THE USE OF VERBAL AND IMAGERY MNEMONICS IN SECOND-LANGUAGE VOCABULARY LEARNING

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This paper provides a critical look at the use of mnemonic associations in vocabulary learning. The paper begins with a definition of mnemonic devices—that is, techniques for converting material to be learned into a form that makes it easier to learn and remember—and focuses on verbal and imagery mnemonics, whereby a word, a phrase, or a sentence and visual imagery serve as mediator between what is known and what is to be learned. Particular attention is given to the keyword approach, in which there is both an acoustic link between a native-language word and the second-language word, and an image of the keyword interacting with the native-language word or phrase. Contentions are discussed concerning both the learning of words through verbal and imagery mnemonics and their subsequent retrieval. Attention is also given to research issues in need of investigation.

Language learners sometimes, if not often, feel that they cannot remember words that they attempt to learn. Such words are probably not committed to memory effectively, and if so, are not stored in such a way that they may be easily retrievable when necessary. In order for learners to go about deepening their receptive or productive

This is a revised version of a paper presented at the 18th Annual TESOL Convention, Houston, Texas, March 6–11, 1984. I would like to acknowledge Joel Levin, Bob Cooper, Paul Mears, Joan Rubin, Paul Nation, Tamar Sivan, Barry Taylor, and four anonymous reviewers for their helpful comments on earlier drafts of this paper. I would especially like to thank Andrea Verete for her assistance in the revision of the article.

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command of vocabulary, they must first remember the words well enough to recognize them or be able to make an attempt to use them in conversation or in written language.

There are various ways of attempting to commit new vocabulary to memory: (a) rote repetition: repeating the word and its meaning until it seems to have stuck; (b) structure: analyzing the word according to its root, affixes, and inflections as a way to understand its meaning; (c) semantic strategies: thinking of synonyms as to build a network of inter-linking concepts, clustering words by topic group or type of verb, or linking the word to the sentence in which it was found or to another sentence; (d) the use of a mnemonic device in order to create a cognitive link between an unfamiliar foreign-language word and its translation by means of a mnemonic mediator.

The purpose of this paper is to provide a critical look at the use of verbal and imagery mnemonics in second-language vocabulary learning. The paper will define what is meant by mnemonic devices and compare them to other approaches to vocabulary learning, consider issues of contention regarding the committing of words to memory using mnemonics and the retrieval of such words or their meanings, and suggest areas for further research.

MNEMONIC DEVICES IN VOCABULARY LEARNING

Mnemonic means “aiding the memory” (Higbee, 1979). Mnemonic techniques “involve physically transferring to-be-learned materials into a form that makes them easier to learn and remember” (Bellezza, 1981, p. 61). Such techniques involve some actual recoding of material, whereby a word, phrase, or visual image acts as a mediator for remembering a given word. This recoding distinguishes them from techniques lacking such recoding—such as rote repetition, processing words according to their structure, or processing words semantically.

Although mnemonic devices have been used for centuries as a memory aid, controlled study of mnemonics has taken place only over the last twenty years (Bellezza, 1981; Paivio & Desrochers, 1981; Pressley, Levin, & Delaney, 1982). A few empirical studies of mnemonics appeared in the late 1800s and early 1900s, with visual imagery mnemonics having their roots in that period. The early studies that were conducted were generally anecdotal in nature, without experimental controls. In fact, mnemonics were often looked upon as gimmicks and therefore not worthy of scientific study until the 1960s, which marked the return of cognitive processes as a legitimate area of research (Higbee, 1979).

One class of mnemonics, mentioned only in passing in this paper, is that referred to as organizational mnemonics (Bellezza, 1981). These include peg-type and chain-type mnemonics. In the case of peg-type mnemonics, vocabulary items are hooked to pegs (i.e., to pictureable words that translate into numbers by means of a consonant-number code) (Paivio & Desrochers, 1979). With the chain type, words are remembered by their use in a story, by their being linked together through a series of visual images, or by their use in rhymes.

Another class, and the focus of this paper, includes verbal and imagery encoding mnemonics, whereby verbal material (e.g., a word, a phrase, or a sentence) and visual imagery serve as cognitive mediators (Bellezza, 1981). A verbal mnemonic for a Spanish speaker learning the English word chalk, for example, could be choca (strikes), as in La tiza se choca con la pizarra (The chalk strikes the blackboard). The Spanish mnemonic has a sound similar to that of the target-language word and is linked in meaning through the sentence that is created. This mnemonic would also be of the imagery type if the learner were to generate a clear image of, say, a teacher striking the blackboard with a piece of chalk. Such mnemonic devices call for the learner to perform a deep or extensive cognitive analysis of the word, in this case, through finding a mnemonic association which in turn increases the duration and strength of the memory traces (Craik & Lockhart, 1972; Craik, 1973). The rate of forgetting is thus a function of the lack of depth of analysis. The form of mental activity performed on material consists of creating images or putting them into mental settings or stories, which contributes to the formation of relevant connections that improve retrievability (Tulving & Pearlstone, 1966; Norman, 1976).

The particular imagery mnemonic as used in foreign-language learning is referred to as the keyword mnemonic. This mnemonic technique operates as follows: A foreign word (the nominal stimulus) is recoded into a more familiar stimulus, the keyword (the functional stimulus). This keyword—a native-language word or phrase—is similar in sound to part or all of the foreign-language word. This stage is often referred to as the acoustic link (Atkinson, 1975). Next, an interacting image is created between the recoded or functional stimulus, the keyword, and the native-language word or phrase. This second stage is referred to as the imagery link. The intended result is that an encounter with the foreign word will evoke the keyword, which in turn reevokes the imagery link, and finally the native-language equivalent can then be retrieved from this interaction or imagery link (Atkinson, 1975; Levin, 1981). For example, in order to learn the Spanish word pato (duck), English-speaking learners create or are furnished a picture of a duck wearing a pot (the keyword) on its head. When they are asked the meaning of pato, this evokes the keyword pot, which in turn reevokes the image of the duck wearing the pot on its head (Atkinson, 1975).

If the word being learned is abstract, it is suggested that it be recoded by an acoustic link into a more concrete word or concept in the native language, which in turn is linked by an image to the more abstract word. For example, in order to learn the English word anger, a French-speaking learner could select as the keyword en guerre (at war) and imagine a general waging war angrily. Hence, when given the word anger, the learner first makes the acoustic link to en guerre and then calls up the image of the general angrily waging war, from which the meaning colère (anger) is to be extracted. (In this example there is also a semantic link between the keyword and the target word, not just an acoustic one.)

If the learner wishes to produce the foreign word when given the native equivalent, the keyword procedure is not as straightforward as with supplying the native equivalent (Pressley & Levin, 1981). The learner has to link the native-language word to the imagery and/or verbal material containing the keyword. The foreign-language word is then generated from the keyword. The fact that there is no direct path from the keyword
to the desired response may lead to partial or incomplete recall (Levin & Pressley, 1983). For example, if French-speaking learners wished to produce the English equivalent for the native colère, they would need to envision the general angry waging war. Then the native-language keyword, en guerre, would emerge from memory by association with the picture. Finally, with the keyword as a link, the learner would arrive at the English anger. The en guerre-anger connection needs to be well-integrated in order for the English word to be produced without error. In fact, several experiments have confirmed that the keyword method can facilitate recall of vocabulary items when students are given a definition of the word if the items are well-integrated in semantic memory. Otherwise, the definition might elicit only the interacting image, which leads to the keyword but not to the recall of the word itself (Pressley, Levin, Kuiper, Bryant, & Michener, 1982).

It has been suggested that the imagery in imagery mnemonics be vivid and clear, but it has even been claimed that images should be ridiculous, bizarre, or ludicrous (Yates, 1966; Lorayne & Lucas, 1974; Higbee, 1979). Evidence for this claim is based on research by Persensky and Senter (1970), which suggested that instructions to produce bizarre mental images improved recall performance when compared with standard learning instructions. In the history of mnemonic instruction—which once belonged to the discussion of rhetoric—the production of bizarre and even ridiculous images has been encouraged (Yates, 1966). Yet studies whose purpose was to separate the effects of bizarreness from those of imaging (e.g., Wollen, Weber, & Lowry, 1972) have failed to find any additional effect of constructing bizarre images over and above the benefit of using mental imagery. Wollen et al. concluded that positive results attributed to the use of bizarre imagery were actually due to the confounding of bizarreness of image with the interaction between the cognitive mediator and the target item.

The Keyword Mnemonic Technique Compared to Other Approaches

As a means of remembering words, the keyword mnemonic technique has been found to compare favorably with other methods, such as that of using a meaningful context, finding the root word, or learning synonyms, both in first-language and second-language vocabulary learning (Pressley, Levin, & Delaney, 1982; Levin & Pressley, in press). For example, the verbal keyword method and the imagery keyword method have both yielded better results among American college students learning words in Malay than were produced by a no-strategy control group (Delaney, 1978). In addition, the advantages of a verbal + imagery keyword method as opposed to rote learning were found to last over time among American college students learning Russian (i.e., 30–60 days) (Atkinson & Raugh, 1975). The positive results of numerous studies led Pressley, Levin, and Delaney to conclude that “keyword method effects are pervasive and of impressive magnitude” (1982, p. 71).

In identifying the benefits of mnemonic devices, Levin and Pressley (in press) point out that “... the theoretical strength of memory strategies resides in the memory side of vocabulary acquisition whereas the theoretical strength of semantic strategies resides in the comprehension side.” It was found, for example, that among college students learning low-frequency nouns in their native language (English), students using one of four varieties of mnemonic strategies outperformed those who used nonmnemonic strategies (i.e., an imagery strategy, synonyms, a read-and-copy approach, multiple context, and a control) (Pressley, Levin, Kuiper, Bryant, & Michener, 1982). The mnemonic strategies produced from 47 percent to 63 percent recall, whereas the nonmnemonic strategies only produced 23 percent to 28 percent recall. With sixth-grade learners of Spanish foreign-language nouns, it was found that use of mnemonic techniques substantially facilitated recall of English equivalents of the foreign-language words in comparison to even the most effective of the nonmnemonic approaches (Pressley, Levin, Hall, Miller, & Barry, 1980).

A problem with generalizing the results of such research to the actual classroom is that there are differences between vocabulary learning behavior under laboratory-like conditions and learning behavior in a natural context. Under experimental conditions, for example, subjects are often not actual learners of the given language, and even if they are, they may not be requested in the experimental tasks to learn words they have any desire to learn (e.g., Raugh & Atkinson, 1975). In recognition of this problem, there have also been a series of studies conducted with authentic language learners in intact classroom settings. The results from such studies have been mixed. Prior to the Atkinson and Raugh (1975) studies, Johnston (1974) taught high-school students general mnemonic methods (the essentials of the keyword method). Students were given a large number of vocabulary items to learn in a classroom setting. Johnston used both mnemonic methods and no-strategy controls. This study provided pre-Atkinson evidence that mnemonics were efficient aids in building vocabulary.

Fuentes (1976) studied second-year high-school foreign-language learners in learning short lists of Spanish vocabulary representing different grammatical classes. The students learned five words a day at their own pace over a six-week period. The keyword method was compared to repetition and context controls. There was no significant difference in performance across groups on a recall test six to eight weeks later. In a study without a control group, Singer (1977) found keyword mnemonics to be beneficial as a motivating factor in the classroom. She taught the keyword method to several junior-high French classes and tested them on recall after ten days. She reported that there was 80 percent or better recall of items.

Levin et al. (1979) ran a series of six experiments, four with high-school learners and two with elementary school children. The high school studies included paced and non-paced treatments. The keyword technique was not found to facilitate learning. The conclusion that the investigators reached was that the keyword mnemonic could not yet be translated directly into practice in the high school foreign-language classroom. The two experiments at the elementary level, involving two trials in learning Spanish vocabulary, resulted in greater success for those learning through the keyword method in comparison to the controls. Merry (1980) also found the keyword method to be
effective using elementary-aged pupils in a paced condition. In contrast to Fuentes' experience with older learners, she found that her younger pupils learned all grammatical classes of words successfully.

Willerman and Melvin (1979) investigated the benefits of the keyword approach in the second semester of a college French course. The students had to learn two 20-word lists (different word classes), with one half assigned to the keyword condition and one half to the control group. The groups were tested for written recall of word definitions and recall of the words themselves. The keyword group did not perform significantly better either at the time of learning or one month later. Finally, Delaney and Raney (1981) also did a series of studies with learners of Russian, Hebrew, and Navajo and found the keyword mnemonic technique to be no more effective than other methods for remembering vocabulary.

There appears to be a difference of opinion regarding whether to consider seriously findings such as those from the above-mentioned empirical studies of the keyword method used in intact classrooms. Some reviewers emphasize the non-experimental aspects of these "natural-environment" studies and thus question their validity (e.g., Levin et al., 1979; Pressley, Levin, & Delaney, 1982), whereas others appear to accept them as valid and worthwhile, given their obvious limitations and obstacles (Paivio & Desrochers, 1981). The general consensus among the researchers cited is that classroom studies encounter problems of student attention, motivation, and prior patterns of vocabulary learning that interfere with experimental work.

A general problem with research comparing different vocabulary learning techniques is that learners may not adhere precisely to a prescribed method. In the keyword mnemonics research of Ott, Blake, and Butler (1976), for instance, it was found that subjects had a tendency to compensate for and violate experimental constraints—for example, using mnemonics to learn vocabulary when not requested to do so. By the same token, Bellezza (1981) reported that subjects in several studies did not necessarily use mnemonics when they were supposed to (only 25% of the experimental subjects in one study and 66% in another), and control subjects used them when they were not supposed to (39% of the control subjects in one study). Hall, Wilson, and Patterson (1981) also conducted a keyword study in which the control subjects were asked to report how they remembered words. Nearly all of them reported having used some variety of the keyword method.

One way that researchers have sought to avoid control subjects' deviations from the expected vocabulary learning behavior is by pacing the experiment so as to limit the spontaneous use of associative strategies on their part (Levin et al., 1979). Results from studies where learning of words is paced are mixed. Both Levin et al. (1979) and Hall et al. (1981) found that the non-pacing of older learners (high-school and college levels respectively) favored the control groups over the keyword groups or showed no significant difference. In their fourth experiment, Hall and his colleagues found that when paced, the keyword group did outperform the control group.

The likelihood that subjects will deviate from experimental guidelines depends in part on their own individual learning styles. Some learners are more predisposed to use a technique such as mnemonics than are others, regardless of how they are instructed to learn. Some learners conjure up visual images more easily than others (Bellezza, 1983; Sede, 1983). Those who have difficulty experiencing visual imagery may be successful at using verbal mediators to create a cognitive representation of new information (Paivio, 1971). Looking at the issue of cognitive strategy training more broadly, it has been pointed out that age, level of ability, prior knowledge of material to be learned, and metacognitive knowledge about the learning process may all influence the success of such training (Peterson & Swing, 1983). In other words, more able and/or older learners may have developed more sophisticated and effective cognitive strategies which would in turn be of benefit in learning vocabulary through the use of mnemonics.

**Verbal Mnemonics Compared to Imagery Mnemonics**

Research investigating performance differences between verbal and imagery mnemonic devices has found that there is a slight advantage in favor of imagery mnemonics over verbal mnemonics (Pressley, Levin, & Delaney, 1982). The advantage for imagery mnemonics depends in part on the words involved because certain abstract words may be difficult to link to a picture through a keyword. Pressley, Levin, and Miller (1981b) found that fifth-grade school children learning ten concrete and ten abstract nouns in Spanish were just as successful learning concrete nouns when they used the imagery as when they used the verbal mnemonic approach. On abstract nouns, however, the group using verbal mnemonics was more successful than the one using the imagery technique.

Age must also be taken into consideration in comparing performance on verbal versus imagery mnemonics because younger elementary school children have not been found to be adept at generating visual images, whereas they may be quite capable of constructing facilitative sentences (Rohwer & Bean, 1973; McCabe, Levin, & Wolf, 1974). A study by Pressley, Levin, and McCormick (1980), for instance, found that second graders as well as fifth graders experienced large Spanish foreign-language vocabulary gains when they made up a sentence in which the keyword and the English translation were "doing something together."

A third factor is that of learners' fluency. Learners with high verbal fluency have been found to benefit more from verbal mnemonics than learners with lower verbal fluency. This proved to be the case in a study in which the verbal mnemonics consisted of constructing a meaningful sentence or phrase linking a part of a foreign word (in Malay) to the definition of the foreign word. Imagery mnemonics, on the other hand, have proven effective regardless of the verbal fluency or spatial ability of the learner (Delaney, 1978). Thus, it appears that a non-imagery verbal variation of the keyword may be more effective for learners with higher verbal proficiency, whereas the use of an imagery keyword mnemonic appears to benefit all learners equally.

**Learner-Generated vs. Teacher-Supplied Mnemonics**

Given the time and effort involved in devising keyword mnemonics for learners in experiments, the issue has arisen as to whether learners can effectively generate such
mnemonics by themselves. It has been shown that young children (first and second graders) may have difficulty inventing good mnemonic links. Given individual differences in imagery ability, it has proven necessary to display line drawings to young children during the imagery stage rather than letting the learners design their own images. Older children (sixth graders) have been able to think up their own images. Children apparently develop the ability to generate verbal mnemonics before imagery mnemonics, as noted in the findings from second and fifth graders learning simple Spanish vocabulary mentioned above (Pressley, Levin, & McCormick, 1980). It has also been found that in native-language vocabulary learning, fifth graders with larger vocabularies may benefit as much from generating their own keywords as from having the keywords provided (McGivern & Levin, 1983).

In the case of adults, it has been found that they do as well when generating their own keywords plus interactive images as they do when they are supplied this information (Pressley, Levin, & Delaney, 1982). Pressley, Levin, Nakamura, Hope, Bispo, and Toye (1980) found, for instance, that in the learning of 30 concrete Latin words, there was no difference between the performance of those subjects provided keywords and those who had to generate their own. Unfortunately, most experiments are conducted using vocabulary items for which keywords can be readily generated. Levin and Pressley (1983) speculate that supplying keywords for the learning of vocabulary items containing less obvious keyword possibilities would be helpful.

The Nature of Associations Generated by Learners

Most studies in which learners generate their own mnemonic associations have not tended to discuss the nature of the associations that the learners actually generate (e.g., Pressley, Levin, Nakamura, Hope, Bispo, & Toye, 1980). One exception were the studies conducted with English-speaking learners of Hebrew in Israel, which included such information. In one study (Cohen & Aphek, 1981), beginning, intermediate, and advanced learners selected from a Hebrew text a series of words unfamiliar to them. Then they were instructed to learn these words “however they wanted to.” In this study, then, the learners not only studied words relevant to a genuine learning task (as opposed to words designated by experimenters), but also selected their own individual words. It was found that students did, in fact, differ slightly in terms of the words that they chose to learn formally.

If the learners used some kind of association, mnemonic or other, they were asked to describe it briefly. Then they were given a series of receptive and productive tasks involving their own individual word lists over a 100-day period. Altogether, nine types of associations were reportedly used by these learners—the first five being mnemonic and the last four being nonmnemonic (i.e., without the recoding of the foreign-language word into another, more familiar word or phrase) (see Table 1).

In a follow-up study with similar students of Hebrew (Cohen & Aphek, 1980), training was provided in how to generate associations, both mnemonic and nonmnemonic. The learners once again selected the words that they wished to learn, but this

<table>
<thead>
<tr>
<th>Table 1. Types of associations used by students</th>
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<td><strong>Mnemonic Associations</strong></td>
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<tr>
<td>1. Associating Hebrew words to English words with a similar sound:</td>
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<td>memeleh (he buries) to hare</td>
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<td>lazzu (to move) to snooze</td>
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<td>imunim (training) to ammunition</td>
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<td>2. Associating Hebrew words with other Hebrew words by sound:</td>
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<td>tsva'a (army) to tesha (leave)</td>
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<td>rsequ (street) to raxok (far)</td>
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<td>ramzor (street light) to or (light)</td>
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<tr>
<td>3. Associating one part of a word to a Hebrew word by sound and meaning, and the other part to an English word by sound and meaning:</td>
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<td>benatayim (meanwhile) to ben (between) and tagim to time*</td>
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<tr>
<td>4. Associating a Hebrew word to an English phrase by sound and meaning:</td>
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<td>benatayim (meanwhile) to been a long time</td>
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<tr>
<td>5. Associating a Hebrew word by meaning to a word in a third language:</td>
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<td>tox (inside) to Yiddish tuchus (backside)</td>
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<tr>
<td><strong>Nonmnemonic Associations</strong></td>
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<tr>
<td>6. Associating the word with another Hebrew word according to structure:</td>
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<td>lifhey (before) to lifaim (sometimes)</td>
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<td>seder (order) to lesader (to put in order)</td>
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<td>7. Associating by one or more letters:</td>
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<td>maskit (truck) by m in that vehicles often begin with m in Hebrew</td>
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<tr>
<td>8. Associating the word with a frequently seen sign:</td>
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<td>le'atsor (to stop) with the sign atsor (stop) in buses.</td>
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<tr>
<td>9. Creating a mental image of the word's referent</td>
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</table>

*Actually, this association is partially nonmnemonic because ben and ben are also a structural relationship.

Table 1. Types of associations used by students


time they were specifically asked to generate an association for every word to the best of their ability. They were provided with a list of suggested means of association reflecting the approaches that learners in previous studies reported using most frequently. The first two types of associations on the list used some mnemonic mediating device, and the remaining six were nonmnemonic:

1. linking the word to the sound of a word in the native language, in the language being learned, or in another language
2. linking the word to the meaning of a part or several parts of the word (e.g., nipax [appendix] to pax [trash can], in that an appendix to a paper is a convenient place to dump less important material)
3. noting the structure of part of the word (e.g., the root or an affix) or all of it
4. placing the word in the topic group in which it belongs
5. visualizing the word in isolation or in a written context
6. linking the word to the situation in which it appeared
7. creating a mental image of the word's referent
8. associating some physical sensation to the word

In this latter study, it was found that the most popular technique selected by students was a nonmnemonic association: noting the structure of part or all of the word (ap-
proximately 25% of the associations). It also appeared that the more words learners knew in the language—and therefore the more they knew about how words were structured—the more likely they were to generate structural associations. However, if words had roots that were not easily identifiable or had a complex morphological structure, the learners had difficulty generating associations for them, such as in the case of the Hebrew word sharrui (in a state of). It is to be remembered that mnemonic keyword approaches are actually intended to be used for those words which do not lend themselves easily to structural or some other form of nonmnemonic association (Levin, personal communication). Student preference for structural associations could be explained in at least two ways. First, Hebrew foreign-language teachers tend to stress structural relations among words because so much Hebrew vocabulary has been created and is still being created on the basis of these structural relationships. Second, the ten-minute training that the learners received was most likely not sufficient to ensure that they would feel comfortable using mnemonic associations.

Research aimed at revealing associational strategies relies on the ability of the learners to provide accurate verbal reports (introspectively and retrospectively) as to what associations they actually generate and use over time. In the Cohen and Aphek studies mentioned above, these descriptions were based on learners' brief written commentaries alongside tasks eliciting receptive or productive use of each of their selected words. It must be noted that learners may, in fact, be performing more complex associations than they are able to (or want to) describe. It is also possible that the learners are in fact using some form of association in cases where they report that they are not, and vice versa. The use of self-report data (i.e., think-aloud protocols, introspective or retrospective self-observation; Cohen, 1984) would provide far more information than did the technique described above.

ISSUES OF CONTENTION

Committing Words to Memory Through Verbal and Imagery Mnemonics

Five issues of contention regarding committing words to memory using verbal or imagery mnemonics will now be considered: (a) learning through translation equivalents, (b) learning only one meaning of words having multiple meanings, (c) learning only one lexical form of the word, (d) dealing with words that lend themselves differentially to keyword generation, and (e) coping with the time demands involved in generating keywords.

The first source of contention deals with whether it is natural to learn all or many second-language words through translation equivalents in the first or another language, especially in cases where no direct equivalency exists (Meara, 1980). It is suggested that in a number of cases learners may do better to learn the word exclusively within its second-language context, without trying to link it to their first language. It is possible to learn a second-language word through a mnemonic keyword or phrase in that language. In other words, there is no need to learn through paired associates across languages. In fact, much of the literature on mnemonics involves work with native-language vocabulary learning where keywords are inevitably in the same language (e.g., Pressley, Levin, & Miller, 1981a). Nonetheless, it appears that learners often seek at least a rough native-language equivalent for a new second-language word before they attempt to learn it, as evidenced, for example, by the notes in student notebooks. Hence, it is likely that even when learning vocabulary through a method that minimizes the use of native language in the classroom (e.g., the Direct Method, Total Physical Response, the Natural Approach, or the Silent Way), learners may still find that they naturally translate a number of words into their first language. In such instances, the use of translation equivalents simply formalizes an already ongoing process.

A second source of contention involves the value of learning only one meaning of a word which may have multiple meanings. It is claimed that the initial formulation of an association may limit the learner's sense of the meaning of the word and of its selectional restrictions (Bellezza, 1981, p. 268). Just as a possible translation equivalent in the learner's native language has a network of emotive meanings, associations, connotations, and multiple meanings, similarly a target word in the second language could be expected to have its own network of meanings. If so, the learner might need to use multiple keywords to fully capture all the various meanings of words with multiple meanings—which would also greatly increase the learning burden.

Initial research in this area has yet to provide definitive answers. Pressley, Levin, Nakamura, Hope, Bispo, and Toye (1980) investigated the issue of multiple meanings for vocabulary words. Fifteen Latin nouns were used and each was assigned three non-overlapping meanings. Two of these meanings were artificial for lack of sufficient words with three real non-overlapping meanings. There was essentially no difference in performance on recall between the group provided keywords and the one generating its own keywords (i.e., in terms of total translations remembered and total number of words for which all three meanings were remembered). Both groups considerably outperformed the control group. The study seems to suggest that it is possible to learn multiple meanings through one keyword, but unfortunately no specific information was given as to experimental procedures (i.e., whether the keywords linked up several of the unrelated words).

It is likely that learners often focus on that meaning of a multiple-meaning word that they perceive as most useful and perhaps rely on the retrieving of that meaning of the word to trigger other possible meanings. A mnemonic device is simply concerned with bolstering the memory strategies for retrieving a word and, say, one of its meanings, not with developing semantic understanding of words (Levin & Pressley, in press). This does not mean, however, that the advocates of mnemonic techniques are unconcerned with developing rich networks of meaning around the vocabulary that is learned. Levin (1981) maintains that mnemonics actually enable the learner to memorize necessary routines more effectively so that the mind can be free to spend time on tasks requiring understanding and reasoning. So, for example, when faced with a multiple-meaning word, the learner could use the mnemonic strategy for the memory side of vocabulary learning while using one of several semantic strategies for the comprehension side (Levin, 1982).
A third contention is that learning just one form of a lexical item by association may not provide adequate grammatical information for successful vocabulary use. For example, learning one form of a foreign-language verb mnemonically may not necessarily provide sufficient morphophonemic clues in order to recognize or produce that verb in other forms (e.g., in another tense, person, number). In point of fact, mnemonic techniques are intended to assist the learner in remembering only the form that is being learned and do not provide a solution for the problem of mastering all the forms of the word. Of course, most direct vocabulary-learning techniques are subject to the same limitation. Thus, with regard to the last two contentions, we see that mnemonic associations are intended as an aid to memory, not as a panacea for full mastery of the semantic and grammatical properties of words.

A fourth contention is that success in using keywords depends on the nature of the words being learned and on the nature of the keywords used. With respect to the difficulty of the target words, for example, nouns have been found to be the easiest to learn through the keyword approach, then verbs, and then adjectives (Paivio, Yuille, & Madigan, 1968; Atkinson, 1975; Raugh, Schupbach, & Atkinson, 1977). With respect to problematic keywords, one study suggested that some words were better learned without using the keyword method, in part because the supplied keywords were difficult to learn (Atkinson & Raugh, 1975). Such studies do not provide information as to criteria for selecting the keywords and setting up the interacting imagery.

Supplying keywords to learners may not only have the drawback that suggested options may clash with individual learner preferences, but also that certain keywords may simply not be viable across whole groups of learners. On the other hand, it has been demonstrated that it is not the keyword itself that matters so much as it is the nature of the interaction of the keyword with the word to be learned (Pressley, 1977; Pressley, Levin, & McCormick, 1980). Miller, Levin, and Pressley (1980), for example, demonstrated that young learners (second graders) learned Spanish foreign-language action verbs almost twice as successfully when using pictured keywords provided by the experimenter as opposed to printed ones. In this case, then, the younger learners needed to have the interaction reinforced. Sixth graders, on the other hand, did almost as well with printed keywords as with pictured ones.

A fifth contention is that it takes more time to commit words to memory through a mnemonic link—especially if the learners are generating the mnemonics themselves—than through rote repetition of the word (Bellezza, 1981). Such an argument may seem intuitively salient, yet the research literature does not appear to support this contention. Rather, groups using keywords do better than controls under time constraints, for example, in a study by Pressley and Levin (1978) in which children generated their own interactive images with no time constraint, and in another study by Pressley, Levin, and McCormick (1980) in which second and fifth graders easily and rapidly generated their own interactive sentences.

When learners select material to be used for mnemonic purposes, there may be a mismatch in which they may, for example, be searching for words that

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technique without imagery (Miller et al., 1980). For example, let us say that learners have learned the Hebrew word for cracking, which is petsiah, through the cognitive mediator petsaia (bomb) (an example taken from Cohen & Aphek, 1980). If the link between two Hebrew words is not close enough in the learners’ minds, then they will have difficulty getting beyond the cognitive mediator, assuming they get that far. Actually, we can see one potential reason why receptive use of mnemonics is easier than productive use. When faced with interpreting the word petsiah, learners have the opportunity to hear the acoustic ring of the word and thus link it to bombs and how bombs cause cracking.

A second source of contention is that the retrieval cues used to prompt item recall in mnemonic systems are so different from those used in natural communication that the carry-over to such natural situations would be negligible. Bellezza (1981, 1983), for example, suggests that since learning through mnemonics constitutes an unusual learning context, this may affect recognition of the words later on—when hearing or reading them. Or at least it may be the case that in order to understand the word, the learner is slightly distracted from the message. In other words, the learner may at times have to slip back into the sometimes fantasy realm of the learning context (particularly if the image is ridiculous or even impossible) in order to comprehend the word. This process would be thought to cause some delay in understanding the message.

On the productive side, it could be argued that there would also be some delay in getting the message out, as well as some distraction away from the message, while learners go through the retrieval process (as in getting from colère to anger) in order to use a new word. In a challenge to the contention that memory aids interfere with comprehension and usage, Pressley, Levin, and Miller (1981a) conducted a series of four experiments in which students learned lower frequency English vocabulary either with or without keyword mnemonics and had to relate to these words in a series of tasks commonly accepted as tapping “comprehension” of vocabulary (i.e., two experiments involving judgments of sentence appropriateness in narrowly defined and more broadly defined sentence contexts respectively, performance on a sentence-completion task, and construction of the original sentences). The keyword group outperformed the controls on these measures.

A third source of contention is that the keyword method works best for words with which the learner already has some familiarity (Paivio & Desrochers, 1979). It has been asserted that the keyword approach may best facilitate the retrieval of second-language vocabulary if some aspects of a given target word have already been acquired so that they are available in memory. In other words, it may facilitate recall if the learner has had some prior contact with these words (Pressley & Levin, 1981; Levin & Pressley, 1983). The problem is that many words learners may wish to learn are totally new to them.

A fourth issue of contention regarding the retrieval process concerns the point at which mnemonic links cease to be needed. The question is whether mnemonic devices drop out with continued retrieval of material or whether they persevere and possibly interfere with language use. It has been suggested that eventually a direct link is formed between the second-language word and the first-language translation, and that the learner then only recalls the keyword under special circumstances, that is, when consciously trying to do so or when there is a retrieval failure in the main process (Atkinson, 1975). Levin and Pressley (in press) indicate that there is little research on the durability of mnemonic strategy effects in the vocabulary-learning domain. They suggest that the “mnemonic dependence” issue has not been investigated directly, but since retrieval speeds up over time, either there is a quicker use of the mnemonic or less dependency on it.

The Cohen and Aphek (1980) five-week, longitudinal study set out to investigate what happens to mnemonic and nonmnemonic associations over time by having the subjects do a series of tasks involving their own personalized list of second-language words that they learned using associations. Each time they used a word in some receptive or productive task, they indicated whether their retrieval of the second-language word or its first-language equivalent involved the use of an associational device, and if so, they described it briefly.

In this study, about half the time (46%) the learners reported that for the purpose of word retrieval they used the associational device that was, in fact, their original one. Success at recall was 86 percent in these cases. In 13 percent of the cases, a new association was reported, with a 78 percent average recall rate. It had not been foreseen that students would create new associational devices along the way, but apparently this is part of the storage and retrieval process. The proximity of these new associations to the original ones was not investigated, and could be in future research. It may be that most newly created associations are, in fact, relatively close to the original ones. It was also found that in the cases where an association was no longer used (31%), the success at recall was 61 percent, considerably lower than the 86 percent success rate when using the original association.

These results were still within little over a month from the creation of the associational devices. At least one other study in the literature also had a longer-term assessment of retention—the Fuentes study with high school learners of Spanish, which lasted from six to eight weeks (Fuentes, 1976). What happens to associational devices over longer periods of time still needs to be investigated. It is not clear whether such devices can be expected to slip away naturally once there no longer exists a need for their use in retrieval of words or their meanings.

**RESEARCH ISSUES FOR INVESTIGATION**

The following are some issues that have not as yet been given serious consideration in the research literature. For example, there is a lingering question as to whether successful results obtained under laboratory-like conditions will hold true for a natural context in which learners are called upon to recognize and use the words that they have learned. In fact, the form of assessment most usually found in research studies is that of written tasks. The question remains open as to how well learners can use vocabulary learned through association, particularly when under time pressure to use a word in speech or understand one that they hear in a natural environment.
Another issue in need of investigation under non-laboratory conditions is that of the lag time involved in retrieving a second-language word or its native-language meaning when a mnemonic device is being used. Although the literature suggests that such lag time is minimal under laboratory conditions, it may be that in the real world, when we are not predisposed to call upon such devices, the lag time may be greater—depending on the strength of the mnemonic device, the nature of the word, the language use situation, and so forth. In other words, the wait time demanded of the listener may be greater than that which the listener is willing to afford. If so, perhaps the listener will lose patience and supply a word for the learner—whether the intended word or some other.

In addition, the long-term studies conducted by cognitive psychologists may include a time span of only a week or so. There is room for research conducted over longer periods of time and also for research that is sensitive to the role that mnemonic devices actually play in the retrieval and use of vocabulary on a daily basis. Such investigations would call for the developing of research techniques capable of tapping this kind of information—such as through verbal report from learners (i.e., self-report, self-observational, and think-aloud data; Cohen, 1984).

Other research issues which could be investigated include:

1. a description of the trial-and-error process of self-generated associations, in an effort to learn more concerning efficient ways of generating such associations;
2. information concerning when or whether the keyword “drops out” (such that the learner does not even remember it).

CONCLUSION

The basic question addressed by this paper is whether the conscious use of mnemonic devices can appreciably reduce the burden associated with learning words. Since learners have been found to use some associative memory aids automatically, the question is whether more formal, systematized use of such aids would produce a marked improvement in vocabulary learning. Mnemonic devices present an opportunity for the teacher, the learner, and the researcher to explore the benefits of heightening the learners' awareness about how they currently learn vocabulary and about other options open to them in order to maximize the benefits and minimize the losses—that is, “the words that got away.” If the teaching-learning process were to include the use of mnemonic associations, then exploration could involve having learners themselves become researchers by keeping a record of their individual successes and failures at retrieving words that were learned using one or another of the mnemonic techniques.

Some learners are wary of using mnemonic devices because, as they put it, they have “too many words to learn.” The technique is seen to introduce irrelevant fantasy into the “serious” matter of language learning. Levin (1981) views the generating of mnemonics as actually fostering certain valued skills, such as creativity, because creativity is likely to be involved in constructing mnemonic devices that “work.” This is perhaps akin to the joy that young children have in playing at learning their first language. Once learning becomes more formalized, as in an adult language classroom, such playing with words may well be eliminated. There may well be a place for such play, especially in the learning of vocabulary and especially when there are large numbers of words that the learner wants or needs to learn in order to reach the desired level of proficiency in the language.

Whereas laboratory studies help provide important insights for the classroom, researchers such as Peterson and Swing (1983) insist that classroom implementation of cognitive strategies should not await laboratory solutions for the following reasons:

1. Many questions raised in this paper can only be resolved by research in the natural environment of a classroom.
2. Answers to questions which hold true in the laboratory are not necessarily applicable to the classroom, where there is loss of control of significant variables.
3. Classroom learning is qualitatively different from laboratory learning.

At a time when training of learners in language-learning strategies is gaining momentum (see, e.g., Rubin & Thompson, 1982; Wenden, 1983; O'Malley, Chamot, Stewner-Manzanares, Russo, & Kupper, 1985), it may be particularly fitting to determine whether strategies for remembering words have a role within such training. Such memory techniques would not be intended to replace the other approaches to vocabulary learning, but rather to complement them by providing a link for facilitating retrieval of a second-language word or its native-language meaning. In other words, whereas the use of mnemonics may not be suitable for learning tasks involving reasoning, understanding, and problem solving, they can be used profitably for straight memory tasks (Flugbee, 1979).

Clearly, there are a number of unresolved issues with respect to the use of mnemonic devices in vocabulary learning. There is not as yet enough information about the results of such strategies to recommend that all learners use them. It is likely that certain learners may find it easier to remember some words through mnemonic devices than through other means. It may be that cognitive style preferences play a role in that individuals who are, say, more field independent are more likely to benefit from using mnemonic techniques with certain words. Because some—perhaps considerable—effort will be needed to generate imagery keyword mnemonics, learners of all kinds may save this approach for those words for which simpler associational links are not readily available.

REFERENCES


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(Rceived 14 January 1986)