying meaning of a word after having understood most, if not all, the contextual (peripheral) senses. Therefore, knowing the abstract basic meaning of a polysemous word can only be the result of a process. This process necessarily includes a number of successive steps.

This research *emphasizes* the important role of the teachers' intervention in accelerating this process. That is, a teacher can speed up this process by explicitly elucidating the relationship between the underlying meaning and other peripheral meanings.

Conclusions

In this part, according to *the* results of this research the answers to the four questions of this study are provided.

Is teaching polysemous words through underlying (or core) meaning approach an effective strategy?

The results of the paired *samples* t-test showed a considerable progress for the experimental group regarding the retention of the forty taught polysemous words.

Is there any significant difference between teaching the core or underlying meaning of polysemous words and the current approach (i.e., sense selection) to teaching these words?

The results of the independent samples t-test demonstrated that the experimental group *taught* through the underlying meaning approach or reference specification outperformed the control group taught through the traditional or sense selection approach.

To what extent does the relationship between the core and extended meanings become evident for the students in the control and experimental groups?

The results of the paired samples t-test comparing the results of pre- and post-questionnaires of each group *separately* showed that there was a great difference between the two groups concerning the transparency of the perceived relationship between the senses of polysemous words. In other words, after the instruction of the words, the experimental group perceived the relationships among the senses of polysemous words clearer than the control group.

How effective is the presentation of the underlying meaning of polysemous words concerning the generalization of students' inferential ability to other polysemous words?

The results of the independent samples t-test showed that there was no difference between the performances of the two groups on the untaught polysemous words. So, no difference was observed between the two groups regarding the *guessing* of the extended senses of novel polysemous words.

Pedagogical implications of the study

In view of the findings of this experimental study, educational practitioners could help EFL learners to come up with the difficulty posed by polysemous words by the delivery of underlying meaning as a complementary tool. It is suggested that if the meaning of a polysemous word is peripheral, the teacher should provide students with abstract underlying meaning and explicitly explain the connection between the senses. Thus, even though guessing the meaning of unknown words from the context is a useful strategy to be learned by EFL learners, it is not sufficient. Additionally, this approach leads to extra-cognitive load for the learners who have to store so many exceptions because of contextual variations. On the one hand, de-contextualization of words is less time-consuming and helps the learners to focus on the underlying conceptual structures of polysemous words and to discover their meaning networks. On the other hand, solely presenting the underlying meaning of polysemous words can lead to inflexibility of the minds of the learners that is more specifically referred to as *'word rigidity'*. That is, sticking to a single unvarying sense in all contexts. In the light of the findings of the present research, it is recommended that both approaches be implemented in the long and cumbersome process of language learning. It can be claimed that this research adds to the body of research in the field of lexical language learning, in that it is another experimental support for the contention of Nation (2000) that teaching polysemous words through the underlying meaning approach is a fruitful way of teaching these kinds of words.

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