

A Matter of Controversy: Teaching New L2 Words in Semantic Sets or Unrelated Sets*

Tartışmalı Bir Konu: Yabancı Dilde Yeni Kelimelerin Anlamsal Bağlantılı veya Anlamca İlişkisiz Gruplar Halinde Öğretilmesi*

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ABSTRACT

The relevant literature reveals no consensus on whether new vocabulary items should be presented in semantic or semantically-unrelated sets in L2 classrooms. Actually, there is an excessive amount of research evidence on the interfering effect of teaching semantically-related words at the same time. However, the majority of these studies have been carried out under strictly-controlled laboratory conditions, so there is still need for more classroom research on this controversial issue. The present study aims to investigate the effects of presenting novel words in lexical sets versus semantically unrelated sets on students' acquisition of these words in a real classroom setting. The participants, 44 Turkish EFL learners, were taught 12 English target words in either semantic or unrelated clusters. The vocabulary instruction was given through pictorial flashcards accompanied by several sentential contexts, which supplied the participants with several meaningful encounters with the target vocabulary items. The results indicated that both types of vocabulary instruction provided EFL learners with effective recognition and production of the target words immediately after the treatments as well as two weeks later. These findings revealed no statistically significant difference between clustering words in semantic sets and unrelated sets. Hence, the current study did not find out any interfering effect of teaching semantically related words simultaneously in a real classroom condition.

Keywords: Interference theory, Semantic set (lexical set), Semantically unrelated set, Semantic clustering, L2 Vocabulary learning and teaching

ÖZ

Yapılan araştırmalarda, yabancı dilde yeni kelimelerin anlamsal bağlantılı gruplar halinde mi yoksa anlamca ilişkisiz gruplar halinde mi öğretilmesi gerektiği konusunda fikir birliği bulunmamaktadır. Bu konudaki çalışmaların çoğu, anlamsal bağlantılı kelimelerin birlikte öğretilmesinin sakıncalı olduğunu iddia etmektedir. Bunu savunan çalışmaların büyük bir kısmı daha çok laboratuvar koşullarındaki yapay çalışmalar olduğundan, bu tartışmalı konunun açığa kavuşturulması için doğal ortamda gerçekleştirilmiş sınıf içi araştırmalara ihtiyaç duyulmaktadır. Gerçek bir sınıf ortamında yapılmış bu çalışma, yabancı dilde yeni sözcüklerin anlamsal bağlantılı veya anlamca ilişkisiz gruplar halinde sunulmasının öğrencilerin bu kelimeleri öğrenmesi üzerindeki etkilerini araştırmaktadır. 12 hedef kelime, İngilizceyi yabancı dil olarak öğrenen 44 Türk öğrenciye anlamsal bağlantılı veya anlamca ilişkisiz gruplar halinde öğretilmiştir. Öğretim sırasında resimli kelime kartları kullanılmış ve görsel olarak zenginleştirilmiş örnek cümleler yardımıyla öğrencilerin hedef kelimelerle birkaç kez karşılaşması sağlanmıştır. Çalışma sonuçları, her iki durumda da öğrencilerin yeni kelimeleri etkili bir şekilde öğrendiklerini göstermiştir. Bulgular ışığında, kelimelerin anlamsal bağlantılı veya anlamca ilişkisiz gruplar halinde öğretilmesi arasında anlamlı bir fark bulunamamıştır. Dolayısıyla, doğal bir sınıf ortamında gerçekleştirilen bu çalışmada, anlamca ilgili kelimelerin birlikte öğretilmesinde herhangi sakınca tespit edilememiştir.

Anahtar Sözcükler: Bozucu etki kuramı, Anlamsal bağlantılı sözcük grubu, Anlamca ilişkisiz sözcük grubu, Anlamsal bağlantılı kelimeleri sınıflama, Yabancı dilde kelime öğrenimi ve öğretimi

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INTRODUCTION

Words are regarded as building blocks of a language. They lay bridges into the mysterious world of meaning in a language. Languages are by no means meaningful without words. With this in mind, vocabulary has a fundamental role in almost all phases of second language (L2) acquisition. First of all, the main motivation behind L2 learning is to communicate, and words are indispensable for a successful verbal communication. As suggested by Wilkins (1972), “Without grammar very little can be conveyed, without vocabulary nothing can be conveyed” (p. 111). That is the reason why tourists mostly prefer carrying dictionaries to travelling with grammar books. Second, vocabulary knowledge is positively correlated with various aspects of L2 development. A broad L2 lexicon is considered to be a reliable indicator of learners’ overall language proficiency as well as a good facilitator of four main language skills. “If an analogy is made between a language and a human body, vocabulary is the heart which pumps blood to all the other vital organs such as reading, writing, listening and speaking” (Sarioğlu, 2014: 1). Hence, vocabulary acquisition is of prime importance in the mastery of effective L2 comprehension and production.

Although there exists a general agreement on the central role of vocabulary instruction in L2 learning and teaching, there seems to be no consensus on the efficiency of some vocabulary teaching techniques. Specifically, whether novel L2 words should be taught in semantic sets or semantically unrelated sets is a controversial issue in L2 lexical field. Teaching vocabulary in semantic (lexical) sets can be defined as simultaneous grouping of new L2 words within meaningful sets such as “clothes”, “family members” and “school equipment”. Semantically clustered words inherently share some common semantic features. As for presenting vocabulary in semantically unrelated sets, it requires categorising new L2 words which have no meaningful association with one another (see Table 1).

Teaching L2 vocabulary in semantic sets or unrelated sets is a matter of controversy in the related literature. On the one hand, some studies suggest the traditional practice of clustering novel L2 words in semantic sets as an efficient way of lexical instruction (e.g., Gairns & Redman, 1986; Graves, 2006; Hashemi & Gowdasiaei, 2005; Haycraft, 1993; Hoshino, 2010; Stahl & Naggy, 2006). With respect to this standpoint, if certain

semantically-associated words are taught simultaneously within the same lexical set, it will have a facilitative impact on L2 learners’ acquisition of the given words. Semantic clustering is argued to provide language learners with well-organised information, which is principally easier to learn (Baddeley, 1990). Such a meaningful arrangement of words is also thought to be in line with the organisation of semantic fields in human brain (Aitchison, 1994). Now that vocabulary items are stored in our brain correspondingly, we can recall semantically related words more easily than unorganised lexical items. Bearing this viewpoint in mind, a great number of language curricula and course books are inclined to serve new EFL (English as a foreign language) words in semantic sets.

On the other hand, an increasing amount of lexical research gives support to instruction of vocabulary items in unrelated sets (e.g., Erten & Tekin, 2008; Finkbeiner & Nicol, 2003; Nation, 2000; Tinkham, 1993, 1997; Waring, 1997). These studies argue that presenting new words in semantically related sets will have an interfering effect on L2 learners’ acquisition of these lexical items, which is a matter of frustration in vocabulary learning. “Interference theory” is put forward as a rationale behind the growing opposition to the semantic clustering of words. The theory suggest that, if a new vocabulary item has too many semantic similarities with the words learned at the same time, L2 learners will have more difficulty in learning that new item because of the interfering effects of those similar words on one another (Tinkham, 1997). According to Schmitt (2000), L2 learners usually confuse the English words “right” and “left” since they share the exactly same semantic features except for “direction”. Thus, a great number of studies lay emphasis on the interfering effect of teaching novel L2 words in the same semantic set.

Overall, whether new vocabulary items should be presented to L2 learners in semantic sets or unrelated sets is still open to debate in the relevant literature. Some studies support the common principle of semantic clustering as an effective way of L2 vocabulary instruction. Others favour teaching novel L2 words in semantically unrelated sets due to the interfering impact of grouping vocabulary items in lexical sets. There are also some other studies, whose findings reveal no statistically significant difference between categorising new vocabulary in semantic sets and in unrelated sets (e.g., Ishii, 2013; 2015). With this in mind, the related literature reveals no consensus on

Table 1: Categorising L2 Words in Semantic or Semantically Unrelated Sets

Semantic Sets	<i>Clothes</i>	<i>skirt, trousers, jacket, shirt, hat, gloves, ...</i>
	<i>Family Members</i>	<i>mother, sister, aunt, father, brother, uncle ...</i>
	<i>School Equipment</i>	<i>book, pencil, pen, eraser, ruler, notebook ...</i>
Unrelated Sets	<i>Sample Unrelated Set 1</i>	<i>red, schoolbag, pants, white, son, rabbit, ...</i>
	<i>Sample Unrelated Set 2</i>	<i>daisy, wife, salt, ball, socks, tiger, table ...</i>

this issue, and it is still worthy of further research, particularly, by means of more authentic classroom-based studies.

Literature Review

Presenting new L2 words in semantic set

There may be two motivating forces behind teaching new L2 vocabulary items in semantic clusters (Tinkham, 1997). Firstly, serving L2 words in semantic sets appears to be in harmony with both structural and communicative approaches of language teaching. Secondly, presenting words in lexical sets is considered to help L2 learners realise the semantic boundaries among the words within the sets (Gairns & Redman, 1986). If the novel target words are clustered with regard to their semantic features, L2 learners will easily explore the semantic differences and similarities among the given words. Thus, semantic grouping of L2 vocabulary items is argued to provide learners with more well organised information so that they can store and then recall them easily from their memory.

Aitchison (1994) also highlights the advantages of establishing semantic relations among new L2 vocabulary items. From his point of view, words are semantically stored and systematised in our brain; therefore, conceptual and semantic mapping will facilitate L2 learners' acquisition, retention and recall of these vocabulary items. In this regard, presenting new L2 words in semantic sets seems to be more in line with the organization of semantic fields in human brain. In a similar vein, Haycraft (1993) makes an analogy between serving words in semantically unrelated sets and a tree with no trunk and branches but only leaves (p. 44). He states further that semantic grouping of new vocabulary items will enable L2 learners to make more effective interconnections among these words in their minds.

In their study, Hashemi and Gowdasiaei (2005) compared the efficiency of teaching L2 words in lexical sets versus semantically unrelated vocabulary instruction in terms of both vocabulary breadth and depth of 60 Iranian EFL learners. The study findings revealed positive research evidence on facilitative impact of semantic clustering. The participants who learned new L2 words in semantically related set achieved better test results when compared to their counterparts who learned the target words in unrelated set. The study pedagogically suggested that EFL teachers should systematically categorise new L2 words under relevant topics and teach them in meaningful contexts.

Hoshino (2010) also carried out a study to investigate the effects of different word lists on vocabulary acquisition of 119 Japanese EFL university students with various learning styles. In a real classroom condition, the effectiveness of five types of word lists was compared: (a) semantic/categorical, (b) unrelated, (c) thematic, (d) synonyms, and (d) antonyms. The results indicated that all of the participants with divergent learning styles memorized more target words in the semantic/categorical list when compared to the words in the other four lists. Thus, the study findings also emphasised the facilitative impact of categorising new words in semantic sets on L2 learners' vocabulary acquisition.

Presenting new L2 vocabulary items in unrelated set

Tinkham (1993) conducted two strictly controlled experiments to compare the vocabulary learning rates and speeds of English native speakers in semantic sets versus in unrelated sets. The results of both experiments demonstrated that the participants memorised the target pseudo-words faster and with fewer trials in unrelated sets than those in semantic sets. In his replication study, Waring (1997) verified Tinkham's (1993) findings as well. The native speakers of Japanese also needed longer time and more trials to memorise the target pseudo-words in semantic sets. Both studies suggested that clustering new words in unrelated sets facilitates learners' acquisition of these words. They revealed some research evidence to confirm the interfering effects of serving semantically similar words together in the same set.

Finkbeiner and Nicol (2003) carried out an experimental study to compare these two types of clustering words in a laboratory setting. 47 mono-lingual English speakers were presented 32 pseudo-words in either semantic or unrelated sets. The participants were seated in front of a computer screen. They both listened to the target words over the headphones and saw its corresponding picture on the screen for 500 ms. They also repeated the target words into the microphone twice. After training all the words in the same way, the oral L1-L2 and L2-L1 translation tests were conducted. The participants' translation latencies of were measured and compared within two groups. The results showed that the participants translated the target words in semantic categories more slowly than those in unrelated clusters. The study findings also offered research evidence on the detrimental effect of arranging vocabulary items in semantic categories.

In their study, Erten and Tekin (2008) investigated the effects of presenting new words in semantic or unrelated sets on Turkish EFL learners' immediate and delayed recognition of these words as well as their test completion time. Sixty fourth-grade students were presented 80 L2 words within four 20-word sets: two sets were introduced in semantic categories and the rest two included unrelated words. The immediate post-test results indicated that EFL learners achieved more vocabulary gains when the target words were introduced in semantic sets. The semantically related words were also recognised better in the first delayed post-tests. However, the second delayed post-tests produced better results in favour of the words thought in unrelated sets. In addition, the participants' test completion time was much shorter for the target words in unrelated sets. Thus, the study findings concluded that Turkish EFL learners revealed superior performance in learning new L2 words in semantically unrelated sets, which highlighted the interfering effect of learning and teaching lexical items in semantic sets.

The relevant literature also comprises some lexical research, the findings of which could not differentiate between semantic and unrelated clustering of novel L2 vocabulary items. As an example, two recent studies conducted by Ishii (2013, 2015) displayed no statistically significant difference between presenting new L2 words in semantic and unrelated sets. She

stated that acquiring semantically similar words is neither more difficult nor easier than learning the given words in unrelated sets. Likewise, Papathanasiou (2009) verified the interference effect of teaching words in semantic sets only for adult beginners, but not for young L2 learners at intermediate level of proficiency. In conclusion, the existent literature reveals no agreement on these two types of clustering new L2 words, which is the main focus of this study.

THE CURRENT STUDY

Justification for the Study

There are two justifications for this study. First, whether novel words should be presented in semantic sets or unrelated sets in L2 classrooms is worthy of further investigation since it is still a matter of controversy in the related literature. On the one hand, some studies still encourage L2 teachers to serve new L2 vocabulary items in semantic sets (e.g., Hashemi & Gowdasiaei, 2005; Hoshino, 2010). On the other hand, an increasing number of studies suggest teaching new words in unrelated sets due to interference effect of semantic categorisation (Erten & Tekin, 2008; Finkbeiner & Nicol, 2003; Tinkham, 1993, 1997; Waring, 1997; Wilcox & Medina, 2013). The existent literature also includes some studies whose findings reveal no statistically significant difference between these two types of grouping words (Ishii, 2013, 2015).

As for the second justification, although there is more research evidence on the interfering effect of semantic clustering, the experimental circumstances in most of these studies are not natural enough to draw conclusions about vocabulary acquisition of learners in real L2 classrooms. In most of these experimental treatments:

- The participants are given a very restricted time to memorize the target words. (e.g., Finkbeiner & Nicol, 2003; Ishii, 2013, 2015; Tinkham, 1993, 1997; Waring, 1997; Wilcox & Medina, 2013).
- Pseudo-words (artificial words) are assigned as target vocabulary items. (e.g., Finkbeiner & Nicol, 2003; Ishii, 2013, 2015; Tinkham, 1993, 1997; Waring, 1997).
- The target words are usually taught in isolation rather than being presented within a larger context (e.g., Erten & Tekin, 2008; Finkbeiner & Nicol, 2003; Ishii, 2013, 2015; Tinkham, 1993, 1997; Waring, 1997).

Many of these studies have been conducted under such strictly controlled experimental conditions (e.g., Finkbeiner & Nicol, 2003; Ishii, 2013, 2015; Tinkham, 1993, 1997; Waring, 1997). Therefore, it is not likely to generalise about the real classroom circumstances. Such kinds of laboratory-type settings cannot offer implications about L2 vocabulary teaching and learning. Thus, there is still a need for further research, especially classroom-based studies.

In their recent study, Bolger and Zapata (2011) found out that the adding story context to L2 vocabulary appears to eliminate the interfering impact of semantic clustering. Hence, we need to know more about how the study results would be if learners studied new L2 words in a wider context and practiced them within a great amount of time in a real classroom.

The Aim of the Study

The present study aims to investigate the effects of both teaching new L2 words in semantic sets and in unrelated sets on vocabulary acquisition of EFL learners in a real classroom setting. More specifically, it attempts to compare these two types of lexical clustering in terms of EFL learners' recognition and production of the target L2 words after they were provided with a number of meaningful encounters with these words in sentential contexts. With this in mind, this study tries to answer these two research questions:

- What are the effects of teaching new L2 words in semantic set or semantically unrelated set on EFL learners' recognition and production of these vocabulary items?
- Does teaching new L2 words in semantic set or unrelated set differ in terms of EFL learners' immediate or delayed recognition and production of these vocabulary items?

METHOD

Participants and Setting

The participants of this study were 44 Turkish EFL learners. They were 12th-grade students from three intact classes at a state high school in Bursa, Turkey. They were all native speakers of Turkish and with A2 CEFR¹ level of English proficiency. 33 of them were female, and the rest 11 were male. Their ages ranged from 16 to 17. They were all considered to have similar educational background as they had been enrolled in the given school through the same nation-wide proficiency exam 3 and half years before this study was carried out.

Convenience sampling was used in the selection of the participants and the research site. The experimental treatments were conducted in an authentic classroom setting in a public high school. With 10 years of teaching experience, the researcher had been working as an EFL teacher in this school for over 5 years, which facilitated the planning and implementation of the study. He was also the teacher of 3 participating classes for more than 3 years, thereby ensuring natural group dynamics. All the treatments were carried out by the same teacher so as to rule out the variations in teaching procedure. The participants got the vocabulary instruction as they usually did within their courses.

At first, there had been 47 participants. However, 3 of them were excluded from the analysis in view of their pre-test results since they had already known two target words. Thus, the statistics from 44 participants who got 0 in the pre-test were included into the analysis.

¹CEFR: Common European Framework of Reference for Languages

Target Words

12 real English words were assigned as target vocabulary items. 6 of them were semantically related whereas the rest 6 were semantically unrelated words. As seen in Table 2, the target words in each set were homogenous in terms of their size, type and length. They were all concrete nouns as a part of speech. The target items in semantic set also had equal number of syllables and letters with those in unrelated set. These words were selected from 5,000-word level and above, which were not likely to be known by the participants.

The target words in each set were also homogenous in terms of their frequency bands. First, the reading texts in their nationwide coursebook (Perşembe, Buluğ, & Eroğlu-Canmetin, 2014) were entered into Cobb's vocabulary profiler (Cobb, n.d.) so as to determine the suitable frequency band. The scores indicated that the students read the texts with the 1,000 and 2,000-word level. Thus, the words from 5,000-word level and above were regarded to be prospective candidates. Then, the frequency band of each target word was checked from Nation's vocabulary levels (Appendix 3 in Nation, 2001: 416–424). Lastly, the final list of 12 target words was decided in the light of the expert opinion from four EFL teachers, two of whom were working in the given school and the rest two were PhD students at a university.

Research Design

The current study made use of one group quasi-experimental research model in pre-post test design with repeated measures. To start with, verbal informed consent was received from all of the participants as well as the school principal. Two weeks before the treatments, the pre-test was conducted to measure the participants' prior knowledge of the target words. In one of two treatments, all the participants were taught each of six target English words in semantic set. In the second treatment, the other six target words were taught in unrelated set. Both treatments were exactly the same except for the target words. In treatments, each target concrete noun was presented through pictorial flashcards together with sentential contexts, in which two sample sentences were served to the participants. The immediate post-tests were administered in two modalities: one for word recognition and the other for word production. The delayed post-tests were employed two weeks later in order to measure the participants' delayed recognition and production of the target items in each set.

The orders of two treatments were also counterbalanced. The half of the participants were first taught the semantic set of the target words and then continued with those in unrelated sets. However, the other half were initially presented the target items in the unrelated sets and continued with those words in the semantic set.

Materials and Instruments

The study employed two kinds of materials: (1) instructional materials to teach the target words, and (2) testing instruments to collect data. All the materials and instruments were produced by the researcher and reviewed by four EFL teachers. Cronbach's alpha analysis was run to measure the internal reliability of the testing instruments. The reliability co-efficient was 0.740 for eight items, which revealed an acceptable internal consistency ($\alpha > 0.700$).

Instructional Materials

The lexical instruction was given by means of a slide show, which comprised pictorial flashcards so that the participants could learn and practise the target words in sentential contexts. Three types of pictorial flashcards were developed to teach each target item (see Figure 1). The first type had only the picture of the related word so as to establish a context to lead the students to the meaning of that word. Here L2 spelling of the target word was not available so that the participants can guess its meaning themselves in the pre-teaching and practice stages. Used for teaching, the second type of flashcards included the picture of the target item together with its English label and part of speech underneath. The last type presented the learners with the example sentences embedded in the corresponding visuals so that they could practise each target word in two different sentential contexts.

Testing Instruments for Data Collection

Three types of testing instruments were prepared for data collection: (1) the pre-test, (2) the immediate post-tests, and (3) the delayed post-tests. The pre-test was conducted to measure the participants' recognition of the target words. It was in six-option multiple choice format, the learners were asked to pick out L2 equivalents of target words in the light of the pictures given as clues above these options (see Figure 2). "I don't know" was also added as 7th option to preclude them from exaggerating their test scores by guessing, as in Nation and Beglar's (2007) vocabulary size test, which is attainable at

Table 2: Target Vocabulary Items

Treatment	Size & Type	Target Words		Mean number of letters	Mean number of syllables
Semantic set (Kitchen Utensils)	Six words (concrete nouns)	*funnel *grater *jug	*jadle *tray *whisk	4.83	1.50
Unrelated set	Six words (concrete nouns)	*eel *okra *pliers	*sledge *stool *tulip	4.83	1.50

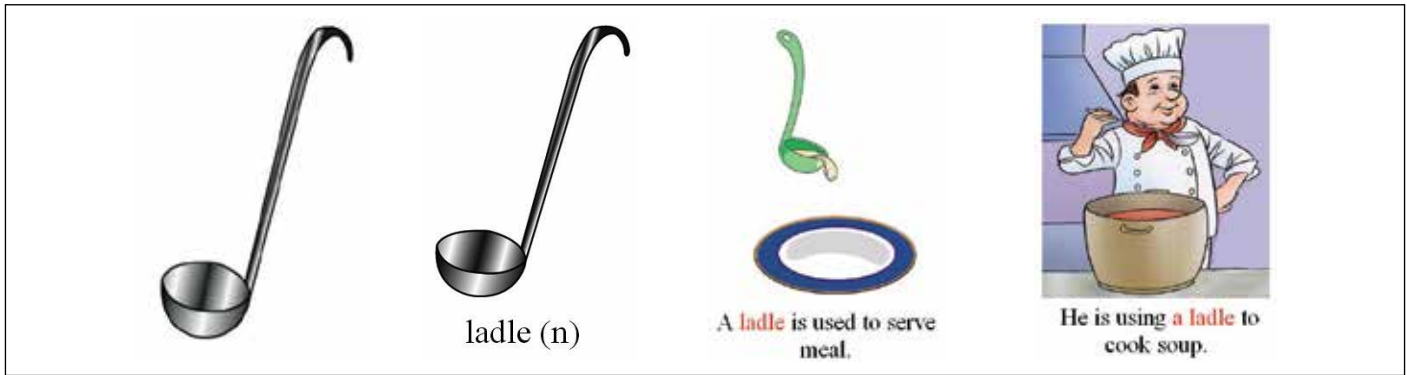


Figure 1: Sample pictorial flashcards for teaching the target word "ladle".

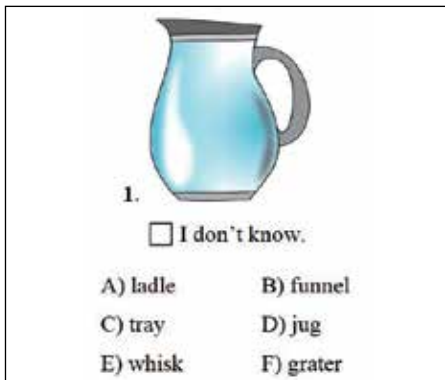


Figure 2: A sample pre-test item.

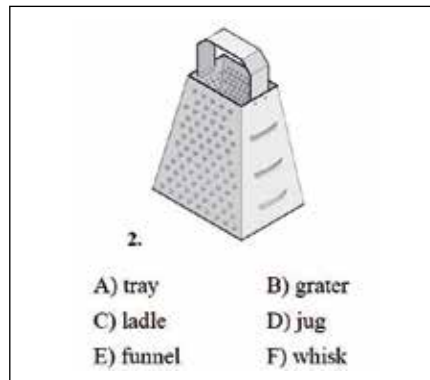


Figure 3: A sample post-test item (word recognition).

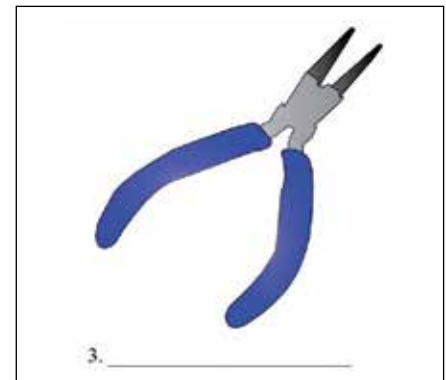


Figure 4: A sample post-test item (word production).

'<http://my.vocabularysize.com>'. In the pre-test, six semantically-associated target words were shuffled with 6 unrelated ones. The pre-test practice was embedded within another routine-classroom activity so as to prevent any memory effects on the participants.

The immediate and delayed post-tests were prepared in two modalities in order to assess both EFL learners' recognition (L2-L1) and production (L1-L2) of 12 target words. The word-recognition tests were in six-option multiple-choice format, and the corresponding pictures were provided as clues above the options (see Figure 3). In the word-production tests, the students were given just the related pictures, and they were required to write (produce) L2 equivalents of the target words in the blanks below the pictures (see Figure 4).

Totally, four immediate post-tests were employed without prior notice. Namely, two kinds of immediate-post-tests (one for the semantic and the other for unrelated set) were conducted in two modalities (one for recognition and the other for production). Each post-test included six items. Two weeks later, these immediate post-tests were administered again as delayed-post tests. The formats of delayed post-tests were not completely the same as those of the immediate post-tests. The order of test items and arrangement of options were different so as to keep the learners away from recalling the correct answers from their pictorial memory.

Instructional Procedure

Two weeks before the treatments, the participants' prior knowledge of the target words were measured through a pre-test. They were allowed 12 minutes to complete the pre-test, but most students completed it much earlier since they did not know the target words. The participants were given no further instruction about target words in two-week period up to the treatments.

Within the scope of the treatments, one set of six target words was presented in semantic sets and the other set of six target items was served in unrelated sets. By means of a slide show, all the participants were taught target words in each set through pictorial flashcards. They also practiced the meaning of each word in two sentential contexts embedded in the corresponding visuals. The same amount of instruction was given on both sets of target words by the same teacher through the same technology and similar teaching materials.

The instructional procedure for each target word was carried on as follows: Initially, the students were shown the unlabelled pictorial flashcard to establish a meaningful context for learning (see Figure 5). Here the teacher tried to elicit the word meaning from the students. When they properly guessed the meaning of the target word in L1 (Turkish), the teacher pronounced it three times: "sledge", "sledge", and "sledge". Next, the students

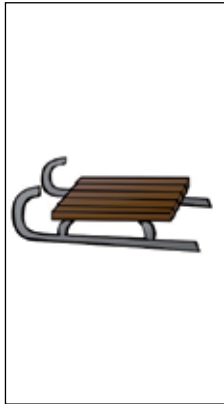


Figure 5

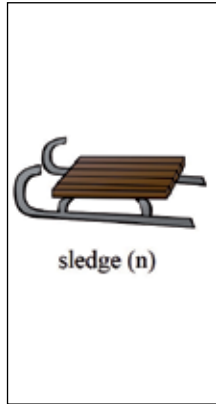


Figure 6

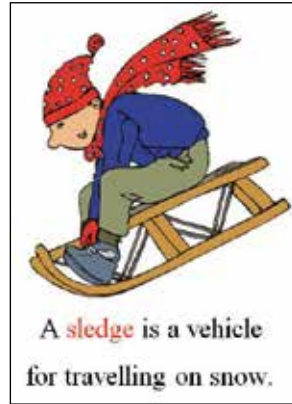


Figure 7



Figure 8

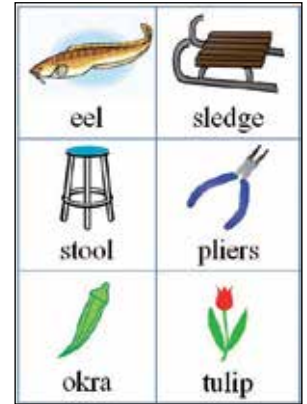


Figure 9

Table 3: Instructional Procedure

Two weeks before the treatments	The pre-test of all the target words (only in word recognition)
↓	
<p>Treatments</p> <p>*Completely the same procedure except for the word clustering</p> <p>(25 minutes)</p>	<ul style="list-style-type: none"> The teacher presents six target words in each set through pictorial flashcards. <ul style="list-style-type: none"> ✓ The teacher shows the unlabelled pictorial flashcard to establish a context, and the students try to guess the meaning of the words. ✓ The teacher pronounces the target words three times. ✓ The students are shown the spelling of the word on the labelled flashcard. Meanwhile, they repeat the pronunciation of the word three times after the teacher. The target words are practised in two example sentences which are embedded in the related visuals. <ul style="list-style-type: none"> ✓ All of 6 words in the set are shown at the same time, and the students pronounce each word three times. ✓ The unlabelled pictorial flashcard of each target word are shown to students one by one, and they are asked to guess and produce the given target word orally as a whole class. <p style="text-align: center;">5-minute distraction activity</p>
Immediately after the treatments	The immediate post-tests in two modalities (5 + 5 = 10 minutes)
↓	
Two weeks after treatments	The delayed post-test in two modalities (5 + 5 = 10 minutes)

were displayed the labelled pictorial flashcard (see Figure 6). Seeing the spelling of the word on the flashcard, they repeated the L2 pronunciation of "sledge" three times after the teacher. Then, the students were presented two different sample sentences accompanied with related visuals (see Figure 7 and 8) to practise the target word in a larger context. Meanwhile, the teacher read the examples to the students, and checked their understanding of the sentences.

After all of 6 target items in each set were taught in a similar fashion, all the words and their corresponding pictures were shown to the students for the last time (see Figure 9). While looking at the screen, they pronounced each target word three times after the teacher once again. Lastly, all the target vocabulary items in the set were practised as a whole class

through a simple activity. Here the students were asked to guess and produce the target words after they were shown the unlabelled pictorial flashcards of each item only once. The vocabulary instruction and practice for each set lasted about 25 minutes.

Two kinds of immediate post-tests were conducted after five-minute distraction activity. First, word production tests were administered to measure the participants' active recall (productive knowledge) of the target words. Then, their immediate recognition of these words was measured by means of another post-test in the multiple-choice format. Five minutes were given to the students for each immediate post-test, but they completed both tests in shorter time. The whole instructional procedure lasted about 40 minutes for one set

of the words. The other set was taught and tested in another successive 40-minute session.

During the treatments, the participants were asked not to take notes about the target vocabulary, and no assignment was given. Two weeks later, four post-tests were conducted again to measure the learners' delayed recognition and production of the target words in each set. They were also allowed five minutes to complete each delayed post-test. No prior notice was given about these tests so as to avoid the regular attempts to study the taught words. In this two-week period, the participants also did not take any English course because of the exam-weeks which were arranged by the school administration.

Piloting and Scoring

The pilot study of the treatments and tests were employed with eight 10th grade students on a voluntary basis. Moreover, the instructional materials and testing instruments were revised by four EFL teachers, two of whom were EFL colleagues of the researcher and the rest two were PhD students at a university. While scoring the word-production tests, one point was assigned to each correctly produced target word, and 0.5 point was given for the answers with one spelling mistake. The responses with more mistakes were not regarded as true.

Data Collection and Analysis

Data were collected in 2015/2016 academic year. The study made use of the pre-test, immediate post-tests and delayed post-tests as data collection tools. The pre-test was mostly employed to exclude the participants who had already known some of the target words instead of testing their recognition of these words before the treatments. The statistical data from three participants were eliminated from the analyses in view of their pre-test scores.

The data were analysed through a statistical software program. The quantitative data gathered from the pre-test and post-tests were entered into the software. First, descriptive statistics of the mean scores and standard deviations were computed individually for each test. Second, one-way repeated measures ANOVA analyses were run to investigate the effects of teaching new L2 words in semantic sets and unrelated sets on the participants' acquisition of these words. So as to determine the significance levels of differences, pair-wise comparisons with Bonferroni adjustment were calculated across the mean scores of pre-tests, post-tests, and delayed post-tests within each treatment. Finally, the independent samples t-tests were applied to explore whether teaching words in semantic and unrelated set differs in terms of EFL learners' immediate or delayed recognition and production of these vocabulary items.

RESULTS

The pre-test results showed that the participants had no previous knowledge of the target words in both semantic and unrelated set. Due to elimination of three participants knowing two of 12 target words, the pre-test mean scores were accepted to be 0 before each treatment. For this reason, the reliability

co-efficient was also not calculated for the pre-test. Briefly, the pre-experimental measures indicated no statistically significant differences between two sets of target words in terms of EFL learners' prior lexical knowledge of these words.

RQ 1: What are the effects of teaching new L2 words in semantic set or semantically unrelated set on EFL learners' recognition and production of these vocabulary items?

One-way ANOVA with repeated measures was employed to investigate the effects of presenting new L2 words in semantic and unrelated sets to EFL learners. The results showed statistically significant differences between the pre-test and post-test mean scores of the participants within each type of clustering. Therefore, the pair-wise comparisons with Bonferroni adjustment were computed among the pre-test, immediate post-tests and delayed post-tests so as to determine where the significant difference existed.

Semantic Clustering: Serving new L2 words in semantic sets was found to have statistically significant effect on the participants' immediate and delayed recognition of these words [$F(2000, 42000)=7022.709, p<0.001$] (see Table 4). The pair-wise comparisons verified the significant difference between the pre-test ($M=0, SD=0$) and the immediate post-test mean scores ($M=5.93, SD=0.33$) as well as between the pre-test and the delayed post-test means ($M=5.14, SD=1.30$) at $p<0.001$ level. Semantic clustering also yielded superior vocabulary gain scores in word production tests [$F(2000, 42000)=958.375, p<0.001$]. The post hoc tests revealed statistically significant differences not only between the mean scores of the pre-test ($M=0, SD=0$) and immediate post-test ($M=5.53, SD=0.83$) but also between those of the pre-test and the delayed post-tests ($M=1.74, SD=1.41$) at $p<0.001$ level. These research findings indicated that teaching semantically related words together had a facilitative impact on EFL learners' immediate and delayed recognition and production of these target words.

Unrelated Clustering: The participating students also got a high-level of vocabulary recognition scores when L2 target words were taught in unrelated sets [$F(2000, 42000)=2642.870, p<0.001$] (see Table 5). According to the pair-wise comparisons, there is a statistically significant difference between the participants' pre-test ($M=0, SD=0$) and the immediate post-test mean scores ($M=5.89, SD=0.54$) as well as between their pre-test and delayed post-test means ($M=5.39, SD=1.22$) at $p<0.001$ level. The statistics also released the significant effect of unrelated clustering on L2 learners' production of target words [$F(2000, 42000)=556.826, p<0.001$]. The post hoc analyses displayed statistically significant difference not only between the pre-test ($M=0, SD=0$) and immediate post-test ($M=5.34, SD=1.05$) but also between the pre-test and delayed post-test scores ($M=1.99, SD=1.53$) $p<0.001$ level. Hence, it can be concluded that teaching new L2 words in unrelated sets equipped EFL learners with superior vocabulary gains in terms of their recognition and production of these words.

Given these findings, semantic and unrelated grouping of new L2 words were both found to be significantly effective in providing EFL learners with higher vocabulary recognition and

production scores not only immediately after the instructions but also two weeks later. Thus, the study revealed positive research evidence about the beneficial effects of presenting novel L2 words in semantic and unrelated sets on EFL learners' immediate and delayed recognition and recall of these words.

RQ 2. Does teaching new L2 words in semantic set or unrelated set differ in terms of EFL learners' immediate or delayed recognition and production of these words?

Although teaching new L2 words in semantic set and unrelated set were both found to have favourable impact on EFL learners' acquisition of these words, independent samples t-tests were also employed to statistically compare these two kinds of vocabulary instruction.

The immediate recognition and production: Shortly after the treatments, the participating students recognised about 99% of the semantically-associated target words properly ($M=5.93$, $SD=0.33$) while the figure was 98% for the unrelated vocabulary items ($M=5.89$, $SD=0.54$). As for immediate word production tests, the mean scores were almost equal for each type of vocabulary instruction. The participants produced 89%

of target words correctly in both semantic ($M=5.33$, $SD=0.83$) and unrelated set ($M=5.34$, $SD=1.05$). All in all, both types of clustering provided the participants with superior vocabulary gains immediately after treatments. However, independent samples t-tests revealed no statistically significant difference between teaching new L2 words in semantic and unrelated sets in terms of EFL learners' immediate recognition [$t(86) = 0.476$, $p=0.635$] and immediate production of these target words [$t(86) = -0.056$, $p=0.955$].

To sum up, teaching novel L2 words in semantic and unrelated sets both gave rise to very high rates of vocabulary gains. EFL learners achieved equally well through both types of vocabulary instruction. The achievement rates of 99% and 88% were really favourable results for immediate recognition and production of target words, respectively. Consequently, the research findings found no interference effect of both semantic and unrelated clustering of new L2 words on EFL learners' immediate acquisition of these words.

The delayed recognition and production: The delayed post-test results demonstrated that the high achievement scores of the participants in word recognition tests were stable even two

Table 4: The Effect of Semantic Clustering on EFL Learners' Vocabulary Learning

		Number of participants	Means	Standard Deviations	Percentages	Degrees of Freedom	F-value	Significance probability
		n	M	SD	%	df	F	p
Word Recognition	Pre-test	44	0.00	0.00	0 %	2,000 42,000	7022.709	0.000
	Immediate post-test	44	5.93	0.33	99%			
	Delayed post-test	44	5.14	1.30	86%			
Word Production	Pre-test	44	0.00	0.00	0 %	2,000 42,000	958.375	0.000
	Immediate post-test	44	5.33	0.83	89%			
	Delayed post-test	44	1.74	1.41	29%			

Note: Maximum mean score = 6.00.

Table 5: The Effect of Unrelated Clustering on EFL Learners' Vocabulary Learning

		Number of participants	Means	Standard Deviations	Percentages	Degrees of Freedom	F-value	Significance probability
		n	M	SD	%	df	F	p
Word Recognition	Pre-test	44	0.00	0.00	0 %	2,000 42,000	2642.870	0.000
	Immediate post-test	44	5.89	0.54	98%			
	Delayed post-test	44	5.39	1.22	90%			
Word Production	Pre-test	44	0.00	0.00	0 %	2,000 42,000	556.826	0.000
	Immediate post-test	44	5.34	1.05	89%			
	Delayed post-test	44	1.99	1.53	33%			

Note: Maximum mean score = 6.00.

weeks later (see Table 7). Although they did not recycle and review the target words, they were able to recognise about 86% of semantically-related words ($M=5.14$, $SD=1.30$) and 90% of the target items in unrelated set ($M=5.39$, $SD=1.22$). On the other hand, the word production rate was 29% for the words taught in semantic set ($M=1.74$, $SD=1.41$) whereas it was 33% for the target vocabulary presented in unrelated set ($M=1.99$, $SD=1.53$) two weeks after the treatments. Overall, teaching new L2 words in unrelated sets led to slightly higher receptive and productive vocabulary gains than semantic clustering. However, these research results once again revealed no statistically significant difference between two methods of vocabulary instruction in terms of EFL learners' delayed recognition [$t(86) = -0,927$, $p=0.357$] and production of the target vocabulary items [$t(86) = -0,796$, $p=0.428$].

In the light of the findings from the delayed post-tests, it can be concluded that the participants perfectly recognised a great deal of the target words, on average of 88%, even though they did not recycle and revise these vocabulary items in two-week period after the treatments. Naturally, there was a decrease in their word production gains in each type of clustering after two weeks interval. However, this amount of decrease was fairly reasonable without further practice and review of the target words in the given time. Nevertheless, EFL learners actively recalled and produced more than one third (31%) of target lexical items even two weeks later, which was regarded as very satisfying outcome in relevant literature.

DISCUSSION and CONCLUSION

The present study concluded that teaching novel L2 words in semantic and unrelated sets produced superior vocabulary gains in terms of EFL learners' immediate or delayed recognition and production of these words. In a real classroom setting, the real L2 target words were presented to 44 Turkish EFL students by means of pictorial flashcards. They also experienced several meaningful encounters with the target items in sentential contexts embedded in corresponding visual images. Under such circumstances, both types of clustering equipped EFL learners with high rates of receptive and productive vocabulary knowledge both immediately after the treatments and two weeks later. The results did not show any statistically significant difference between presenting words in semantic and unrelated sets. Thus, this study revealed no interference effects of semantic or unrelated clustering on students' acquisition of the target words in an EFL classroom, especially when they practised newly-learned words in a broader context and within a great deal of time.

The study findings add a new dimension to the relevant literature in relation to the controversial issue of presenting new L2 vocabulary in semantic or unrelated sets. It proposes that the way of clustering new words is not as important as how many words to teach in per class period and how to teach these lexical items. On the one hand, teachers should set more realistic goals on the number of new words to be presented

Table 6: The Statistics of Immediate Post-Tests

		Number of participants	Means	Standard Deviations	Percentages	Degrees of Freedom	t-value	Significance probability
		n	M	SD	%	df	t	p
Immediate post-tests (Word recognition)	Semantic Set	44	5,93	0,33	99%	86	0,476	0,635
	Unrelated Set	44	5,89	0,54	98%			
Immediate post-tests (Word production)	Semantic Set	44	5,33	0,83	89%	86	-0,056	0,955
	Unrelated Set	44	5,34	1,05	89%			

Note: Maximum mean score = 6.00.

Table 7: The Statistics of Delayed Post-Tests

		Number of participants	Means	Standard Deviations	Percentages	Degrees of Freedom	t-value	Significance probability
		n	M	SD	%	df	t	p
Delayed post-tests (Word recognition)	Semantic Set	44	5,14	1,30	86%	86	-0,927	0,357
	Unrelated Set	44	5,39	1,22	90%			
Delayed post-tests (Word production)	Semantic Set	44	1,74	1,41	29%	86	-0,796	0,428
	Unrelated Set	44	1,99	1,53	33%			

Note: Maximum mean score = 6.00.

to L2 learners. Naturally, the size of vocabulary to be taught at a time relies on many factors such as the difficulty of the words, their similarity to L1 and the levels, needs, interests of the learners. In this regard, Schmitt (2000) suggests serving an average of 10 novel vocabulary items in a 60-minute lesson. Gairns and Redman (1986), consider ideal vocabulary load as eight to twelve productive items per lesson. That is the reason why the current study has attempted to teach six vocabulary items at a time. On the other hand, the quality of teaching and practising new L2 words is also more important than categorising these words. Obviously, there is no best way of teaching L2 vocabulary which suits all circumstances. However, the relevant literature reveals several practical guidelines which should be born in mind by L2 teachers and researchers.

This study takes a few of guidelines into consideration: using dual coding, exemplification of the concept the word refers to and providing a number of encounters with a word. First, dual coding requires using both linguistic and visual elements together so as to convey the meaning of target words (see Clark & Paivio, 1991; Paivio, 1991 for further information about the dual coding theory). Likewise, the current study makes use of both pictorial flashcards and verbal linguistic elements to present the target words to EFL learners. Second, meaningful examples about the concept of a word also facilitate L2 learners' mastery of the given word. According to Nation (2001: 215), "examples help bring a message alive". With this in mind, this study supplies EFL students with several sample sentences so that they can easily conceptualise the meanings of target vocabulary items in their minds. Third, learning a word involves knowing many different aspects of that word such as spelling, pronunciation, meaning and use. Therefore, limited amount of exposure to a word is not sufficient for L2 learners even to acquire only one meaning sense of that word. They should repeat, recycle and practise the newly-learned words through various exercises, tasks and activities. Similarly, this study, to a certain extent, attempts to provide EFL students with several encounters with the target words in different meaningful contexts.

In the relevant literature, many studies try to compare the effects of grouping new L2 words in different clusters on vocabulary acquisition of L2 learners. However, most of these studies are conducted in strictly-controlled experimental conditions. For instance, the study by Wilcox and Medina (2013) allows the participants only two seconds to learn each target word. Likewise, Ishii (2015) gives EFL learners totally 45 seconds to memorise 6 new words. Such studies can be claimed to deal with memorization, rather than vocabulary learning. Thus, it is not convenient to make generalisations about vocabulary learning and teaching in real L2 classrooms in view of the research findings from such studies conducted in laboratory-like settings. These studies also select artificial words as the target items rather than using real L2 words, and they present these words in isolation. However, the present study anticipates that practising new words in a larger context and within a great deal of time may provide L2 learners with better learning or less confusion.

In view of these limitations in the related literature, the current study attempts to compare two ways of grouping novel L2 words in natural classroom setting, and it offers EFL learners more opportunities to practice the real target words in various meaningful contexts which were also enriched with visual materials. The research findings suggest that both semantic and unrelated clustering facilitate EFL learners' acquisition of new L2 words provided that they are provided with more meaningful learning environment. In this respect, a study by Bolger and Zapata (2011) reveals that adding a story context to the target words is likely to eliminate the interfering effect of presenting semantically-associated words in semantic sets. The present study also concludes that there is no significant difference between teaching new L2 words in semantic sets and in unrelated sets, especially when these words are sufficiently practised through visual materials and meaningful sample sentences in a real L2 classroom setting.

Implications, Limitations and Suggestions for Further Research

The current study has some significant implications about L2 vocabulary learning and teaching. First of all, the quality of teaching and practising new L2 words is more important than the categorisation of these words. Second, the use of visual materials plays a fundamental role in almost all stages of L2 vocabulary instruction in that it facilitates learning and retention of lexical items. Third, apart from the explicit teaching of novel L2 words in isolation, teachers should supply L2 learners with opportunity to practise newly-learned vocabulary items in larger contexts in order that they can easily conceptualise the meaning of these words in their minds. Fourth, they should recycle, practise and revise new L2 words in a range of meaningful contexts via several practical exercises, productive tasks and activities. Hence, EFL teachers should benefit from a number of methods and techniques rather than utilising a single approach in L2 vocabulary instruction.

In the light of the limitations of the present study, some suggestions can be made for further research. Initially, there is still a lack of classroom research to compare the effects of semantic or unrelated clustering on L2 learner's acquisition of new vocabulary items. Such research evidence needs to be substantiated by similar kinds of studies conducted in real L2 classroom settings. Second, the scope of this study is restricted in not only the size of the participants but also the number of target words. Further studies should be conducted with greater sample size and with different vocabulary items so as to verify these findings. Third, it would be better to confirm these research findings with various types of learners at different levels of language proficiency and at different ages. Fourth, this study just adds sentence contexts to the target words to be presented. Further research can focus on the teaching of the target vocabulary items in broader contexts. Finally, the target words used in the study were concrete nouns; therefore, further studies can assign the words from other parts of speech as target vocabulary items.

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