Network-building and Vocabulary Memorization for Beginners

Xu Yingying

Kristianstad University

The School of Teacher Education

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Tutor: Jane Mattisson

Table of contents

1. Introduction

As a universal language today, English plays a key role in people's daily lives. More and more non-English-speaking countries pay great attention to English learning. Many researchers of English as a Second Language (ESL) know very well how important vocabulary is in learning a new language. Read (2000), for instance, claims that second language learning is seen as an essential matter of learning vocabulary. Boyd Zimmerman (1997) argues that vocabulary learning plays a central role in human communication, because it is essential to label the world we live in, as well as objects, events and feelings. Both researchers believe that students must learn thousands of words which speakers and writers of English use in order to be a proficient English speaker.

Different experts have different opinions about the vocabulary range: from 400,000 to 600,000 words (Claiborne, 1983:5), from half a million to over 2 million (Crystal, 1988:32), about 1 million (Nurnberg & Rosenblum, 1977:11). Even though, not only second language learners but also native speakers have difficulty in mastering all the words. Still, the average native speaker acquires quite a large amount of vocabulary. In addition, the study conducted by D' Anna, Zechmeister, and Hall (1991) shows that English native-speaking university graduates have a vocabulary size of about 20,000 words. Building a vocabulary equivalent to that of a native speaker takes time and considerate effort. Consequently, more attention is paid to vocabulary learning strategies (Nation 2001).

According to Nation (2001), vocabulary learning involves both direct and indirect learning. Strategies for direct vocabulary learning refer to decontextualised learning---learning individual words from word list; while strategies for indirect vocabulary learning are those of contextualized learning---learning from context. Since there are so many words in the language and it takes so much time to effectively learn a word, direct study seems to be an inefficient procedure for vocabulary growth

for native speakers of English. But for non-native speakers of English who need to quickly increase their vocabulary size (especially the high-frequency words), direct learning is a useful complement, which can be a way of quickly raising learners' awareness of particular words so that when they meet these words in reading or listening they will be noticed and more easily learned. A study conducted by Cohen and Aphek (1981) confirms that word lists are good for beginning students.

Once words in the list have been encountered, consolidating them in memory then plays a key role in mastering the words. Referring to Schmitt (2000), there are many strategies for memorizing words, such as using physical action to help memorization, saying words aloud when studying, connecting word to a previous personal experience, and using semantic word-web.

1.1 Aim

The aim of the present investigation is to establish whether network building, i.e. building connections between related words, helps second language learners at the beginner's stage to memorize the core meanings of English nouns and adjectives.

1.2 Material and method

The primary material in this investigation is the test paper (see Appendix One) and the subjects doing it after a self-learning period. More details about the subjects and the target words memorized in the self-learning period are stated in the following.

1.2.1 Subjects[1]

The subjects of this investigation are students from two classes of Grade One in Middle School in Ningbo, China. Two classes were chosen with the purpose of

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[1] Due to time limitation, the amount of subjects in this investigation was relatively limited. If the research is pursued further, more subjects will be included.

comparison. They have learned English systematically for one semester. With regard to the students' exam result last semester, i.e. autumn 2009, 98% of Class One students gained more than 60 points out of the total 100 points, and 32% gained more than 80 points; while, 98% of Class Two students had a score of more than 60 points, and 30% of more than 80 points. It seems that Class One and Class Two students have a similar level of English. The reason to choose students of Grade One Semester Two is that students at that stage are able to learn new vocabulary on their own, and it may be good for English learners to know how to learn vocabulary by using strategies from the early stage of learning English.

All the subjects are anonymous. They are not asked to specify their name, gender, age or ethnicity because this is of no relevance to the outcome of this investigation.

Each class has fifty students. There are five English lessons per week (one lesson per day), with each lesson lasting 45 minutes. Moreover, Teacher A is the English teacher of both Class One and Class Two. Teacher A is the one who handed out the test papers to the subject in the classroom, and then collected them in when the subjects finished.[2]

1.2.2 Target words

The target words in this investigation are thirty nouns and adjectives from the word list of the participants' Grade One English textbook. It is shown by the result of a pre-test (Pre-test One) that the thirty words are new to all the participants, as all the participants who were asked to write down the meanings of the thirty words in Chinese were unable to do so. The pre-test was carried out one week before the investigation in accordance with Hulstijn's recommendation that "if administering a pre-test at least one week before the experimental treatment, the pre-test will not have influenced on the investigation process" (2003:351).

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[2] According to Bachman and Palmer (1996), the one who is the invigilator in the test will influence the test result to some extent. The reason why the researcher mentions this is for the purpose of consideration of test validity. However, since the evaluation of the test is not the focus of this investigation, it has not been further discussed.

Nouns and adjectives are both content words, and Read (2000) argues that when doing research on vocabulary, it is better to focus on content words. Content words include nouns, adjectives, verbs, and adverbs; while articles, prepositions, pronouns, conjunctions, and auxiliaries belong to function words, according to Read. The reason why nouns and adjectives are chosen instead of verbs and adverbs is that "nouns are easiest to learn, followed by adjectives; on the other hand, verbs and adverbs are the most difficult", according to Rodgers (1969:327). Since the subjects are all English beginners, it is more suitable to choose words which are easier to learn.

The thirty target words form three groups according to the three most important types in the network theory (discussed in detail in the Theoretical Background section) --- coordination, collocation and superordination, (Aitchison, 2003). In Aitchison's book, those three types of links are illustrated as follows:

COORDINATION consists of words which appear together on the same level of detail, such as *salt* and *pepper*; *butterfly* and *moth*; *red, white, blue, black, green*. Opposites may belong to this group, as with *left* and *right*, or they are the two commonest members in a larger group, as with *hot, cold, warm, cool*.

COLLOCATION involves a word which is likely to be found together with the stimulus in the same speech, as with *salt water, butterfly net, bright red*.

Stimulus refers to something that encourages activity in people and things (Collins Cobuild, 2006). "In word association tests *stimulus* is used as a term to describe a word which is there to trigger a word association from the participants" (Schmitt, 2000:38).

SUPERORDINATION. When a superordinate occurs, the cover term will include the stimulus word. For example, *insect* is elicited by *butterfly*, and *colour* is a response to

red.

Each group has ten words which are almost in accordance with the number of new words which English beginners are able to learn in each class, according to the research of Webb (1962). When estimating learners' capacity for the initial learning of English vocabulary, Webb finds that learners could cover 10-15 words per hour. The words of the group SUPERORDINATION are about colour which is the most important learning objective in Grade One English learning, according to the curriculum criteria of Grade One English textbook, and the ten words happen to be all the words about colour in the word list. The words of the group COORDINATION are five pairs of opposites which were selected by Teacher A from the most commonly used adjectives in the Grade One word list. The words of the group COLLOCATION were selected out through a test (Pre-test Two): Students from the two classes were asked to do a test in their mother tongue (Chinese) before class. They were asked to respond in Chinese with the first word that came into their mind when seeing the adjectives in Chinese which were already known. Then, their answers were collected and the most frequently occurred nouns to the adjectives presented. Table 1 in the following shows the exact thirty words.

Table 1 **Thirty target words**

SUPERORDINATION	colour, pink, red, yellow, green, blue, white, black, grey, brown
COORDINATION	big-small, fat-thin, tall-short, hot-cold, beautiful-ugly
COLLOCATION	(red)apple, (blue)sky, (black)night, (yellow)leave, (white)snow, (fat)pig, (hot)summer, (cold)winter, (ugly)witch, (beautiful)princess

(The adjectives in brackets are the ten words provided in Pre-test Two.)

It can be seen from Table 1 that the words in each group are related in a certain way and have connections with each other.

1.2.3 Procedure

Before the investigation was carried out, teacher A was interviewed by e-mail about some background information on the subjects' strategies for memorizing vocabulary (see Appendix Two). The interview shows that all of the subjects were unfamiliar with memorizing vocabulary by means of building connections between related words. Instead, they usually memorized individual words by rote. The interview indicates that it is impossible for the subjects who were asked to memorize the target words individually by rote to memorize the words through building connections among them.

In the self-study period of this investigation, Class One students were given the word lists in which the target words are related and connected with each other in a certain way; while Class Two students were given the word lists in which the target words are not related with each other. Furthermore, all the words in lists given to both Class One and Class Two students are together with their core Chinese glosses/translations. As Ellis and Beaton (1993) suggest, a new English word in the early stages of learning has only one simple link to its first language equivalent. Thus, the students in both classes memorized the core meanings in Chinese (see section **2.2)** of the target words during the self-study period. The reason why they were asked to memorize Chinese translations is explained in section **2.3**. After self-study, the students were tested. Then follow interviews on comprehension of the tests. More details about the procedure are in the following.

The experimental procedure of this investigation consists of seven stages, which are shown in the following table.

Table 2 **Experimental procedure of this investigation**

Stage One (self-study)	Day 1 (memorization)	Class One: the words in superordination group
		Class Two: the words in List One
	Day 2 (review)	Class One: the words in superordination group
		Class Two: the words in List One
Stage Two (self-study)	Day 3 (memorization)	Class One: the words in coordination group
		Class Two: the words in List Two
	Day 4 (review)	Class One: the words in coordination group
		Class Two: the words in List Two
Stage Three (self-study)	Day 5 (memorization)	Class One: the words in collocation group
		Class Two: the words in Llist Three
	Day 6 (review)	Class One: the words in collocation group
		Class Two: the words in List Three
Stage Four (immediate post-test)	Day 6	Both Class One and Class Two students were tested immediately after self-study.
Stage Five (interview)	Day 7	Two interviews were carried out to illustrate the outcome of the immediate post-test.
Stage Six (delayed post-test)	Day 13	Both Class One and Class Two students were tested a week later.
Stage Seven (interview)	Day 14	Two interviews were carried out to illustrate the outcome of the delayed post-test.

The self-study period was composed of three stages: Stage One, Stage Two and Stage Three. According to Schmitt (2000), it is critical to have a review session soon after the learning session in order to be sure that the number of new-memorized words forgotten naturally by participants will be minimized. Schmitt proposes that one of the reviews showed 24 hours later after the learning session. Consequently, three groups of the target words, i.e. words in superordination group, words in coordination group, and words in collocation group, need six days to study with two days together spent

studying the same word list: one day for memorizing and the next day for review what had been learned. One class each day lasting 45 minutes was spent on self-study. In the class, the participants got together in the classroom and did the self-study.

As mentioned above, Class One students were given the word lists in which the words have connections with each other during the self-study period. In Stage One, Class One students were given the words in the superordination group. In Stage Two, Class One students were given the words in the coordination group. In Stage Three, Class One students were given the words in the collocation group. All the word lists given to Class One students are together with Chinese explanations about the relationships among the ten words.

Compared with Class One students, students in Class Two were randomly given ten target words out of the thirty ones each stage which are not related with each other. Consequently, Class Two students also memorized the thirty target words after the self-study period. Tables 3 and 4 below show the new words memorized in the three stages by the subjects.

Table 3 **The new words memorized in the three stages among Class One students**

Stage One	colour, pink, red, yellow, green, blue, white, black, grey, brown. [superordination]
Stage Two	big-small, fat-thin, tall-short, hot-cold, beautiful-ugly. [coordination]
Stage Three	(red)apple, (blue)sky, (black)night, (yellow)leave, (white)snow, (fat)pig, (hot)summer, (cold)winter, (ugly)witch, (beautiful)princess. [collocation]

(The adjectives in brackets are the ten adjectives memorized in the previous stage used to introduce the new words by means of building the network of collocation.)

Table 4 **The new words memorized in the three stages among Class Two students**

Stage One	List One: winter, pink, red, big, ugly, thin, short , sky, night, snow.
Stage Two	List Two: cold, beautiful, small, pig, fat, summer, colour, yellow, blue, black.
Stage Three	List Three: hot, tall, grey, brown, white, green, leave, witch, apple, princess.

In Stage Four and Six, there were two tests designed after three stages of self-study. Schmitt (2000) emphasizes that memory has a key interface with vocabulary learning, and memory comes in two basic types: short-term memory and long-term memory (more explanations in section **2.10)**. With reference to the influence of memory, two tests were designed for both Class One and Class Two students. The contents of the immediate post-test and the delayed post-test are the same and both of the tests are about the thirty words with the form of English-Chinese translation. Students were asked to write down the core Chinese meaning of the word provided in English. Immediate post-test was carried out immediately after the three stages, and delayed post-test was carried out a week later. Both post-tests were taken by the subjects individually, in order for them not to be influenced by each other.

The purpose of designing two post-tests was to see the similarity or difference between the students' short-term memory of the thirty words and their longer-term memory of the thirty words. According to the Forgetting Curve which was discovered by a German Philosopher called Hermann Ebbinghaus, a week could be considered as the bound between short-term memory and relative long-term memory (Baddeley, Eysenck, & Anderson, 2009). Thus, delayed post-test was carried out a week later. Webb (1962) found that during several periods of continuous learning, the amount of the information recalled, which learned at the beginning of the periods, was not less than the amount of the information recalled, which learned in the end of the periods. Thus, it is not needed to worry that the immediate post-test can not reach the reliable results of the subjects' short-term memory of the words memorized in Stage One. After the three stages, there were no reviews of the thirty words in class with the

teachers' guidance before the delayed post-test, and the students were not told to do the same test again to avoid the subjects reviewing the thirty words just before the delayed post-test. Then the delayed post-test testing the subjects' long-term memory of the target words was comparatively reliable.

After carrying out the two post-tests, the outcomes of the post-tests were analyzed respectively with the purpose of making comparison between them. What was compared was mainly the average number of correct answers students of the two classes gave in the test, with the purpose of judging whether network building helps them in consolidating the core meanings of nouns and adjectives in memory.

Moreover, after the data was collected, four interviews were carried out on comprehension of the two post-tests. In Stage Five, two interviews were conducted respectively to Class One students and Class Two students with the purpose of illustrating the outcome of the immediate post-test. Likewise, in Stage Seven, another two interviews were conducted with the purpose of illustrating the outcome of the delayed post-test. The interviewees are the same in the immediate post-test and in the delayed post-test. Twenty students (ten from Class One, and ten from Class Two) were asked the reason why they were able to give more right translations of the words in a certain group. Ten out of a class of fifty students were selected at random. More explanations about the selection are stated in the paragraph below.

As the researcher[3] was not in China, the interview was conducted in the form of computer-accessed personal interviewing. Personal interviews as opposed to group interviews were chosen because students will not be influenced by each other's opinion and may to some extent feel free to express their own ideas relatively frankly. It is an interviewing technique where the interviewer and the respondent sit in front of the computer and communicate through chatting software (QQ)[4]. All the students

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[3] The researcher here refers to the writer of this essay. The same is true in the following.
[4] Chatting software instead of video phone was chosen to avoid the body language of the

were asked if they were familiar with computer technology; only ten of those who answered in the affirmative in each class were selected. The content of the interview was recorded for further analysis (as shown in the Analysis and Discussion section).

In addition, all the word lists and test papers used in this investigation were e-mailed to Teacher A and he printed them out and then handed out to his students. The results were also collected by him and e-mailed back to the researcher.

2. Theoretical background

This section discusses previous studies mainly concerned with the nature of vocabulary, word association, mental lexicon, and network theories. In addition, several factors influencing vocabulary memorizing are also discussed.

2.1 The nature of vocabulary

According to Read (2000), vocabulary is defined as a construct. Read has also retained *vocabular*y as the term for the subject matter and used *word* much more to refer to individual unit.

Schmitt (2000) considers *vocabulary* to be a list of words which usually in an alphabetical order and together with their translation equivalents. As to *word*, it is described as the combination of meaning, register, association, collocation, grammatical behaviour, spelling, pronunciation and fluency. Nation (2001) lists qualities which can be included in "knowing" a word. See Table 4 below.

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interviewer influencing the respondents.

Table 5 What is involved in "knowing" a word? (From Nation, 2001:27)

Form	spoken	What does the word sound like?
	written	What does the word look like?
	word parts	What parts are recognizable in this word?
Meaning	form and meaning	What meaning does this word form signal?
	concept and referents	What is included in the concept?
	associations	What other words does this make us think of?
Use	grammatical functions	In what patterns does the word occur?
	collocations	What words or types of words occur with this one?
	constraints on use (register, frequency…)	Where, when, and how often would we expect to meet this world?

It is clearly seen from the table above that even the meaning of a word can be analyzed in three different perspectives. In the aspect of meaning associations, one word can make people think of other words, and the words together are related.

2.2 Word-meaning theory

Aitchison (2003) argues that _word_ has fuzzy meaning instead of fixed meaning, which means that it is impossible to pin down a definite meaning for a word. Another argument made by Schmitt (2000) is that many or most words in English have two or more meaning senses---polysemy. Among the different meaning senses for each word, one is usually the most basic, frequent, or fundamental, and can be termed the _core meaning sense_. In learning a second language, it seems that learners learn the core meaning sense of a word before more figurative senses. Consequently, for English beginning learners, it is reasonable to learn the core meanings of a word first, then to learn other meaning senses.

2.3 Glossing

Studies have showed that glossing has a positive effect on vocabulary learning

(Jacobs, Dufon and fong, 1994; Myong, 1995). These studies also show that glossing contributes to vocabulary learning and occasionally to comprehension. It is another tool in helping learners in the gradual process of strengthening and enriching their knowledge of particular words. Jacobs, Dufon and fong (1994) find no difference between first language and second language glosses in their effect on comprehension and vocabulary learning. Learners were happy with second language glosses as long as they could be easily understood. Myong (1995) finds that first language glosses did not differ from second language glosses in their effect on comprehension of words. Moreover, the first language glosses resulted in learners remembering vocabulary more efficiently[5] both in the short-term period and the long-term period.

2.4 Word association

Schmitt (2000) denotes that words are related to each other in various ways. Words can be linked with each other, or with ones already known, through meaning association. Nation (2001) argues that learners can be helped in explaining relationships among words: *x* is the opposite of *y*; *x* involves *y*; *x* is a kind of *y*.

Schmitt (2000) identifies three major categories within word associations, namely syntagmatic, paradigmatic and clang associations. Syntagmatic relationships demonstrate that all sentences are built of sequences of symbols which all add to the meaning of the sentence (Crystal, 1985). Syntagmatic associations have a tendency to have a different word class than the stimulus (Schmitt, 2000). Words in the collocation group belong to syntagmatic associations (McCarthy, 1990). Crystal argues that "paradigmatic relationships stand for symbols in a sentence which have links with symbols absent from the sentence but which exist in the given language, and the connection means that words in a sentence can be replaced by other words and still keep the same grammatical form" (Crystal, 1985:162). Crystal (1985) argues that words in the coordination and superordination group belong to the paradigmatic

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[5] *Efficiently* in this essay means memorizing the core meanings of words well and thoroughly with no waste of time or energy.

associations. Moreover, "clang associations are related to the stimulus when it comes to form but not meaning, for example *save-cave*" (Schmitt, 2000:39).

Furthermore, Craik and Tulving (1975) indicate that if words are organized in some way before memorization, recall is improved. In other words, it is much easier to learn words in groups. In addition, Pawley and Syder (1983) argue that the reason we can speak our first language fluently and choose word sequences that make us sound like native speakers is because we have stored large numbers of memorized sequences in our brain. Kroll and Curley (1988) also demonstrate that language beginners, especially bilinguals, may rely on the network of word associations already extant in their first language to facilitate lexical learning in the second language.

2.5 Mental lexicon

Nation (2001) states that words are not stored at random in the mind; rather, the lexicon is recognized to have organization. Additionally, word association studies provide evidence that indicates that words are organized in the mind. By analyzing the associations, Nation believes that clues can be gained about the mental relationships between words and the organization of the mental lexicon.

A mental lexicon is seen as a human word-store, according to Aitchison (2003). A mental lexicon is arranged on a systematic basis. Aitchison describes the human word-store as a mental dictionary in metaphor. She argues that there are few similarities between a mental lexicon and a dictionary. In a dictionary, words are organized in alphabetical order, while the system of mental lexicon appears to be more intricate. There are two differences between a mental lexicon and a dictionary according to Aitchison. Firstly, many aspects of words, such as sound structure, stress patterns, and stressed vowel(s) will affect human's recognition and use of words. But in a dictionary, words are organized according to their initial letters. Secondly, the mental lexicon has the ability to add, change and take away words; a book-form

dictionary lacks this kind of capacity. In addition, Aitchison shows that humans do not very often deal with isolated words, and words in the mental lexicon relate to each other.

McCarthy (1990) argues that it is important not to assume that the mental lexicon functions exactly the same way in a first language as in a second language. Similar discussions are carried out by Biskup (1992). Biskup points out that some researchers claim that mastering two languages means that one has two separate mental lexicons, whereas other researchers believe that there is one mental lexicon dealing with all languages in the mind. As to L2 mental lexicon, Meara (1983) argues that the organization of L2 learners' mental lexicons is usually less advanced.

2.6 Network theories

Aitchison (2003) states that network theories deal with how the mental lexicon is actually built up and gives one example: "suppose the mental lexicon is a sort of connected graph, with lexical items at bodes with paths from each item to the other" (Aitchison, 2003:84). When discussing the connections between lexical items, Ashcraft (1994) considers the connections between the items as semantic relatedness. If two items are strongly linked in the mental lexicon, the degree of semantic relatedness is high. "It takes a short period of time to retrieve a lexical item when the relatedness is high, while it takes a comparatively long time when the relatedness is low" (Ashcraft, 1994:272). Consequently, it can be claimed that if the meanings of two words are strongly linked, it will take comparatively little time to retrieve them. In addition, Aitchison also shows that most researchers agree that a network of some type is inevitable. Schmitt may give the reason: "it seems logical to assume that the relationships in the mind are not just quirks, but reflect some type of underlying mental relationship in the mind" (Schmitt, 2000:38).

What is more, according to Aitchison (2003), early work on meaning networks

suggested that links between words were formed by linguistic habits. If words often cropped up together, such as *pen* and *pencil*, *envelope* and *postage stamp*, then these frequently associated items were thought to develop extra strength. Aitchison also lists two important findings: Firstly, people almost always select items from the semantic field of the original word. In other words, clusters of words relating to the same topic seem to be stored together. Secondly, people nearly always pick up the partner when the item is one of a pair.

In addition, Morton (1969) and Neeley (1990) have demonstrated from the perspective of lexical-semantic networks that a perceived word form does not activate its own meaning only, but also the meanings of related words. When learners are asked to read two words in a row and translate the meanings, it is possible that they tend to write down the gloss of the second word faster when the second and first word are, to some extent, similar in meaning.

Aitchison (2003) points out that coordination, collocation and superordination are the three most important types of links in the word web. The detailed definitions of the three types have been already shown in section **1.2.2**. Aitchison also indicates that collocational links appear to have priority for children in school years.

Read (2000) holds another opinion. He argues that lists of words which are strongly associated with each other---like opposites or word sets---are more difficult to learn than lists of unrelated words because of the cross-association that occurs among the related words. As a result, learners usually learn words in list individually instead.

2.7 Coordination

As mentioned in the section on learning material, coordination is described by Aitchison (2003) as words linked together with the same meaning or consisting of two components, like opposites. Murphy (2003) concludes that contrasting words have the

same level in meaning although they are directed in the reverse way.

The term "antonymy" is then introduced. An antonym is defined by Aitchison (2003) as "a word of opposite meaning" (Aitchison, 2003:100). Cater (1998) divides antonymic relationships into four groups: complementarity, converseness, incompatibility and antonymy. "Complementarity" is a term used to refer to words ruling out others because the words have no degree, as in *dead* and *alive*. "Converseness" means words correlated with each other, as *buy* and *sell*. If someone buys something then someone else is the seller. "Incompatibility" refers to words belonging to the same semantic field but excluding each other, such as words of colours and seasons. The final group is "antonyms", which include all of the mentioned terms above.

2.8 Collocation

Jenkins (1970) claims that in association tasks, collocations are the second most common response type after coordinates. Collocational links are "powerful and long-lasting" links between words in the mind (Aitchison, 1987:79).

Moreover, Schmitt (2000) states that collocations seem to be a psycholinguistic reality and that the mind does organize words according to their collocational links to some extent. Schmitt also finds collocation an important organizing feature in addition to meaning, and that collocation might usefully be incorporated into vocabulary instruction in some way.

McCarthy confirms that "the relationship of *collocation* is fundamental in the study of vocabulary, it is a marriage contract between words, and some words are more firmly married to each other than others" (McCarthy, 1990:12). It does not mean that words must lie just next to each other. "Words that commonly occur with or in the vicinity of a target word (that is, with greater probability than random chance) are called

collocates, and the resulting sequences or sets of words are called *collocations*"
(Reppen & Simpson, 2002:104). Deciding whether two words are collocations or not
can be a complicated process. A possible approach suggested by Cater (1998) is to
create a set of words which are likely to be found together with a stimulus. In this way,
the set of words as well as the stimulus are in the collocational relationships.

McCarthy (1990) adopts the word *blond* to illustrate the definition of collocation.
Blond in most cases can be used to describe *hair*; it is not possible to combine *blond*
with *computer*. Consequently, there is a strong link between *blond* and *hair*,
indicating that those two words collocate. *Bread* and *butter* are also two words often
appearing together; it may be concluded that they are easily connected because both
of them with the same initial letter *B*. Nevertheless, some kinds of connected words
are based on their meanings, such as *knife* and *fork* (Ashcraft, 1994). Aitchison
describes some collocational pairs as "freezes" (Aitchison, 2003:91) because they
have been fixed. *Knife* and *fork* is an example of a frozen pair. Idioms and several
expressions are also examples of this kind of collocation. Nation claims that
"expressions like *good morning* are so strongly collocated that they are treated like
one word by speakers" (Nation & Meara, 2002:36).

Furthermore, it is pointed out by Crystal that common collocations can also be tied to
cultural aspects, such as *green* in English is connected with *jealousy* for metaphor use.
Additionally, other collocations influenced by cultural factors are phenomena which
actually exist in reality, such as *sour milk*, but not *eggs* or *ham* (Crystal, 1985:240).

In Nation's (2001:56) book, collocation is described as follows:

> Collocations differ greatly in size (the number of words involved in the
> sequence), in type (function words collocating with content words: *look* with
> *at*; content words collocating with content words: *united* with *states*), in
> closeness of collocates (expressed their own honest opinion), and in the
> possible range of collocates (*commit* with *murder*, *a crime*, *hara kiri*,
> *suicide…*)

Nation also argues that where collocations are similar between the first and second language, the learning burden will be lighter. In addition, he confirms the point of view of Aitchison that collocational knowledge is essential because the stored sequences of words are the bases of learning, knowledge and use.

Viewing the significance of collocation, Jiang (2009), a Chinese researcher, claims that "it is necessary and important to raise learners' collocation awareness in the process of learning English as a second language, especially at the early stage of learning"(2009:113). Ying and O'Neill (2009) report three different levels of awareness. *Noticing* is a starting level of "awareness of specific features in the target language input" (2009:183) and is considered a critical first step towards mastering such features. *Cognitive awareness* is a second, deeper level employing "various cognitive strategies for deep processing of the noticed features in the input, thus having a greater chance of internalizing them" (2009:183). *Metacognitive awareness* is a third, higher level when learners "develop a psychological relation to their learning content and process" (2009:183). According to Lightbown and Spada (2006), English beginners have not developed their metacognitive awareness at the beginning stage of English learning.

In China, collocations in English teaching have been given little attention. Jiang reports that "collocation as a very important part of vocabulary acquisition has been either overlooked or treated unsystematically" (2009:103). Thus, it is urgent for English teachers in China to make efforts to raise learners' awareness of L2 collocation; this applies particularly to English beginners.

It is proposed by Jiang (2009) that collocation-focused pedagogical tasks should be designed to guide learners to become aware of L2 collocations. Jiang also provides four sample pedagogical tasks which receive positive feedback both from the teachers and the students in his research. The sample tasks designed are under the direction of

the criteria of being entirely practical for class instruction and pedagogically possible in the context of English teaching in China. It is feasible to adopt the pedagogical tasks to raise the collocation awareness of L2 learners in China.

2.9 Superordination

Aitchison (2003) believes that connections which are made by putting words into categories belong to superordination. Cater (1998) illustrates superordination in terms of hyponymy. Hyponymy is a kind of relationship between two words in which one is specific and the other wide-ranging. "Hyponyms can be said to be unbalanced synonyms, where the organization is hierarchical" (Cater, 1998:21). A *robin* can be categorised under the general term *bird*.

There are two different views of the qualities a relationship must have in order to be considered a superordinate bond. Referring to McCarthy (1990), semanticists only accept a relationship where one item is the representation of the superordinate, such as *chair* is one type of *furniture*. Be in varied from McCarthy, Schmitt (2000) includes meronymy as one kind of superordination. Compared with superordination which is general-specific connections, meronymy is part-whole relationship, which is stated by Cater (1998).

2.10 Role of memory in vocabulary learning

Schmitt (2000) argues that memory connects closely with vocabulary learning and memory comes in two basic types: short-term memory and long-term memory. Short-time memory is fast and adaptive but has a small storage capacity, while long-time memory has an almost unlimited storage capacity but is relatively slow. Furthermore, Ellis (1996) suggests that short-term memory capacity is one of the best predictors of both eventual vocabulary and grammar achievement.

Klimesch (1994) postulates that there are memory networks, which are "inferred

structures designed to explain how information is stored and recalled" (Klimesch, 1994:43). Memory networks consist of nodes and connecting links. Information is represented in a network by links and nodes. Klimesch (1994) cited the Huffman tree, displayed in Figure 1 below, to show that redundant information is stored by links and nodes. The Huffman tree is considered as a well-known binary coding structure (Klimesch, 1994).
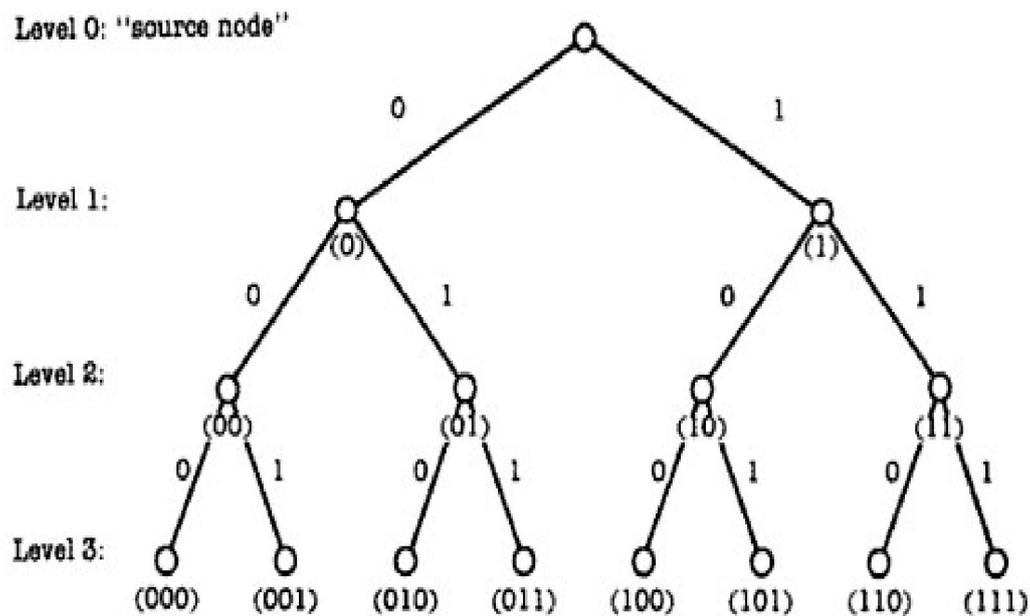

Figure 1 **The Huffman tree as an example of a redundant network**

There are two types of links in the above Figure 1: the ones carrying the information *zero* and the ones carrying the information *one*. The structure is hierarchical. It presents that the information which can be represented is more complex when the more encoding stages are encountered. Consequently, the information at a lower level can be viewed as that stored in short-term memory, and the information at a higher level could be seen as that stored in long-term memory.

Either in short-term memory or in long-term memory, forgetting always plays a role in vocabulary learning, and people should view partial vocabulary knowledge as being in a state of flux, with both learning and forgetting occurring until the word is

mastered and fixed in memory (Schmitt, 2000). Schmitt's research showed that most of the forgetting occurred with words that were only known receptively, and productive words were much less prone to forgetting. "Receptive vocabulary use involves perceiving the form of a word while listening or reading and retrieving its meaning. Productive vocabulary use involves wanting to express a meaning through speaking or writing and retrieving and producing the appropriate spoken or written word form" (Nation, 2001:25).

2.11 Factors affecting vocabulary memorizing

In addition to the role of memory, there are other factors which affect vocabulary memorization, such as the characteristics of target words, individual learner differences, and different vocabulary memorizing strategies. Paragraphs in the following will discuss the three factors in detail.

As described in the introduction section, there are quite a large number of strategies to help memorization. For instance, it is feasible to use physical action to help memorization, to say words aloud when studying, to connect word to a previous personal experience, and to apply semantic word-web into memorization (Schmitt 2000).

Daller, Milton, and Treffers-Daller (2007) propose that learning strategies and individual variation interfere with vocabulary memorizing to some extent. Ellis (1997) provides a framework for illustrating the complex interaction among individual learner differences, learner strategies and language learning outcomes. The framework is displayed in the figure below.

Figure 2 **A framework for illustrating the interaction among individual learner differences, learner strategies and language learning outcomes (Ellis, 1997:63)**
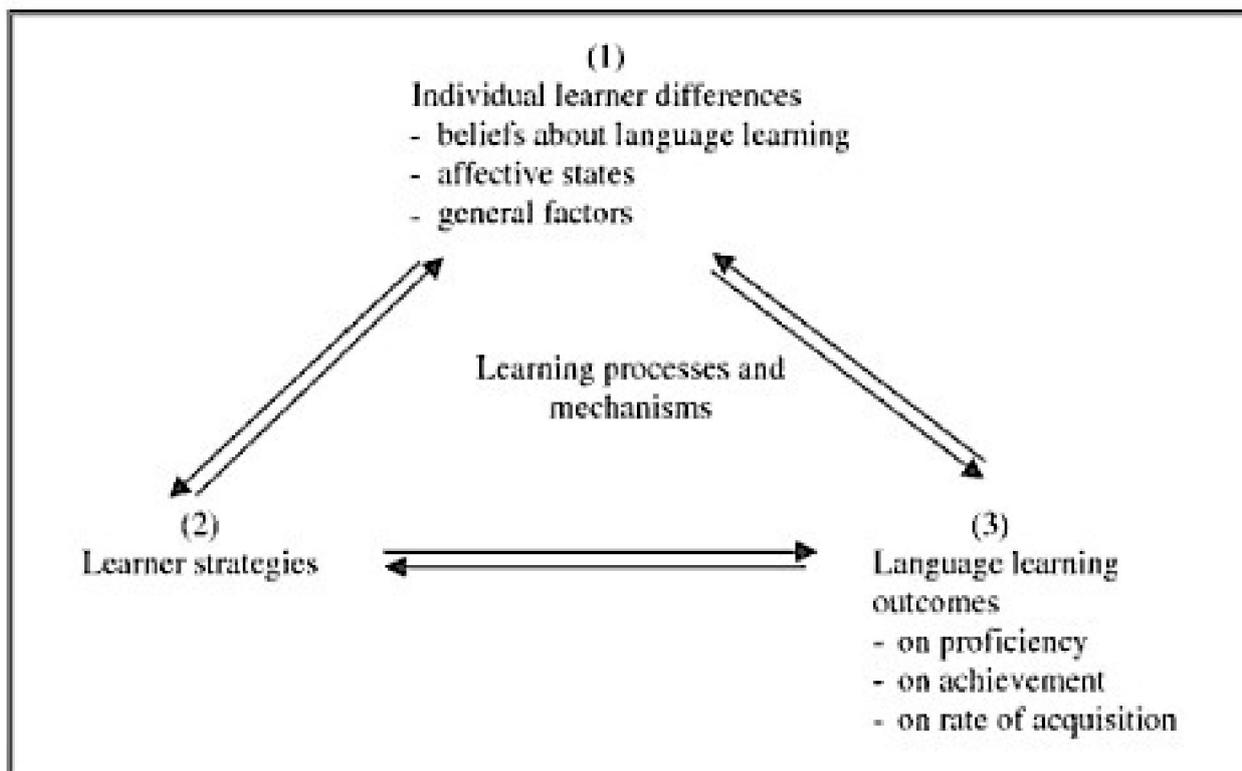
As shown in the above figure, Ellis (1997) distinguishes three sets of variables which influence each other. The first one includes beliefs about language learning, affective states and some general factors (language aptitude, motivation, age, learning style). The second set of variables is comprised of various learner strategies learners employ in L2 learning. Ellis (1997) defines learning strategies as "the particular approaches or techniques that learners employ to try to learn an L2" (1997:77). The third one involves language learning outcomes in terms of proficiency, achievement and rate of acquisition.

Sun (2010) further explains the way in which individual learner differences and the characteristics of target words affect word storage in the memory. Based on the arguments postulated by Sun, there are three main aspects of individual learner differences which play a role in remembering words. To begin with, learners' presence

or lack of self-confidence in learning new words is of great importance. If learners are confident when memorizing new words instead of anxious or worried, they will be more successful in remembering vocabulary. Secondly, interest and motivation are two additional and influential factors. Ellis (1997) claims that motivation involves "the attitudes and affective states that influence the degree of effort that learners make to learn an L2" (1997:75). If learners are interested in and have a positive attitude towards memorizing new words, they will be able to provide correct translations of more words. The final factor is learner's language aptitude. Language aptitude is believed to be "in part related to general intelligence but also to be in part distinct" (Ellis, 1997:73). If a learner has a higher language aptitude, then he is considered to be able to memorize words more successfully.

Additionally, it is suggested by Sun that the level of difficulty of words will also influence the language learning outcomes.

2.12 Previous research on vocabulary memorization in China

Rote memorization is a common method adopted by a large number of Chinese students when learning English vocabulary. The advantages of rote memorization provided by some experts may account for the phenomenon. O' Malley and Chamot (1990) claim that rote memorization can be effective[6] if students are accustomed to using it. If a generalization can be made, rote memorization may be more suitable for beginners, because rote memorization contains less material that may distract a novice. A study by O' Malley and Chamot has shown that students who relied on their familiar rote repetition approach learned well (O' Malley & Chamot, 1990:157).

However, many school teachers and experts in China argue that rote memorization is not a good way to facilitate memorizing words. They suggest new ways to facilitate vocabulary memorization.

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[6] *Effective* in this essay means producing the result that is wanted or producing a successful result.

Meng (2009) provides four ways to help learners remember vocabulary. The first way she suggests is memorizing words through the affix, especially the derivational affix. English learners can infer the meaning of a new word from analyzing the affix with which they are already familiar. Secondly, there is an urgent need to review new words soon after they are introduced, for forgetting mostly happens at the early stage after learning (Baddeley, Eysenck, & Anderson, 2009). Thirdly, it is suggested that English learners can reduce the time spent in remembering new words when the reviewing times are increased. Fourthly, Meng proposes that it is good for learners to review new words 1.5 times more than that needed to successfully store vocabulary in the brain. This method can help learners to store the memory of new words more efficiently.

Jin (2008) suggests that it is useful to implement association into vocabulary memorization. Building connections between words in the aspect of their meanings helps grasp new words firmly.

Wang (2008) believes that the forgetting curve can be made use of to memorize new words. He claims that to avoid forgetting words newly learned; English learners should review the words in line with the speed of forgetting, which is shown by the forgetting curve.

Liang (2009) suggests that English learners should be encouraged to brainstorm among the words in a collocation group to consolidate the memory of a certain set of words.

Sun (2010) argues that one of the best memorizing strategies is to connect new words with the ones already known either as regards pronunciation, form, or semantic meaning.

From the above discussion, it can be concluded that many Chinese researchers suggest applying association strategies and forgetting rules into vocabulary memorizing.

3. Analysis and discussion

To find an answer to the research question, whether network building helps beginning learners to memorize the core meanings of nouns and adjectives, 100 participants' data of the immediate post-tests (Post-test One) and delayed post-tests (Post-test Two) was collected and is displayed in the following tables. Furthermore, four interviews, as mentioned in Method section, were analyzed to offer some explanations regarding the test results.

There are five sub-sections in this part. The first two sub-sections are about the results from immediate post-tests and delayed post-tests, with each sub-section concerning the comparison between the two classes. Then follows the third sub-section: the comparison between the results from immediate post-tests and delayed post-tests. Finally, other factors affecting outcomes and pedagogical implications are included.

As mentioned in Method section, the content of the immediate post-test and the delayed post-test are the same, i.e. students were asked to write down the Chinese equivalent translations of the thirty words. Both two tests are achievement tests. If students give correct translations, they are believed to be successful in memorizing the core meanings of the words. Furthermore, from the point of view of scoring, if students write down the exact Chinese translations or synonyms, they are judged to have given the correct answers. If they write down wrong translations or fail to fill in something, these are viewed as incorrect answers. The number of correct answers each student gave was counted, and the average number of correct answers given by each class will be shown in the following tables.

3.1 Data from the immediate post-tests

One hundred test papers of immediate post-test were collected. The average number of correct answers which Class One and Class Two students gave is shown in Table 5 below.

Table 6 **Students' translation accuracy in the immediate post-tests**

	Class One		Class Two	
Words in coordination group	7	23%	9	30%
Words in collocation group	8	27%	10	33%
Words in superordination group	6	20%	6	20%
Total number	**21**	**70%**	**25**	**83%**

Table 6 above shows the average number of correct answers which students gave to three groups of words, i.e. coordination, collocation and superordination, and the total number of students' translation accuracy. The percentage of correct answers is also presented.

It is displayed in Table 6 that, on the whole, Class Two students who did rote memorization gave more correct translations than Class One students who built networks to help memorization in Post-test One. The initial results suggest that rote memorization helps students more in remembering the core meanings of words than building networks in a short period. One reason may be that Class One students are confused by the cross-association that occurs among the related words; this conclusion is in line with Read's (2000) argument (cf. section 2.6). As Class One students are only English beginners, they have difficulty in distinguishing the exact word among the relative word web immediately after self-study.

Another argument postulated by Meara (1983) could also contribute to illustrate the

outcome. The organization of students' word web of the words in the brain is less advanced at the beginning of their language learning. Linguistic habits of building networks have not been formed yet, as Aitchison (2003) demonstrates. The outcome is also in accordance with the opinion of O' Malley and Chamot (1990), who claim that students can perform well by relying on the rote memorization approach with which they are familiar. What is more, the interview (see Appendix Two) with Teacher A provides evidence that rote memorization is actually the method students usually adopt.

On the one hand, among the Class Two students, translation accuracy is highest in the collocation group where the average percentage is 33%. The second highest translation accuracy is in the coordination group, where the average percentage is 30%. Class Two students achieved comparatively lower accuracy in the superordination group, with an average percentage of 20%. The words of three groups are presented in Table 1, in section **1.2.2**.

The interview (Interview Two) with ten students from Class Two after the immediate post-test may offer some explanations regarding the test results. Table 7 below shows the details of the interview.

Table 7 **Interview with Class Two students after the immediate post-test**[7]

The researcher	After doing the test, have you found that you can remember the core meanings of certain words (not other kinds of words)? What reasons may account for this in your opinion?
Student 1	Yes, I gave more correct translations of the words which I can hear in daily life.
Student 2	Yes. But I wrote down all the correct answers.
Student 3	Yes. But it is hard to explain.
Student 4	Yes. I like fairy tales. So the words which appear frequently in the story are the ones to which I am able to give correct answers.
Student 5	Yes. But I do not know the reason.
Student 6	Yes. I think so. The words I am most familiar with in Chinese are the ones I am able to memorize efficiently.
Student 7	Yes, I remember the ones which I think must be used in daily conversation.
Student 8	No, I am confused with all of the meanings.
Student 9	Yes. I remember the words which can be used to describe my appearance.
Student 10	Yes, but I can't express it using words.

Table 7 demonstrates that Class Two students memorized words in the collocation and coordination group more efficiently. The following reasons can be given: 1) Class Two students are familiar with the words in Chinese. 2) They have a personal preference towards those words. 3) The words are used by them in Chinese in daily life. 4) The words are heard by them in Chinese most of the time. 5) They consider the words important. Thus, it is reasonable to argue that students in Class Two tend to remember words in accordance with their familiarity with the words, their preference, and also the words' significance to them. As Sun (2010) has already established,

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[7] As the chats were in Chinese, the present writer has translated them. The same is true for the following interviews.

learners tend to memorize words that have personal or emotive significance.

As to Class One students, the outcome of the immediate post-tests is lower than that of Class Two students. To be more specific, the percentage of Class Two students' translation accuracy is 27% in the collocation words group, 23% in the coordination words group, and 20% in the superordination words group. The ranking of the three groups as regards translation accuracy is, however, the same between Class One and Class Two. One likely reason is that students' networks of words in the brain are less advanced, as Meara (1983) claims, and words in their minds are almost like clusters, with a loose relationship between each other. The interview, presented in Table 8, with ten students from Class One (Interview Three) provides an explanation as to why students give more correct translations of the words in the collocation and coordination group than those in the superordination group.

Table 8 **Interview with Class One students after the immediate post-test[8]**

The researcher	After doing the test, have you found that you can remember the core meanings of certain words (not other kinds of words)? What reasons may account for this in your opinion?
Student 1	Yes. I think so. The words I am most familiar with in Chinese are the ones I am able to memorize efficiently.
Student 2	Yes. I like fairy tales. The words which appear frequently in the story are the ones I memorize well.
Student 3	Yes. But I do not know the reason.
Student 4	No, I am confused with all of the meanings.
Student 5	Yes. I remember the words which can be used to describe my appearance.
Student 6	Yes, but I can't express it using words.
Student 7	Yes. But I wrote down all the correct answers.
Student 8	Yes, I remember the ones which I think must be used in daily conversation.
Student 9	Yes, I memorize the words which I can hear in daily life more efficiently.
Student 10	Yes. But it is hard to explain.

Table 8 reveals that the ten students from Class One provided almost the same reasons as those from Class Two. They also remembered words they are familiar with, prefer, and consider important.

Consequently, it is clearly seen that at the beginning stage of memorizing the core meanings of target nouns and adjectives, rote memorization is more effective than network building for consolidating words in one's memory.

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[8] The translation of the ten respondents' answers is almost the same as those in Interview Two because the central meanings of the ideas they express are the same.

3.2 Data from the delayed post-tests

Six days after the immediate post-test, another one hundred test papers of delayed post-test were collected. In the same way, the average number of correct answers which Class One and Class Two students gave was counted and presented in Table 9 below.

Table 9 **Students' translation accuracy in the delayed post-tests**

	Class One		Class Two	
Words in coordination group	6	20%	7	23%
Words in collocation group	8	27%	6	20%
Words in superordination group	5	17%	4	13%
Total number	**19**	**64%**	**17**	**56%**

Table 9 displays the average number of correct answers which students gave to three groups of words. The total translation accuracy is also presented as well as the percentage of correct answers.

As Table 9 shows, Class One students who built networks to help memorization gave more correct translations than Class Two students who memorized words by rote in the delayed post-test. It could be claimed that in the long run network building helps students more in memorizing the core meanings of words than rote memorization, which is in line with quite a large number of arguments from experts. Craik and Tulving (1975) suggest that if words are organized in some way before memorization, they are remembered for a longer period. In this self-study, words were organized in three networks, i.e. coordination, collocation and superordination. Thus, more words were memorized successfully. Nation (2001) confirms the opinion of Craik and Tulving that learners can be helped by explaining relationships among words.

On the one hand, as regards Class One students, translation accuracy is highest in the collocation group, where it is 27%. The second highest translation accuracy is in the coordination group, where it is 20%. The comparatively lower translation accuracy is in the superordination group, where it is 17%. It is in accordance with Aitchison's (2003) point of view that collocational links appear to have priority for English beginners. Nation (2001) adds that if collocations are similar between the first and second language, they are easier to learn. The collocational links in this investigation were built by participants in their L1, so it might be believed that the burden on the memorizing task is lighter. In the perspective of mental lexicon, Schmitt (2000) states that the mind organizes words according to their collocational links to some extent, which could also explain why students were able to give more right answers in the collocation group. In addition, the outcomes of the interview (Interview Four), in which ten students from Class One were interviewed after the delayed post-test, provide explanations of the results of the delayed post-test. Both reveal that students memorized the words in the collocation group best. Table 10 below displays the answers from ten respondents in the interview.

Table 10 **Interview with Class One students after the delayed post-test**

The researcher	After doing the test this time, have you found that you can remember words in a certain group for a longer period? What reasons may account for this in your opinion?
Student 1	Yes. I remember the words which were given to me in Stage Three for a longer period. Because I have expressed them in Chinese before.
Student 2	Yes. I remember the words which were given to me in Stage Three for a longer period. Because I have expressed them in Chinese before.
Student 3	Yes, I remember the words which were given to me in Stage Three for a longer period. I don't know the reason.
Student 4	Yes. I remember the words which were given to me in Stage Three for a longer period. Because I have expressed them in Chinese before.
Student 5	Yes, but a little. I have written down all the correct answers.
Student 6	Yes. I remember the words which were given to me in Stage Three for a longer period. Because I have expressed them in Chinese before.
Student 7	No. I failed to write down the answers.
Student 8	Yes. I remember the words which were given to me in Stage Three for a longer period. Because I have expressed them in Chinese before.
Student 9	Yes. I remember the words which were given to me in Stage Three for a longer period. Because I have expressed them in Chinese before.
Student 10	Yes. I remember the words which were given to me in Stage Three for a longer period. Because I have expressed them in Chinese before.

Furthermore, the data reproduced in Table 9 shows that students also remembered words in the coordination and superordination group well. Aitchison (2003) provides some reasons. Aitchison argues that people always pick the partner if the item is one of a pair. That is one kind of coordination network. What is more, Aitchison claims that clusters of words relating to the same topic are stored together and easier to recall, which is the influence of the network of superordination. However, the words in

collocation group are the words the subjects memorized best among the three groups.

On the other hand, as regards Class Two students, the ranking of the translation accuracy of the three groups of words is similar to that of Class One students. The interview (Interview Five), in which ten students from Class Two were interviewed, was conducted to illustrate the results of the delayed post-test. Table 11 below is the interview in detail.

Table 11 **Interview with Class Two students after the delayed post-test**

The researcher	After doing the test this time, have you found that you remember words in a certain group for a longer period? What reasons may account for this in your opinion?
Student 1	Yes. I like fairy tales. So the words which appear frequently in the story are the ones I memorize for a longer period.
Student 2	No, I am confused all the meanings.
Student 3	Yes. I think so. The words I am most familiar with are the ones I memorize for a longer period.
Student 4	Yes, I memorize the words which I can hear in daily life for a longer period.
Student 5	Yes. But I do not know the reason.
Student 6	Yes. But it is hard to explain.
Student 7	Yes, but I can't express it using words.
Student 8	Yes. But I wrote down all the correct answers.
Student 9	Yes. I remember the words which can be used to describe my appearance.
Student 10	Yes, I remember the ones which I think must be used in daily conversation

It is shown in Table 11 above that the students memorized words efficiently according

to their familiarity, preference and the significance of the words for them. It seems that the reason why Class Two students memorized certain kinds of words efficiently in the delayed post-test is the same as the reason why they did so in the immediate post-test. It is understandable that the method adopted by Class Two students to learn vocabulary is the same---rote memorization.

3.3 Comparison between immediate post-tests and delayed post-tests

Table 12 below compares the data from Class One and Class Two students in the immediate post-tests and the delayed post-tests.

Table 12 **Comparison between the immediate post-tests and the delayed post-tests**

	Class One		Class Two	
	immediate	delayed	immediate	delayed
Words in coordination group	7 23%	6 20%	9 30%	7 23%
Words in collocation group	8 27%	8 27%	10 33%	6 20%
Words in superordination group	6 20%	5 17%	6 20%	4 13%
Total number	**21** **70%**	**19** **63%**	**25** **83%**	**17** **56%**

The above data demonstrates that both Class One and Class Two students gave fewer correct translations in the delayed post-tests than in the immediate post-tests. According to the forgetting curve, forgetting takes place immediately after new information is stored in the brain. Moreover, there is a greater decrease in the translation accuracy of Class Two students as compared to Class One students. Class One students' memory reduction decreased by 9%, while Class Two students' memory

reduction decreased by 27%. It implies that network building consolidates memory more efficiently than rote memorization over a longer period of time, which is confirmed by Craik and Tulving (1975) and Nation (2001). The latter reports that if words are organized in certain groups, they will be stored in the brain more efficiently. Furthermore, both in the immediate post-tests and in the delayed post-tests, Class One students gave most of the correct translations of the words in the collocation group. This does suggest that collocational links appear to have priority for English beginners (Aitchison, 2003).

A number of conclusions can be drawn from this study: To begin with, in a short-time period, memorizing by rote facilitates memorizing the core meanings of the target words more than building networks. As mentioned in section **3.1**, rote memorization is assumed to be the way of learning vocabulary which learners are familiar with; it is also suitable for English learners at the beginner's stage. In addition, in the long-term, building networks plays a more significant role than memorizing by rote in facilitating memorizing core meanings. It can be argued that explaining relationships among words helps learners to remember the meanings of words efficiently, as Nation (2001) states.

3.4 Other factors which may affect learning outcomes

As mentioned in section **2.11**, language learning outcomes will be influenced by individual learner differences, the difficulty or easiness of target words for learners, and different learning strategies. In this investigation, the target words were chosen according to the subjects' level of English. The learning strategy employed by the learners in the investigation is building networks to memorize the meaning of words. Consequently, apart from what has been discussed in the analysis section, other factors which may affect the outcomes are mainly individual learner differences, which are not discussed in detail in this investigation because the influence of individual learner differences on the outcome is not the central focus of the

investigation.

According to Sun (2010), when memorizing target words, the subjects' self-confidence is one of the factors influencing the investigation's outcomes. Another factor affecting the outcomes is whether or not the subjects are interested and willing to memorize words. The factor which can not be improved in a short time is the subjects' language aptitude, which language learners are born with. If the subjects have a comparatively high language aptitude and confidence as well as interest, then they will memorize target words more efficiently and give more correct translations in the post-tests.

Learners' individual differences do affect the outcomes of memorizing vocabulary to some extent. In this investigation, however, the central focus is to identify whether the learning strategy, i.e. network building, works to facilitate vocabulary memorization. What is more, for practical reasons, there was little time to further investigate the subjects and figure out their differences. Consequently, the factor of individual differences has not been considered when interpreting the outcomes. Further research, however, will be pursued in the perspectives of learning strategies, individual differences as well as language aptitude.

3.5 Pedagogical implications

As demonstrated above, building networks is an effective method for beginners to facilitate memorizing the core meanings of nouns and adjectives in the long-term. What is more, collocation, one of the three main networks discussed in this investigation, is the most useful one in consolidating vocabulary memorization. In the light of these findings, several suggestions for incorporating network building into English language teaching are suggested in the following. These are mainly strategies for building networks of target words and raising English beginners' awareness of L2 collocation.

3.5.1 Building networks of target words

Network building can be adopted to teach English beginners how to memorize words in a word list more efficiently in the brain. When teaching English beginners vocabulary, it is better for teachers to emphasize that attention should be assigned to word clusters, i.e. words in collocation, coordination or superordination groups. Teachers can guide students to group target words according to collocation, coordination or superordination first and then ask them to memorize the selected words systematically.

3.5.2 Raising awareness of L2 collocation

This investigation confirms Aitchison's (2003) view that collocational links seem to have priority for English beginners. Consequently, it is advisable to take measures to raise English beginners' awareness of L2 collocation in the early stages. Just as Jiang (2009), a Chinese researcher, (see section **2.8)** claims, "it is necessary and important to raise learners' collocation awareness in the process of learning English as a second language, especially at the early stage of learning" (2009:113) in China.

Based on sample pedagogical tasks suggested by Jiang (2009), three collocation tasks are suggested by the researcher in the following to raise English beginners' awareness of L2 collocation in China.

The first task asks students to note down expressions they want to learn in the materials they read. Teachers could provide in advance some sample expressions students should recognise and note down. The purpose of designing this task is to push students to notice words and phrases when reading. It is hoped that learners may become used to learning vocabulary in clusters through directing learners' attention to words and their collocates. This task is in accordance with the *Noticing* level of

awareness claimed by Ying and O'Neill --- "awareness of specific features of the target language input" (2009:183).

The purpose of designing the second task is to "emphasize the good expressions and the possible collocates as a reinforcement of what may have been noticed" (Jiang, 2009:105). The task asks students to fill in the incomplete sentences with one of the expressions provided in the box and change the form where necessary. The expressions provided could be chosen from learners' English textbook and have been noted down by the learners. The learners are expected to be able to practice the word cluster in different contexts. This task is in line with the second, deeper level of *cognitive awareness* described by Ying and O'Neill --- "deep processing of the noticed features in the input" (2009:183).

The third task concentrates on specific active words with the purpose of enhancing students' awareness of collocates that often go along with these active words. Exercises can be designed, for example, to ask students to describe a dream. Firstly, students can be shown the samples: a *bad* dream / a *pleasant* dream. Students should then add as many collocates as they can think of. If necessary they can refer to a collocation dictionary. This task also belongs to developing cognitive awareness argued by Ying and O'Neill (2009).

With awareness of L2 collocation, it seems easier for English beginners to view words in certain networks rather than individually. Consequently, memorizing target words through collocational networks should be more natural for them.

4. Conclusion

Vocabulary, as one of the vital part of English language learning, has attracted the attention of more and more researchers interested in explaining the question of how to learn English vocabulary efficiently and effectively. The traditional method of vocabulary learning in China is rote memorization, which requires a large amount of time and efforts.

The research described here explores the role of network building as opposed to rote memorization in memorizing the core meanings of nouns and adjectives. The results of the investigation indicate that network building does indeed facilitate vocabulary memorization and enables beginners to remember words for a longer period of time. In addition, collocation network is one of the three networks mentioned in the investigation which aids memorization of the core meanings of words most efficiently. When it comes to the application of network building in English teaching, the researcher recommends combining network building with vocabulary memorization: making active use of building networks to broaden the range of vocabulary.

It is hoped that the findings of this investigation will be of interest to researchers in similar investigation settings and prompt them to explore new appropriate approaches to aid vocabulary memorization.

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Appendix One

Post-test

Translate the following words into Chinese.

winter	pink	red
big	ugly	thin
short	sky	night
snow	cold	beautiful
small	pig	fat
colour	yellow	summer
blue	black	tall
hot	grey	brown
white	green	witch
leave	apple	princess

Appendix Two: Interview One

Interview with teacher A in advance of the investigation

RESEARCHER: According to your observation, what methods do the students usually adopt to memorize words?

TEACHER A: They usually learn vocabulary mechanically and do rote memorization. Actually, I have asked them a similar question, and their answers were memorizing words individually by rote.

RESEARCHER: Have you introduced some ways of memorizing vocabulary to students?

TEACHER A: No. Ways of memorizing vocabulary are not emphasized.

RESEARCHER: In your opinion, are the students familiar with memorizing words in groups?

TEACHER A: I don't think so. Because they have already begun learning English systematically, they haven't realized to remember words in groups. Most possibly, they just remember the word list which is given to them.