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Beginning to Learn Foreign Vocabulary: A Review of the Research

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The article is an attempt to provide a comprehensive review of the experimental findings on foreign vocabulary learning. Almost all the research has been carried out on learning word pairs made up of a foreign word paired with its mother-tongue translation. The first section of the review compares direct and indirect vocabulary learning. The second section reviews the evidence on how much vocabulary can be learned in a given time, how many repetitions are required for learning to occur, and why some words are more difficult to learn than others. The section on technique compares the effectiveness of a variety of techniques for receptive and productive vocabulary learning. The article concludes with advice on interpreting experiments on vocabulary learning.

Introduction

This review tries to present the experimental findings on foreign vocabulary learning in a way that is useful for foreign language teachers. The body of the material has been divided into three sections following Anthony's (1963) division of approach, method, and technique. The section dealing with approach considers the question of whether vocabulary should be taught or not. The section on method looks only at grading. It examines issues such as: How many words can be studied within a set time? Why are some words more difficult to learn than others? Selection of vocabulary, although it falls within the domain of method, has been adequately dealt with elsewhere (Richards 1974) and is not discussed here. The two sections on technique present the experimental findings on the relative effectiveness of various techniques for receptive and productive learning. The review ends with advice on interpreting experiments on foreign vocabulary learning and with suggestions for future research.

Previous reviews have appeared in *The Handbook of Research on Teaching*, edited by N.L. Gage (Carroll 1963); *The Encyclopedia of Educational Research* (4th edition) edited by R.L. Ebel (Carroll 1969); and in the *ACTFL Review of Foreign Language Learning*; Vol. 7 *Perspective: A New Freedom* (King, Holley and Weber 1975). Meara's (1980) excellent survey of experiments on vocabulary acquisition and storage provides a useful balance to this survey. Meara concentrates on how bilingual speakers store words, in an attempt to see what happens to vocabulary when it is learnt. There has been considerable research on first language vocabulary learning

at school (Petty and others 1968) and on paired-associate learning with nonsense syllables, which bears some resemblance to foreign language vocabulary learning. The implications of paired-associate studies with nonsense syllables for foreign vocabulary learning have been described by Higa (1965) and commented on by Carroll (1963).

Experiments on foreign vocabulary learning have mainly been concerned with accelerating the *initial* learning of vocabulary. However, vocabulary learning is an on-going process and the experimental findings reviewed here should be considered with this in mind.

Approach: direct and indirect vocabulary learning

In direct vocabulary learning, a conscious effort is made to learn vocabulary either in context or in isolation, for example, by learning lists of word forms and their meanings, by doing vocabulary learning exercises, or by studying affixes and roots. In indirect vocabulary learning, new words are learned incidentally while reading or listening, usually as the result of information provided by the context.

By far the bulk of vocabulary learning is indirect. Because of the amount of vocabulary involved and the complexity of the learning, it is not possible for a language course to teach all of the vocabulary required to read unsimplified material with ease (Honeyfield 1977). In addition, there is some experimental evidence to show that large quantities of vocabulary can be learned indirectly. Saragi and others (1978) found that after reading a novel, learners could recognize the meanings of 76% of the ninety new words tested although the learners had not been able to refer to a dictionary while reading and were not expecting a vocabulary test.

Indirect vocabulary learning can thus be encouraged by exposure to large amounts of reading and listening material. A well organized extensive programme of graded simplified reading is an important vocabulary component of a language course. Concurrently, learners can be given practice in the strategies of guessing the meanings of words from context. Seibert (1945), Honeyfield (1977) and Clarke and Nation (1980) give useful advice on this.

However, our understanding of indirect vocabulary learning is very limited. We know that such learning occurs and is very important. We have ideas about how to encourage such learning, but many important questions remain unanswered. How does indirect learning of vocabulary by reading compare with and complement indirect learning by listening? Are vocabulary exercises which directly teach the production of vocabulary in speaking and writing more sure and efficient in developing a productive vocabulary than indirect learning? Is directly learned vocabulary retained in the memory for a longer time than indirectly learned vocabulary?

Although the relationship between direct and indirect vocabulary learning is not clear, direct vocabulary learning can play an important part in developing a foreign vocabulary. As we shall see in the following sections of this review, the initial learning of a large number of words can be accomplished efficiently and in a short time by direct learning. Such learning should not be considered as a substitute for indirect learning but as a complementary approach which speeds vocabulary development.

Method: grading

When planning vocabulary learning it is useful to know roughly how many words learners can master within the available time, how many times these words should be repeated, and when they should be repeated. When these words have been decided, it is necessary to divide up the words. Are small quantities better than large groups? If words are to be graded according to difficulty, how can we tell which words will be more difficult than others, and what can we do about it? The findings presented in this section show the possibility of rapid initial learning of large amounts of vocabulary, and show how careful selection and gradation can reduce the difficulty of such learning.

In the rest of this review the term *word pair* often occurs. When vocabulary is learned in lists, an item often consists of a pair of words, namely a foreign word form and its meaning which is usually a translation. Thus, one item in a list is referred to as a word pair.

Amount of time and repetitions needed to learn a list of word pairs?

The answers given to this question are surprising and show that teachers and course designers greatly underestimate learners' capacity for the initial learning of foreign vocabulary. Thorndike (1908) found that learners could average about 34 German-English word pairs per hour (1,030 words in 30 hours). The least efficient of his learners averaged 9 per hour (380 words in 42 hours) and the most efficient 58 per hour (1,046 words in 18 hours). After 42 days more than 60% of the words were still retained. Webb (1962) gained even more spectacular results in a continuous six-hour learning session. Like Thorndike, Webb found a wide variation of achievement among learners. Some learners mastered only 33 lists of six English-Russian pairs (198 words) in six hours, an average of 33 word pairs per hour. Other learners mastered 111 lists (666 words) in under four hours, an average of about 166 words per hour. Both Thorndike and Webb found no decrease in learning capacity as the learning progressed. Webb found that after five hours of continuous learning, learning and recall were not less than in the first hour of learning. In fact, there was an increase in learning capacity as the experiment progressed. Thorndike (1908), and also Anderson and Jordan (1928), comparing tests covering several weeks, noticed that the initially fast learners still retained a greater percentage of words than the slower learners. That is, fast

learners are not fast forgetters.

The data on the number of repetitions required for learning is just as surprising. Lado, Baldwin and Lobo (1967) found that college students who had completed at least six credits of college Spanish achieved recognition scores averaging 95% and recall scores averaging 65% after meeting each word pair once in a 100-word list. The word pairs were infrequent Spanish words with English translations accompanied by pictures. Crothers and Suppes (1967) found that after seven repetitions of 108 Russian-English word pairs almost all of the learners had mastered all of the words. After six repetitions of 216 word pairs most learners had learned at least 80% of the words. Learning rates also tended to increase as the experiments progressed, thus showing the existence of a "learning to learn" effect. In their study of indirect vocabulary learning in context, Saragi and others (1978) found that on average the number of encounters required for most learners to recognize the meaning of a word was around sixteen. In this experiment the learners did not know that they would be tested on the new vocabulary and did not consciously study it while reading.

Number of words to be studied at one time

In a series of experiments, Crothers and Suppes (1967) investigated the effect on learning of the number of Russian-English word pairs in a list. If, for example, learners are required to learn 300 foreign word pairs, is it better for the learners to study 100 of them several times first, then study the second 100 several times, and then the third 100, or is it better for the learners to try to learn all the 300 word pairs as one list? When 300 words are learned as one list, the learners go through the whole 300 words once, then start at the beginning of the list again and continue going through the list until all the words are known. Crothers and Suppes studied the following list sizes: 18, 36, 72, 100, 108, 216 and 300 word pairs.

When difficulty was low, it was more efficient to use the largest sized group of words. When difficulty was high, then the smallest sized group of words was the best. Difficulty here has several meanings. Difficulty is high when there is limited time for learning and the learners have no control over the time they can spend on each item. Difficulty is high when the learners must recall and not just recognize the new words. Difficulty is high when the words themselves are difficult because for example they are difficult to pronounce and their English translations are adjectives, adverbs, or verbs, rather than nouns (see Rodgers 1969 and Higa 1965). In the following section on word difficulty various procedures are suggested which can reduce the difficulty of words. When preparing lists of words for learning the teacher can check to make sure that each list contains only a few difficult items. If this is done then lists of 100 words or more can be used.

Holley (1973) tried to answer the question "How many words should

be studied at one time?" by looking at the learning of vocabulary in context. Holley investigated the relationship between new word density (that is, the ratio of unknown words to the total length of a text) on the one hand and vocabulary learning, reading time, comprehension, and student ratings of difficulty and enjoyability on the other, using a 750-word text with a glossary. Instead of finding an optimal new word density beyond which learning suffered, Holley found that "vocabulary learning continues to increase even up to a new vocabulary density of one new word per fifteen known words" (p. 343). Scores on reading time, comprehension, and student ratings of difficulty and enjoyment were not significantly related to new word density. However, many writers of graded readers choose, on the basis of experience, to limit the introduction of new words to one new word per forty known words. Most graded readers are several thousand words long and thus a ratio of 1 to 40 still results in the learners meeting a large number of unknown words. In a short text, like that used by Holley, a higher ratio of new words to old may be tolerated because the total number of new words is not high.

The repetition of words

Seibert (1927), Anderson and Jordan (1928), and Seibert (1930) investigated retention over periods of up to eight weeks. Their findings are all in agreement with Pimsleur's (1967) memory schedule. Most forgetting occurs immediately after initial learning and then, as time passes, the rate of forgetting becomes slower. For example, Anderson and Jordan (1928) measured recall immediately after learning, after one week, after three weeks and after eight weeks. The percentages of material retained were 66%, 48%, 39% and 37% respectively. This indicates that the repetition of new items should occur very soon after they are first studied, before too much forgetting occurs. After this the repetitions can be spaced further apart.

Why are some words more difficult to learn than others?

As we have seen from Crothers and Suppes's (1967) experiments, the difficulty of vocabulary has a direct effect on the optimum size of the list for learning. There is valuable information about word difficulty both from experiments involving foreign vocabulary, and from experiments with nonsense words. Here we are concerned only with those involving foreign vocabulary, but Higa's (1965) discussion of the "difficulty" of foreign language vocabulary using evidence from paired-associate experiments with nonsense words is a very useful source of information. The experiments discussed below show that vocabulary may be difficult as a result of its pronounceability, its form class or part of speech, its similarity to known words, its being learned and tested productively or receptively, and the learner's level of language proficiency.

Rodgers (1969) found that pronounceability of the Russian foreign word form and the part of speech of the English translation were important variables affecting the difficulty of particular Russian-English pairs. If the Russian words were easy for an English speaker to pronounce, they were easier to learn even when he did not have to speak them. If the English item in a pair was a noun or an adjective, this made the pair easier to learn than if the English item was some other part of speech. Pronounceability of the foreign word form had a stronger effect on difficulty than the part of speech of the English meaning. Syllable length of the Russian word, and demonstrability of the English word did not have a significant effect on difficulty. Rodgers's findings on the effect of pronounceability agree with findings by Faust and Anderson (1967). The difficulty caused by pronounceability could be counteracted by ensuring that foreign words which are difficult to pronounce are not introduced until the learners have had practice with the sounds, sound combinations, and spelling used in those words.

Foreign words which are similar in form and meaning to English words are easier to learn than those which have no formal similarity. Anderson and Jordan (1928) studied the effect of three different types of Latin-English word pairs on learning and retention. 'Identical' words were those with similar form and meaning, for example, *provincia-province*. 'Association' words were those "whose English and Latin sounds are dissimilar but for which there are derivative English words closely associated to the Latin word in sound [and meaning]" (p. 486), for example:

fuga flight fugitive — one who flees

The derivative and its meaning were included in the learning lists. 'Non-association' words were those 'between whose Latin and English form there is no sound similarity or derivative connection familiar to the pupil and which depend for their learning on rote memory' (p. 487). Identical words were learned and retained better than non-association words. This experiment confirms the value of using cognates and drawing attention to derivation. The use of derivatives with 'association' words needs to be handled carefully however. Learners need to know the English derivatives, and the connection between the form and meaning of the derivative and the English member of the Latin-English pair also needs to be obvious to the learners.

The difficulty of vocabulary is also affected by whether the vocabulary is learned productively or receptively. Productive learning involves being able to produce the foreign word by speaking or writing. Receptive learning involves being able to recall the translation of the foreign word when the foreign word has been seen or heard. Stoddard (1929) compared the effects of learning two types of word pairs:

English translation — French word
French word — English translation

In the test which followed the learning, half of the words studied were tested one way: see the English translation and write the French word; and half the other way: see the French word and write the English translation. The learners made twice as many correct answers in the French to English part of the test as they did in the English to French part of the test. Stoddard also found that the direction in which the pairs were learned had a significant effect on their recall. That is to say, learners who studied French-English pairs did better on the French-English part of the test than learners who studied English-French pairs. Learners who studied English-French pairs did better on the English-French part of the test than learners who studied French-English pairs. So, if vocabulary is needed just to be able to read, learning foreign word-English word pairs is best. If vocabulary is needed for writing, then English word-foreign word pairs are best.

Finally, vocabulary may be difficult because of the learners' level of language proficiency. Henning (1973) found that learners in the beginning stages of language learning stored words in their memory according to the sound of the words. This means that the learners associated words which sounded similar, for example *their* and *there*. So, if similar sounding words are learned early in a formal language course, they are likely to interfere with each other because of their association. Henning also found that high-proficiency learners stored words according to their meaning. Words with related meanings, like *eat* and *food*, were stored together in the learner's memory. Henning's study suggests that in the early stages of language learning, homophones should be avoided as much as possible. Unfortunately, in most courses at present there are many homophones in the early lessons. As most courses are based initially on an oral approach, the earlier introduction of the written form could help to reduce interference from homophony or partial homophony and thus make learning easier, because many of these homophones are not homographs.

Technique: receptive learning

Teachers and researchers have seen lack of vocabulary as one of the main obstacles to progress in the receptive skills of listening and reading. With the ready availability of word lists like the General Service List (West 1953) and the lists that accompany the various series of simplified readers, the problem has been that of how to help learners to learn these words as quickly as possible. At the rate at which new vocabulary is introduced into most published courses, it takes several years before learners are capable of reading simplified books at the two thousand word level. In order to shorten this time gap, research on techniques has tried to answer the question: What is the best way to learn large amounts of vocabulary quickly? Experimentation with techniques for beginning to learn receptive and productive vocabulary has always used regular simultaneous presentation of a word pair (foreign word-translation, or translation-foreign word) as its standard and has compared this with other forms, activities, and types of

control. The other forms investigated have been the use of a foreign definition or synonym, or a picture in place of the translation. The other activities have been delay between seeing the foreign word and its translation, placing the foreign word in a context, use of a mnemonic technique, and in productive learning, saying or writing the foreign word. The other type of control has been allowing the learner to choose which word pairs to give extra attention to instead of proceeding regularly through the list during each repetition.

Presentation of word meaning in the mother tongue or in the foreign language

Lado, Baldwin and Lobo (1967) found that the presence of the native language in the meaning was consistently superior to presentation through the foreign language alone by the use of a synonym or definition. This finding is also supported by Mishima (1967). In the initial stages of learning of a new word, a translation will be more meaningful because it will have many more associations for the learner than will a known synonym in the foreign language.

Presentation of a word form and its meaning

If there is a delay between the presentation of a word form and its meaning, learners have an opportunity to make an effort to guess the meaning, and presumably this extra effort will result in faster and longer retained learning. However, the guessing can only be successful if the foreign word form gives a good clue to its meaning, either because the foreign and native words are cognates, or because the word form and its translation have previously been seen together. Experimental evidence shows that simultaneous presentation of a word form and its meaning is best for the first encounter, and thereafter, delayed presentation is best because there is then the possibility of effort leading to successful guessing.

Lado, Baldwin and Lobo (1967) found simultaneous presentation to be superior to delayed presentation. In their experiments the subjects met each word pair only once during learning. As a result of this, the delay between the foreign word and the mother-tongue word was not an opportunity for effort to recall the mother-tongue word before it was seen but was merely a chance to make a wild guess. When time is limited and each item is seen only once, then simultaneous presentation gives longer time to observe either part of the word pair. An experiment by Forlano and Hoffman (1937) also favoured simultaneous presentation over a guessing procedure, but in the guessing procedure, the learners had to guess the English translation even on the first trial when there was no chance of making a correct guess. Thus, simultaneous presentation is most effective as a technique on the very first presentation of a word pair.

In an experiment by Royer (1973) the learners saw each foreign word and its English translation simultaneously on the first trial and guessed by attempting to recall on subsequent trials. The group who were studying

under the recalling procedure learned significantly more correct responses on a test given immediately after the learning sessions. In the experiment, this group had cards with the foreign word form on one side and the English translation on the other. As we shall see, this technique for learning vocabulary can also make use of Atkinson's (1972) findings about the value of learner controlled sequencing, because by using cards learners can easily arrange their next learning sequence on the basis of their present performance at recalling the meaning. If however lists are used, then on the second and subsequent runs through the list, the meanings of the word forms should be covered by a piece of paper and each meaning is uncovered by the learner *after* trying to recall it. This procedure is a simple form of programmed learning.

Are words best studied in lists or in context?

Many language teachers prefer to present new words in context. Judd (1978) refers to several well-known writers on language teaching to support his statement: "Most people agree that vocabulary should be taught in context" (p. 73). Judd justifies this assertion by continuing, "Words taught in isolation are generally not retained. In addition, in order to grasp the full meaning of a word or phrase, students must be aware of the linguistic environment in which the word or phrase appears" (p. 73). In fact, we know that, "words taught in isolation" are retained very well indeed, both in large quantities and over long periods of time. The second part of Judd's justification is more difficult to refute because of its vagueness. Context is essentially *interpreting* the meaning of a word, but precisely how does "the linguistic environment" help the initial learning of a word? (1) In most cases each linguistic environment presents a very restricted and limited meaning of a word compared with a translation or a dictionary definition. Meeting a word in a number of different environments will help learners grasp its full meaning, but here it is diversity of context rather than context itself which helps the learning. A number of different translations of a word may be equally beneficial and more efficient. (2) If a word commonly collocates with another word then meeting these words together will be helpful, particularly a productive use of the word. However, here the context is much smaller than a sentence. (3) Meeting a word in context will help the learner to realize what part of speech the word is, that is, if it is a noun or a verb, etc. This information, however, as Rodgers (1969) indicates, is also typically available when words are presented in isolation because of the part of speech of the mother-tongue translation. (4) Certainly, the evidence from studies of the recollection of text indicate that learning words in context would not help the learning of a word form, as the content of a text is remembered much better than its formal elements. Thus, except by providing a number of different environments, it is difficult to see how context does help the initial learning of a new word.

Except for one poorly controlled study (Grinstead 1915), all experiments comparing learning in context with learning word pairs (foreign word-English translation) have not produced results which favour learning in context. Morgan and Bailey (1943), Morgan and Foltz (1944), Lado, Baldwin and Lobo (1967), and Gershman (1970) found no significant difference between learning word pairs and learning words in some kind of context. In Gershman's experiment, neither writing nor having to search for the target words helped learning. Seibert (1930), in tests carried out at intervals of fifty minutes, two days, ten days, and forty days, found that the method of learning word pairs consistently gave better results than learning words in context.

In spite of these findings, the issue of context and lists is far from settled because most of the experiments were not satisfactory to the extent that they did not take the following points into account. First, it is necessary to decide what context is. For Crothers and Suppes (1967), context consisted of a neutral (i.e. non-defining) sentence. For Seibert (1930) context was a defining sentence with the English translation following the word to be learned, for example 'On *mele mors* (bit) dans la bouche du cheval' (p. 297). For Morgan and Bailey (1943), Morgan and Foltz (1944), Holley and King (1971) and Holley (1973) context meant the presence of a story, i.e. the words were presented in a passage, and the material was accompanied by a specially prepared glossary. Lado, Baldwin and Lobo (1967) defined context as anything added to the word pair, such as putting the foreign word in a sentence, providing cognates to accompany the meaning (automovil — car — automobile), breaking the foreign word into parts (apartamento — a-partir-mento), and placing several foreign words in the context of a story. Until we are able to decide the ways in which various types of context help the learning of words, there will continue to be a wide variety of interpretations of the term *context*. Second, every attempt must be made to ensure that the learning is being carried out in a way that makes use of the context, otherwise words in context could be learned as if they were in lists. Gershman explained the lack of difference between context and word pairs in his experiment in the following way (1970: 3690b):

... despite differences in the overt responses required for completion of the tasks, there were no basic differences in what the learner did covertly, which was to establish the bond between the target word and its English equivalent, i.e. to establish a word-meaning association.

For example, presenting words totally in context did not prevent the learner from translating the target word through his own language.

None of the experiments mentioned above made the context the only source of the meaning of the words to be learned. Third, the length of time allowed for learning needs to be controlled. When words are learned in context,

particularly in a passage, how much time is actually spent on the new words, and how much on the intervening context? This decision is particularly acute when comparing list learning with learning in context. Morgan and Bailey made the following comment on the effect of context on vocabulary learning (1943: 566):

Context may bring less frequent use of dictionary, reduce the time spent and, as a total result of these two factors, reduce the amount of learning as measured by vocabulary recall tests. Thus, if vocabulary learning is the aim, the use of contextualized material might be less efficient than the use of word lists.

Fourth, it is necessary to control the difficulty of the context. Crothers and Suppes (1967) taught the context words before the experiment. Other experimenters were not as careful.

The experiments discussed in this section do not provide support for the idea that vocabulary is best learned initially in context. In none of the experiments however were learners given advice and instruction on how to make use of context. Neither was learning measured in a way that would reveal the particular knowledge (in addition to foreign word-English word) that context may give. Nonetheless, however attracted we are to the idea that "vocabulary should be taught in context" this idea remains a statement of belief rather than a conclusion based on experimental evidence.

A belief in the value of meeting words in context should not have the negative effect of discouraging the initial learning (or learning at some time) of words in isolation. As we have seen in other sections of this review, large numbers of word pairs can be learned in short periods of time, and this knowledge can persist over several weeks without further practice. Also, the independence in reading given by this initial learning of lists will quickly result in words in a variety of contexts. Seibert (1945) has investigated the effectiveness of guessing words from context and has suggested procedures for doing so. If learners are taught these procedures their ability to interpret words in context improves markedly. These procedures however show how learners can find the meanings of word forms and do not ensure the learning of the word.

Allocation of time for each word

Atkinson (1972) studied the effects of four word sequencing strategies (two of which made use of a computer and so will not concern us here) in learning written English responses to written foreign nouns. In the random order strategy the learners studied the items in a random order without having any control over the order of the items. In the other strategy the learners decided for themselves which item was to be studied. "The learner

rather than an external controller determines the sequence of instruction" (p. 124). The learners could choose items to study that had given them difficulty in earlier trials, but all the words from the earlier trials, both easy and difficult, were tested in the retention test. The learner controlled strategy resulted in a retention gain of 53% over the random strategy as measured by a retention test given one week after the learning. Atkinson's experiment shows an advantage of writing each word pair on its own small card rather than learning from one large list. If words are on cards then learners can change their order as a result of previous learning, and can thus give more attention to the more difficult words.

Memoristic techniques versus rote learning

Experiments investigating the recall of familiar non-foreign words (Crak and Lockhart 1972, Craik and Tulving 1975) indicate that words which do not receive full attention and are analyzed only at a superficial level do not stay long in the memory. On the other hand, words that are fully analyzed and are enriched by associations or images stay longer in the memory. Craik and Tulving state (1975: 290):

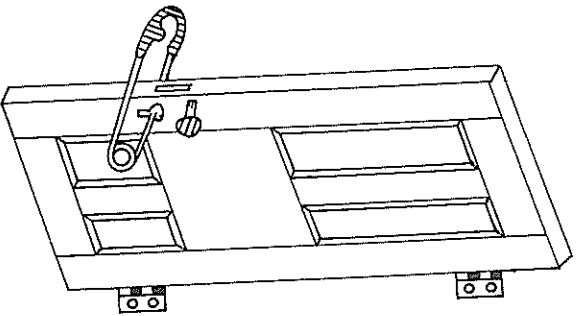
It is abundantly clear that what determines the level of recall or recognition of a word event is not intention to learn, the amount of effort involved, the difficulty of the orienting task, the amount of time spent making judgements, or even the amount of rehearsal the items receive; rather it is the qualitative nature of the task, the kind of operations carried out on the items, that determines retention.

That is, what the learners do while studying words is more important than how motivated they are, how hard they work, how much time they spend and the number of repetitions of each word. These findings cannot be totally applied to foreign vocabulary learning. Foreign vocabulary learning requires repetition even if only because one occurrence of a word will not contain enough information for a learner to master the word. Also recalling an already known form is a simpler task than learning an unfamiliar word form and connecting it to a given meaning. However, Craik and Lockhart's (1972) theory of the importance of the kind of operations or processing carried out on an item does receive support from experiments on the 'keyword' technique.

The 'keyword' technique of vocabulary learning "divides the study of a vocabulary item into two stages. The first stage requires the subject to associate the spoken foreign word with an English word, the keyword, that sounds like some part of the foreign word; the second stage requires him to form a mental image of the keyword interacting with the English translation" (Atkinson and Raugh 1975: 126).

For example, if a learner wants to master the Indonesian word *pinna*

which means *door*, he would think of an English word (the keyword) which sounds like *pin* or a part of *pin*, for example, *pin*. Then he would form a mental image of a pin and a door interacting with each other.



The keyword technique has been tested in the learning of Russian (Atkinson 1975; Atkinson and Raugh 1975), Spanish (Raugh and Atkinson 1975; Fuentes 1976), and German (Ott and others 1973). With one exception (Fuentes 1976), the keyword technique gave results which were superior to other techniques, such as rote rehearsal, both with regard to short-term retention and long-term retention (from two to six weeks). However, in his experiment Fuentes found no significant differences between learners who composed their own keywords, learners who had keywords supplied, and learners who used rote learning. Fuentes followed up his experiment with a questionnaire and found that some subjects in his experimental groups did not use the keyword technique for every word pair in the experiment. Also, some of the subjects in the control group were using a mnemonic technique similar to the keyword technique (Fuentes 1976: 2694-A):

Apparently, successful second-year foreign language students spontaneously use mnemonic techniques closely akin to the keyword as a matter of course. In addition their learning repertoire includes other approaches such as the use of root words and occasionally rote. Those Ss who were most successful were selective in their use of several learning strategies. They were able to apply them to the appropriate words with good results.

Fuentes (1976) also found that "The keyword technique proved to be neither harmful nor beneficial to the pronunciation of second-year Spanish students" (p. 2694-A).

Thus the keyword technique, while being very effective for learning foreign vocabulary, is best considered as only one of several learning techniques that can be used to master foreign vocabulary. Other possible techniques which try to develop both form and meaning associations are the use of analysis into affixes and roots, and mnemonics like "A *pin* (door) is used for going *into* something" (i.e. the partial homophony of *pin* and *into*). The general principle of the "levels of processing" theory (Craik and Lockhart 1972) is that the more that words are analyzed and are enriched by associations or images, the longer they will stay in the memory. Although the keyword technique seems rather bizarre at first sight, its effectiveness lies in its association of both formal and meaning elements of the new word by the use of aural and imagery cues. The analysis of words into Latin affixes and roots is similar to the keyword technique in this association of form and meaning.

In general, the experiments in this section have shown the value of modifying the technique of rote learning of a simultaneous presentation of a word form and its meaning. Fuentes's (1976) findings indicate that each learner can profit from a range of techniques that he can apply flexibly to the words he will learn. For receptive learning, these techniques should include the following.

- (1) Significant and striking ways of denoting the meaning of a word form, either with translations, images or pictures, related foreign words, or foreign synonyms or definitions.
- (2) Home-made sets of small cards with the foreign word form on one side and the meaning on the other. These cards can be slightly smaller than the width and length of a matchbox and can be made from medium thickness drawing paper. They can be carried around and studied whenever there is a free moment. Words which prove difficult can be placed on top of the others for the next learning session.
- (3) Mnemonic techniques like the keyword technique.
- (4) Analyzing words using the commonest Latin and Greek prefixes and suffixes. This is similar to the mnemonic techniques except that previous learning of the prefixes and suffixes is needed. A list of the most useful prefixes can be found in Stauffer (1942).

Seibert (1945) has convincingly demonstrated the high possibility of success in guessing the meaning of words from context. Trained learners can guess between 60% to 80% of the unknown words in a text using only context

clues. Learners should be given guidance and practice in the techniques of guessing from context because this will be valuable both in learning new words and in establishing words already studied in lists.

Technique: productive learning

Productive learning means learning items to use in speaking or writing. Stoddard (1929) and Crothers and Suppes (1967) compared productive learning with receptive learning. In the receptive learning tests in the experiments, the learners saw the foreign word form and gave its English translation. In the productive learning tests, they saw the English word and had to produce the foreign word form. In both experiments there were relatively fewer correct answers in the productive tests than in the receptive tests. Productive learning thus requires more time than receptive learning. Experimenters have investigated whether using pictures in place of translations, and saying or writing the foreign words while studying them improves productive learning.

Pictures or words?

Experiments involving pictures as a means of learning productive vocabulary indicate that questions like "Which are more efficient, pictures or translations?" are not appropriate. Pictures and translations have different effects and so should be regarded as complementary sources of meaning rather than alternatives. Thus, for receptive learning, Lado, Baldwin and Lobo (1967) found that simultaneous presentation of both a written and spoken translation *accompanied* by a corresponding picture was superior to other arrangements and alternatives. Experiments by Kopstein and Roshal (1954) and Deno (1968) while favouring pictures over translations noted the differing effects of pictures and translations under various learning and testing conditions. Deno concluded that in his experiment "the pictures ... are not encoded in the same manner as the words" (p. 206).

A further argument for regarding pictures and translations as complementary is that different learners prefer different sources of meaning. Kellogg and Howe (1971) compared pictures and translations for learning Spanish words. They concluded, "Learning was significantly more rapid with the pictorial than with the written stimuli" (p. 92). This however did not apply to all learners. Twenty-five out of eighty-two learners learned faster with words than with pictures. So, although on the average picture stimuli gave better results than words, a significantly large group within a class learned better from words. A teacher would achieve better results for all his learners by providing both words and pictures rather than by providing the form favoured by the majority.

Active learning versus silent learning

According to Seibert (1927) silent rote repetition of vocabulary lists is

not the most efficient way of learning. If foreign vocabulary is to be learned for productive purposes, that is the learners are required to produce the foreign words, then saying the words aloud brings faster learning with better retention. Seibert (1927) found that the result obtained by studying aloud was, in every case, far better than the results obtained by studying aloud with written recall and by studying silently. Seibert also measured the time required for relearning after two, ten, and forty-two days. "Except in the first learning of the vocabulary, there is a constant saving of time in relearning by the last two processes [learning aloud and learning aloud with written recall] over the silent learning. However in the last re-learning [after 42 days], the results obtained [by learning aloud] are far better than those obtained by the two other [processes]" (p. 306). Gershtman (1970) also found that writing had no significant effect on learning.

In the section on grading it was noted that for productive learning, translation-foreign word form pairs are superior to foreign word form-translation pairs. The research on techniques for productive learning indicates that wherever possible the translation should be accompanied by a picture, and that the foreign word form should be spoken by the learner while studying it.

Interpreting experiments

A foreign-language teacher needs to be cautious when interpreting experiments on vocabulary learning. There are three reasons for this. First, many experiments involving foreign vocabulary learning do not have the investigation of such learning as their main aim. Second, some experimenters fail to appreciate the complexity of vocabulary learning and do not control important variables. Third, findings of significance to the language teacher are sometimes hidden behind badly expressed explanations and rationales, and misleading statistics. Let us look at each of these in turn.

About one third of the experiments discussed in this review were not designed specifically to provide data to guide the foreign language teacher in teaching foreign vocabulary, but were designed to test some more general educational principle. So, the use of foreign vocabulary as the learning material in the experiment was incidental to the aim of the experiment. For example, Fry's (1960) experiment was a study of the effectiveness of different types of response modes during learning from a teaching machine. Webb's (1962) experiment studied the effect of prolonged learning on learning rather than the capacity of learners for mastering foreign vocabulary. In addition, some experiments involving foreign vocabulary learning do not investigate procedures that are relevant to learning foreign vocabulary and they sometimes loosely use terms that have more restricted meanings in the field of language learning. Fry's (1960) experiment is a good example of this. He compared two procedures for learning foreign vocabulary. In one procedure the learners saw an English word and then chose the corresponding

foreign word from a multiple choice set. In the other procedure the learners saw an English word and wrote the corresponding foreign word. As a part of his conclusion, Fry stated, "There is a possibility that multiple choice training items are more efficient if recognition is the only criterion for learning" (p. 474). But, recognition in foreign language learning means being able to recall the meaning on seeing or hearing the foreign word. Recognition for Fry is choosing a foreign word from a given set when seeing an English word — a situation which never occurs in foreign language use. Thus it is necessary to see if experiments are relevant to foreign language learning before accepting their conclusions.

Because of the complexity of foreign vocabulary learning, experiments need to be carefully controlled if their findings are to be meaningful. Ironically, it is the experiments that are not intended to be studies of foreign vocabulary learning, but rather those looking at issues of wider educational significance that are usually the best controlled. Some experiments which were however designed to study foreign vocabulary learning were well designed and controlled. In the experiment by Kellogg and Howe (1971) for example, which compared the effects of pictures and written words as stimuli, the variables of pronounceability, familiarity, and learning time were controlled. The pictures were pre-tested to ensure they were not ambiguous. A long term retention test was given. The study by Holley and King (1971) on the other hand was not as well controlled. This study compared the effects of three forms of glossing (bottom of page, side of page, appended word) at two different new word to known word densities. The learners were allowed twenty minutes to read and study the material. The material was 750 words long thus allowing the learners to read at a minimum speed of thirty-seven words per minute. As a slow reading speed for foreign language material containing known words is about 100 words per minute, the learners obviously had plenty of time to make use of various learning strategies that would obscure the possible effects of the different forms of glossing. There was also no control group who read the passage without the help of any glosses.

A well-controlled experiment would need to consider the following factors.

- (1) Variables affecting vocabulary difficulty such as previous knowledge, pronounceability, familiarity, part of speech, imageability (see Higa 1965).
 - (2) The learners' ability and willingness to use the experimental procedure.
- Fuentes (1976) found that some learners in his experimental groups were not using the experimental technique to learn the vocabulary, and some learners in the control group were spontaneously using a technique very similar to the experimental

technique. Lado, Baldwin and Lobo (1967) and Gershman (1970) also encountered the same problem. Covert activity may be more effective than the overt responses made by the learners. Some covert activity can be controlled by restricting learning time. Requiring the learners to make overt responses may also limit unwanted covert activity. Lado, Baldwin and Lobo's (1967) experiments using mnemonics may well have yielded non-significant results because learners were not shown the rationale behind each procedure.

- (3) The relationship of testing to learning. Stoddard (1929), Kopstein and Roshal (1954), and Fry (1966) found that different types of tests gave different results depending on their relationship to the learning procedure. If the type of test differs from the learning procedure, then this is likely to affect the results.

- (4) Long term retention. In some experiments only short term retention was tested. In language learning, retention needs to persist for at least long enough for learning to be reinforced in a following lesson. Long term retention of at least twenty-four hours, and preferably a week or more should be checked. If an experiment does not take account of the above factors, then its conclusions should be viewed with suspicion.

A well-controlled experiment may give a misleading impression because of the way its results are presented. The experiments on learning in context for example reveal a very wide range of definitions of the term *context*. None explain how context is thought to affect learning. Crucial terms like *context* need to be defined and their supposed function explained if a foreign language teacher is to be able to make use of the findings of the experiment. The demands of the classroom require the teacher to be flexible and thus a duplication of an experimental procedure is not always possible. If however the experimenter explains what he considers to be the critical features in his experimental procedure, teachers may adapt his procedure for learning in the classroom. The experiments on the keyword technique (especially Ott and others 1973) are good examples of how the rationale of the experimental procedure should be explained.

Finally, with the current emphasis of individualized learning in foreign language teaching, the findings of an experiment should not be hidden behind averages. For example, although Kellogg and Howe (1971) concluded that "Learning was significantly more rapid with the pictorial than the written stimuli" (p. 92), almost one-third of the learners learned faster with words than pictures. Such information is valuable for a foreign language teacher and can be used to plan learning activities.

Future research

Most experimental studies of foreign vocabulary learning have focused on, or at least involved, the learning of word pairs. However, one of the main contentions of this survey is that this can be only a part of the process of vocabulary learning. Future research needs to look at vocabulary learning with a richer idea of what it means to know a word and of how words are learned. In such studies, learning word pairs may still play a part. For example, how does the initial learning of words by the word pair approach affect the later development of knowledge of that word? When is the best time for word pair learning to take place, when a word is first met or at some later stage? Can beginners in a foreign language proceed immediately from learning a list of word pairs to reading a specially prepared book which is written using only those words and has a minimum of grammar difficulties? In addition, questions like the following need to be answered: How can learners most efficiently develop the skill of guessing word meanings from context? Which words are most efficiently learned from lists and which may be inferred from context?

In spite of numerous experiments on learning word pairs, there is as yet no general theory of learning word pairs. In this survey I have tried to fit Craik and Lockhart's (1972) theory of levels of processing to some of the material. Until some general theory like this is developed and tested, our knowledge of learning word pairs will consist only of isolated rules of thumb. It is not enough to know that certain techniques help some learners and are more efficient than other techniques. We need to know why. How does context help learning (if it does at all)? Do techniques like the study of Latin affixes and roots and imagining help learners because they work at deeper levels than rote repetition? Does training in the use of vocabulary learning techniques help learners? If it helps, why does it help? The answers to these questions and others like them will help to place word pair learning in a theoretical framework that can rise to new techniques and a more rational approach to vocabulary learning in the foreign language classroom.

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