

*A POSSIBLE ROLE FOR THE FIRST LANGUAGE IN YOUNG LEARNERS'*

*PROCESSING AND STORAGE OF FOREIGN LANGUAGE VOCABULARY*

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**Abstract**

This research was carried out to explore the role played by the first language (L1) in young learners' processing and storage of English vocabulary in English as a foreign language (EFL) context. A series of written and online vocabulary assessments were administered to two classes of 9-year-old Taiwanese children who were distinguished by a pedagogical difference. A computation of vocabulary gain between the two assessments showed that the control group, provided with L1 glosses, had learned and retained more new words, demonstrating that L1 contributed to foreign language (FL) vocabulary learning. The group also produced shorter reaction times than the experimental group who were pedagogically instructed to map English vocabulary directly onto pictures. Furthermore, the interviews, which took place immediately after the online assessments, showed that both groups had employed L1 translation to access English word meanings. The results suggest a possible role for the L1 in young

learners' processing and storage of FL vocabulary.

**Keywords:** *first language, young learners, online tasks, English vocabulary learning, bilingual memory representations.*

## **Introduction**

Among the various component skills of language learning, vocabulary is particularly important to beginning learners. It is viewed as a central component of verbal comprehension since vocabulary learning is a precondition for speaking and understanding a language (Miller 1978). In addition, vocabulary learning is often positively correlated with later literacy development in both first language (L1) and second language (L2) (Beck *et al.* 1987; Bensoussan 1992; Hazenberg and Hulstijn 1996; Laufer 1992 ; Yovanoff *et al.* 2005).

However, L2 vocabulary learning in a context where English is taught as a foreign language (EFL) is quite different from L1 vocabulary learning. This paper is intended to demonstrate that L1 plays an essential role in young learners' processing and storage of English vocabulary in the initial stages of L2 learning.

## **Literature Review**

### **L1 Vocabulary Acquisition**

There are several theories about how children acquire vocabulary. For native child speakers of a language, Aitchison (2003) proposes that labelling is a word-learning skill which enables them to symbolise and to connect the form and meaning of a word. Successful labelling involves repeated matching of a name with its referent. The ability develops when children aged between one and two years of age discover that a whole situation is ritually accompanied by a name repeated by their interlocutors (Smith 1978).

Fast-mapping is another well-established notion with regard to young children's vocabulary development. Using colour words, Carey (1978) demonstrated that children as young as three years old were able to employ their existing linguistic knowledge and rapidly create lexical representations for unfamiliar word they encountered. The young children were able to fast-map the new word onto a new item with only a few instances of exposure. It was hypothesised that children's mental lexicon, as well as their conceptual domain, was re-structured to give place to the new word when they acquired it. Later research revealed that normal and language-impaired children did not differ in their ability to map a novel word to its

referent (Dollaghan 1985, 1987). These studies demonstrate that children realise the significance of object labelling and learn to connect form and meaning from an early age.

### **L2 Vocabulary Learning**

However, vocabulary learning in a non-native language presents a different picture. To begin with, the learners are equipped with an L1 and have passed the stage of learning where they match the form and meaning of a word. Furthermore, they have learned from their L1 experience how the world works and hence they are unlikely to retrace their L1 learning route and apply it to foreign language (FL) learning.

An interesting question then follows: in what manner is an individual's lexical forms mapped onto their respective meanings when one more language is added? In other words, how or where are an L2 learner's two languages connected? Vygotsky (1986) has argued that FL learning does not repeat the course of native language acquisition but instead employs the native language as a mediator. The FL learners use the semantics of the native language as a foundation and only translate the word meanings that are already well-developed in the native language.

It appears that the mother tongue exerts a great influence over the way a foreign language is learned (Corder 1994; Swan 1997). Laufer and Shmueli (1997) provided

their subjects with vocabulary glosses, half of which were explained in English and the other half were translated into their L1 equivalents. Meanwhile, the subjects were assigned to four different teaching modes—(a) isolation, i.e., word lists, (b) minimal context, i.e., in one meaningful sentence, (c) text-context, and (d) elaborated text-context, i.e., original text with clarifying phrases and sentences—in order to have the outcome of their memorisation of new words examined. The results showed that learners had better retention of these FL words when their L1 equivalents were provided, irrespective of the mode in which the words had been learned.

Experienced FL learners appear to prefer L1 glosses to picture aids in learning new vocabulary. Lotto and De Groot (1998) recruited Dutch undergraduates who had years of experience in FL learning to compare two teaching methods—word-association and picture-association. The results from two recall tests indicated that the presentation of L1-L2 word pairs during learning provided a better opportunity for acquiring L2 words than did the presentation of picture-L2 pairs. Van Hell and Candia Mahn (1997) suggest that experienced learners, through their increasing experience in FL learning, prefer to associate the new vocabulary with the corresponding L1 words to achieve the most efficiency.

Coady *et al.* (1993) proposed that it was very likely that FL learners, in the case of

English vocabulary learning, attached an English label to an already existing native-language schema rather than building an entirely new schema for frequently occurring universal concepts. MacWhinney (2005), in the unified competition model, states that the L2 is parasitic on the L1 in terms of lexical learning because of the extensive amount of transfer from the L1 to the L2. In the initial stages of learning the L2 system, learners do not formulate a separate conceptual structure but rely on L1 forms to access L2 lexical meanings. The aforementioned studies point to the possibility that the native language has a crucial role to play during the process of L2 vocabulary learning.

Similar findings have been observed in Taiwanese learners of English at different educational levels. High school students agreed that Chinese glosses were more effective than English glosses in promoting their incidental vocabulary learning (Chang 2005; Chen 2004; Chuang 2004; Huang 2002). Among the elementary school pupils, a provision of L1 glosses had a significantly positive effect on subjects' performance in an immediate vocabulary recall test (Hsieh 2005). The results indicate the importance of the native language, to which learners attach the target language labels when attending to new words.

## **Representations of Bilingual Memory**

Potter *et al.* (1984) proposed two hypotheses regarding the association between equivalent words in a bilingual's two languages. The *word association hypothesis* stipulates that a direct association is established between newly learned L2 words and their corresponding translation equivalents in the L1 and hence that the L2 is always mediated through the L1. The *concept mediation hypothesis*, in contrast, posits that L2 words are directly associated with the nonlinguistic concept which is common to the two languages and therefore that words in the two languages are not directly associated. In other words, concepts can be accessed directly by and for L2 words, without L1 activation.

The two hypotheses assume a distinction between word representations and their concepts and make different predictions for the relative time required to perform the naming and translation tasks. The *word association hypothesis* predicts that picture-naming in the L2 should take longer than translating because two extra steps are needed for the former task. It is assumed that L2 picture-naming requires a retrieval of the concept as well as a retrieval of the L1 word before the name can be given in its L2. Translation of a word from the L1 to the L2 is direct because the L2 is always mediated through the L1. In contrast, the *concept mediation hypothesis* claims

that there should be little or no difference in the time required naming pictures in the L2 and that required translating words from the L1 to the L2, because concepts can be directly accessed for L2 words.

Potter *et al.* (1984) recruited a group of highly proficient bilingual Chinese-English speakers and compared their performance in picture-naming and L1-L2 translation. It was found that the proficient bilinguals took no longer to name a picture in the L2 than to translate a written L1 word into its L2, which supports the concept mediation model. Surprisingly, the same pattern of results was found in a group of novice learners of French. The authors consequently dismissed the word association hypothesis and concluded that direct conceptual processing of L2 was in place very early in L2 acquisition.

However, this finding was challenged (Chen and Leung 1989; Kroll and Curley 1988; Kroll and Sholl 1992; Kroll and Stewart 1994). It was pointed out that the less proficient English-French learners in Potter *et al.* might have passed the stage of accessing L2 words via the L1 link because they knew enough French to enable them to spend a summer in France, despite the great difference between their amount of training in the L2 and that of the proficient Chinese-English learners. Kroll and Curley (1988) recruited English-speaking adult subjects who were relatively fluent in German



and those who had studied the language for less than two years. For the less fluent subjects, translation reaction times were shorter than picture-naming times, as was predicted by the word association hypothesis. For the more fluent subjects, translation and picture-naming times did not differ statistically, just as the concept mediation hypothesis predicted. These data proved that L2 learners not only accessed their L1 to understand their L2 in the early stages of language acquisition but also shifted their reliance on lexical association to a reliance on conceptual mediation in later stages as their proficiency increased. Kroll and Stewart (1994) subsequently proposed the Revised Hierarchical Model to account for the developmental shift in a bilingual's strategies of accessing L2 words. The model posits that the strength of connection between the lexical and conceptual representations in a bilingual's two languages differs primarily as a function of L2 fluency and the relative dominance of the L1 over the L2.

Chen and Leung (1989) conducted a similar study and recruited three different groups of Cantonese-speaking subjects to explore lexical processing for beginning and proficient adult learners as well as beginning child learners. The same trend of results was obtained for the beginning and proficient adult learners, which supported the word association and the concept mediation hypotheses respectively. However, the

pattern of results for child beginners who had learned English for two years was unexpected and inconsistent with either of the tested hypotheses: they named pictures in the L2 440 milliseconds faster than they translated L1 words into the L2. It was suspected that these child beginners, whose mean age was about seven, still had decoding problems with L1 words because they made more errors with regard to L1 words than pictures. Two more experiments were conducted where second- and fourth-graders were recruited. Both experiments replicated the result of the first experiment and showed that child learners were significantly faster in picture-naming than in translating words from the L1 to the L2. Chen and Leung suggested that the child beginners used pictorial representations rather than L1 words to access L2 word meanings probably because pictures were typically used in Hong Kong as media for teaching English vocabulary to children.

The different patterns of results shown in child and adult beginners spelled out the necessity of a connection between pedagogically motivated vocabulary studies and psycholinguistic studies investigating the mental representation of the bilingual lexicon (Meara 1997).

### **The Present Study**

The present study was pedagogically motivated to investigate how young learners process and store English vocabulary in the initial stages of L2 learning in a context where their L1 was overwhelmingly dominant. By adopting the principles of the research on bilingual memory representations, this study asked the young learners to match the phonological form of a word with its referent in a series of written and computerised vocabulary assessments. The usual measures of word- and picture-naming were not used in order to avoid any results confounded by speech output. It was expected that the results for reaction times would not only effectively reflect the point of time at which the subjects identified the visual and auditory cues but also further indicate the status of the L1 in L2 learning.

It was hypothesised that young learners who were offered no L1 translation equivalents to the target lexical items would have shorter reaction times in response to auditory and visual cues because they would directly link the English word with its referent. On the contrary, the group who were provided L1 translation had an extra step of L1 translation equivalents to process, which would cause a delay when the learners tried to retrieve the target language item from their mental lexicon. The delay was expected to be apparent in the longer reaction times.

## **Method**

### **Subjects**

Sixty-four pupils from two fourth grade classes were recruited from a suburban elementary school in southern Taiwan to participate in an English storytelling programme. One of the classes was labelled the experimental group and the other the control group, distinguished by a pedagogical difference embedded in the programme's explicit vocabulary teaching. The experimental group was instructed in English only and had 32 participants and an equal distribution of gender. The control group was provided Chinese translation equivalents to the English lexical items and had 16 girls and 15 boys available for assessment. One boy in the group was deemed unsuitable owing to his severe learning difficulties. All the other subjects were normally developing children with no reported history of hearing or speaking difficulties. Their mean chronological age was 9 years 5 months at the beginning of the study.

A survey was administered to elicit information regarding their English learning experience and habits of language use. Up to 60% of them used a mixture of both Taiwanese and Mandarin Chinese at home but the latter was the dominant language at school. The experimental group had a mean of 29.41 months ( $SD = 17.65$ ) of English

instruction and the control group 30.26 ( $SD = 21.01$ ) months. Their difference in instruction length showed no significance,  $t(61) = -0.17$ ,  $p > .05$ , (two-tailed). None of them had visited an English-speaking country.

A vocabulary test was also administered as an achievement test to assess their vocabulary knowledge from the two textbooks used in the previous school year. The experimental group achieved a higher score ( $M = 28.88$ ,  $SD = 8.94$ ) than the control group ( $M = 24.19$ ,  $SD = 11.92$ ), but the difference was not significant ( $t[61] = 1.77$ ,  $p > .05$ , [two-tailed]).

### **Materials and Design**

Embedded in the English storytelling programme, explicit vocabulary teaching was employed to investigate the vocabulary learning outcome in relation to a pedagogical difference in the L1 glosses. Two regular class sessions were devoted to each of the two stories while the same part of a story was told to each group on the same day. Flashcards carrying an English word on one side and a corresponding picture on the other were used as teaching aids to both groups.

It is necessary to point out that vocabulary learning in this present study was for young learners to learn names of objects. Consequently, only spoken forms of words

were taught and no written forms were shown to the young learners. In addition, pictures, instead of words, were used in vocabulary assessments to avoid any complication created by the participants' different levels of developing reading skills in the initial stages of learning to read (De Groot and Van Hell 2005). Spelling was not a school requirement for the fourth-graders.

Vocabulary assessments were carried out in two formats. Written vocabulary tests included pretests and posttests. Pretests were administered to establish a set of lexical items unknown to the subjects. The 20-strong test items for each story were divided into three parts so that the young learners could quickly make their choice among six to eight pictures. Being asked to listen to a tape, the subjects wrote down the number preceding a lexical item on the exam sheets which had pictures of objects corresponding to the target vocabulary. Posttests containing the same test items were administered to investigate their increase in vocabulary knowledge.

Computerised tests were also used in the study because they measured not only the participants' accuracy but also their reaction times in matching the visual and auditory cues. Reaction times indicate the processing complexity faced by the subjects in coming to a decision and reflect the difficulty of the question item for the subjects (Cook 1990; McDonald 2000). A script was written to be run in the DMDX system

and the lexical items were read and recorded onto a Compaq Presario 2800 laptop. A total of 30 questions were constructed, consisting of four practice trials and 26 test items, for each online test. An auditory cue appeared simultaneously with a visual picture and the timing started as soon as the picture appeared on the monitor. Subjects were allowed six seconds to right-click or left-click the mouse to indicate their answer to each question. The timing loop stopped as soon as they pressed the mouse. Immediately after the online test, the participants were asked in a short interview if any Chinese translation of the English words had occurred in the online tests. A list containing pictures of the target words were displayed and the young learners were asked to point out the pictures whose Chinese meanings had occurred to them.

### **Procedures**

A pretest was always administered to the whole class before a story was told and a posttest about two weeks after completion of the story. The online assessments, commencing on the same day as the corresponding story was completed, were conducted in the control room of the audio-visual auditorium of the primary school. Online tests for a story usually lasted three days because subjects were tested individually. All participants were repeatedly reminded before tests that the results

were used solely for the study and would not be passed on to the school.

## Results

In terms of vocabulary scores, the experimental group ( $n = 32$ ) performed better on the written assessments and the control group ( $n = 31$ ) on the online tasks.

*Table 1*  
*Differences in Scores, Word Gain, and Reaction Times for Vocabulary Assessments Between Groups Who Were or Were Not Provided L1 Glosses*

Assessment	Experimental ( $n = 32$ )		Control ( $n = 31$ )		df	<i>t</i>
	M	SD	M	SD		
<b>Story A</b>						
Pretest	14.34	4.43	12.13	3.74	61	2.14*
Posttest	15.66	4.74	15.00	4.21	61	0.58
Word gain	2.03	1.89	3.55	3.38	61	-2.21*
Online test	19.41	3.63	19.68	2.61	61	-0.34
Reaction time	2274.32	437.56	2047.90	343.31	61	2.28*
<b>Story B</b>						
Pretest	5.19	3.08	4.32	3.75	61	1.00
Posttest	10.22	5.17	9.87	4.84	61	0.28
Word gain	5.22	3.54	5.77	4.11	61	-0.58
Online test	17.53	3.63	18.52	3.16	61	-1.15
Reaction time	2382.52	492.68	2173.30	339.27	61	1.96

*Note.* Word gain represents the increase of vocabulary knowledge from the pretest to the posttest.

Reaction times were measured in milliseconds.

\* $p < .05$

Independent-sample *t*-tests were computed to compare the two groups' mean differences. Of the two pretests, significance was only shown on that of Story A ( $t [61] = 2.14, p < .05, [two-tailed]$ ) where the experimental group scored higher ( $M = 14.34, SD = 4.43$ ) than the control group ( $M = 12.13, SD = 3.74$ ). The results indicate that the



former group knew more words than the latter group before the story was told. But the gap in their vocabulary knowledge was closed, as was evidenced by the disappearance of significance in the posttests,  $t(61) = 0.58$ ,  $p > .05$ , (two-tailed). In terms of vocabulary gain between the two assessments, the control group had consistently gained more new words than the experimental group, but significance was only found for Story A,  $t(61) = -2.21$ ,  $p < .05$ , (two-tailed). The vocabulary assessments for each story were correlated with each other, with their  $r$  values ranging from .459 to .615 for Story A and from .292 to .629 for Story B,  $p < .05$  (two-tailed). These results indicate that the subjects were consistent in their vocabulary performance, which reflects the test-retest reliability of the vocabulary assessments.

With regard to accuracy in the online tasks, the two groups performed indifferentially and no significant between-group differences were found. In terms of reaction times, the control group responded consistently faster than the experimental group and significance was found only for Story A ( $t[61] = 2.28$ ,  $p < .05$ , [two-tailed]) where the control group ( $M = 2047.90$ ,  $SD = 343.31$ ) had shorter reaction times than the experimental group ( $M = 2274.32$ ,  $SD = 437.56$ ).

According to the interviews, over half of the respondents from the experimental group admitted that Chinese translations had occurred to them during both online

assessments. In contrast, almost two thirds or more of the control group said they had mapped the cues with Chinese translation.

## **Discussion**

### **Interconnection of L1 and FL at the Lexical Level**

Provided with L1 glosses in the explicit vocabulary teaching stage, the control group was able to gain more new words and close the statistically significant gap in vocabulary knowledge for Story A, as was evidenced by the results of the online task and the posttest. It is speculated that when the L1 translation was given, a long-term memory was created in the control group for the English words (Hulme *et al.* 1991). The connection of the two languages at the lexical level made retention of English vocabulary easier. By contrast, the experimental group, which could not access FL meaning conceptually owing to their limited English proficiency, failed to make similar progress. The result that the two groups performed similarly in the vocabulary tests for Story B further indicates that pictorial mediation—the method modelling on L1 vocabulary acquisition—was not more effective than L1 glosses. These results collectively suggest that the provision of L1 translation contributed to the young learners' immediate recall and retention of vocabulary (Laufer and Shmueli 1997;

Lotto and De Groot 1998).

It was highly likely that the subjects from both groups had employed L1 glosses in memorising the words if the data from the interviews were considered. More than half of the young learners from both groups admitted that L1 translation equivalents had occurred to them during the online tests. Some children from the experimental group expressed that L1 translation had occurred in their processing of even those words they had learned from the storytelling sessions, during which no Chinese glosses were given. The interview result, on the one hand, lends support to the claim that the two languages of beginning L2 learners are interconnected at the lexical level (Kroll and Curley 1988; Kroll and Stewart 1994). On the other hand, it corresponds to the claim that L2 learning did not retrace the L1 acquisition route (Vygotsky 1986).

### **A Possible Role for the L1 in Initial L2 Learning**

The result of reaction times was crucial to suggest a possible role for the L1 in young learners' initial L2 learning. According to the hypothesis of the present study, the experimental group had been expected to match the English words directly to their corresponding pictures and hence produce shorter reaction times, due to the control group having to process one more step of L1 translation equivalents. However, the

reaction times showed the opposite. Since it has been established that L1 translation was employed by both groups during their online processing, the two groups must have undergone the same three processing steps: recognition of the picture cues, processing and recognition of the English phonological forms, and location of L1 translation equivalents. A question then arises: why did the experimental group need more time for the three steps?

It is speculated that the experimental group produced longer reaction times because they had to spend extra milliseconds in locating the L1 names for the L2 words. On the contrary, the readily-matched mapping of English phonological forms to their L1 translation equivalents from the classroom instruction enabled the control group to respond faster. The speculation contradicts Chen and Leung's (1989) argument that child beginners were liable to access L2 meaning via pictorial representations if real objects or pictures were used in teaching, but it is in line with the claim of the Revised Hierarchical Model (Kroll and Stewart 1994). Since the subjects of the present study were in the very early stage of English learning and their L1 was overwhelmingly dominant, the connection between their FL lexical and conceptual representations was relatively weak in comparison to the connection between the two languages at the lexical level. The longer reaction times from the

experimental group suggest a possible role for the L1 in the young learners' initial L2 learning.

### **Limitations and Suggestions for Future Research**

Despite the claim that a possible role for the L1 might exist in the young learners' initial L2 vocabulary acquisition, the results of the present study were confounded by their pre-existing vocabulary knowledge. It is consequently suggested that objects which are not commonly seen in an EFL context should be employed as test items or that younger learners who have not received English instruction be recruited in future research to further clarify the lexico-semantic representations of L2 child beginners.

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