TESOL M.A. Essay

Use of Mnemonics in Learning Novel Foreign Vocabulary: Help or Hindrance?

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Research has consistently indicated that the use of mnemonic devices substantially enhances higher levels of retention in immediate recall of second language vocabulary words in comparison with other learning strategies. However, the evidence does not explain why the immediate benefits of mnemonic devices fail to extend to long-term retention. In addition, research on mnemonics has drawn mostly on the assessment of phonetic-hospitable languages such as English (as opposed to image-hospitable languages such as Chinese). To examine the use of mnemonic devices more thoroughly, this review will draw on psychological research on memory to discuss the efficacy of mnemonic methods, as opposed to rote rehearsal, in learning vocabulary in phonetic- and image-hospitable languages.

1. Overview: Mnemonic Strategies

Brown and Perry (1991) identified three main types of mnemonic strategies: (1) keyword, (2) semantic, and (3) keyword-semantic. According to Ellis (1997), the core of a keyword method is to create a form and semantic connection between the target word and its translation. A semantic strategy attempts to evoke an association between the target word and the learners' existing semantic systems. A keyword-semantic strategy involves a combination of the aforementioned strategies.

Research has shown that keyword mnemonics is an effective device in accelerating learning speed and in boosting immediate recall of second-language vocabulary. However, other research (e.g., van Hall & Candia Mahn, 1997) indicates that a greater degree of forgetting is associated with the keyword mnemonic strategy relative to a non-mnemonic strategy (e.g., rote learning). Thus, a discussion of the feasibility of keyword mnemonics in learning foreign language vocabulary must consider the various factors affecting the efficacy of the keyword mnemonic strategy in relation to a non-mnemonic learning strategy.

Among the aforementioned three mnemonic strategies, the keyword mnemonic strategy has received considerable attention. It has been well documented in the second language acquisition (SLA) literature with regard to the learning of a variety of languages, e.g., Russian (Atkinson, 1975), Chinese (Wang & Thomas, 1992), and Spanish (van Hall & Candia Mahn, 1997). Typically, the keyword method includes two learning phases. The learner associates the target word (e.g., Chinese "xia", meaning "downward") with a phonologically or orthographically similar word—keyword (e.g., English "shower"). Next, learners have to create an interactive "mental" image in which both the keyword and its L1 equivalent interact (e.g., "the water of the shower pouring down"). Obviously, the mnemonic system does not decrease the load of information to be processed in our language comprehension system; in fact, mnemonic strategies aim at organizing the storage of information more elaborately and integrating the new information with prior knowledge into a cohesive whole. In short, proponents of the keyword method contend that retention will extend longer if the novel foreign word can be associated with a context the learner already knows.

2. Imagery-based Mnemonics in Learning Phonetic-hospitable Languages

Van Hall and Candia Mahn's (1997) discussion of native Dutch speakers' learning of Spanish sheds light on how the efficacy of the keyword method interacts with various variables, such as the concreteness of the foreign word, the semantic qualities of the keyword, and language learning experience. Van Hall and Candia Mahn constructed a 2¥2¥2 factorial design in order to examine the efficacy of the keyword method in learning Spanish in terms of learning condition (mnemonic vs. rote learning) and time (immediate vs. delayed recall). The three factors were language-learning experience (multi-lingual vs. monolingual), concreteness of the target word (concrete vs. abstract), and semantic relatedness of the keyword to the target word (semantically-related vs. semantically-irrelevant). In their view, assessment of all of these variables is needed to gauge the success of keyword mnemonics. In the following section, these variables are discussed in greater detail.

2.1 Effect of Language Learning Experience

Contrary to the common belief that mnemonic strategies will magnify immediate recall for all learners, van Hall and Candia Mahn contend that the keyword method is not effective for either experienced or inexperienced learners. In their study of the performance variation exhibited in learners receiving keyword mnemonics and rote rehearsal, inexperienced learners receiving either of the learning conditions recalled comparable numbers of learned items. For experienced foreign language learners, rote learners' performance surpassed that of keyword learners. Thus, the keyword method does not seem to magnify an experienced learner's retention level. The fact that the retention rate of experienced learners in the vocal rehearsal group surpassed that of the mnemonic group suggests that experienced learners seem to be more sensitive to vocal rehearsal in learning foreign language words. Presumably, their refined phonological knowledge enables them to be more receptive to the vocal information and thereby more able to access the words stored in their memory. The involvement of phonology (vocal rehearsal) seemed to play a more significant role in retaining novel foreign words.

2.2 Effect of Vocal Rehearsal on the Retention of Memory

A strong link between vocal stimuli and memory has been documented in the psychological and psycholinguistic literature (e.g., Conrad, 1964; Salame and Baddeley, 1982). In asking subjects to perform a read-aloud task, Conrad noticed that people tend to confuse words with similar pronunciation (acoustic errors, such as B vs. V) but not words with similar orthography (visual errors, such as T vs. F). Furthermore, very often people have the experience of reading a passage and "hearing" the words echoing in their heads. In fact, this kind of automatic phonological coding, triggered by visual input, does not require actual articulatory movement or verbal rehearsal. The above behavioral evidence shows that people "read" visually presented input and encode it acoustically. In addition, the fact that people can very easily come up with rhymes for words shows that storage of words, whether originally presented visually or acoustically, seems to be organized phonologically in our working memory. Hence, phonological stimuli, as can be obtained in vocal rehearsal, may be made to play a central role in enhancing the level of retention in a phonetic-hospitable language, where the high spelling-sound correspondence might be the key to word decoding.

2.3 Effect of Word Property on Memory

The link between the keyword and novel foreign word is one of the foci in van Hall and Candia Mahn's (1997) research discussing the feasibility of mnemonic devices. They posit that keywords that are semantically-related or phonologically/ orthographically similar to the target foreign words function as optimal retrieval cues to recall concrete words. Additionally, they claim that the semantic status of the keyword and concreteness of the foreign word significantly affect the retention span and the retrieval speed of lexical items. Concerning the effect of word quality (e.g, concreteness) on the retention of learned items, van Hall and Candia Mahn indicate that the creation of an interactive image between abstract words and their corresponding keywords would be less "natural"; the resulting image is therefore more difficult to memorize. Similarly, some psychologists hold that the concreteness of the lexical unit corresponds to the transparency of its meaning, and that concrete words are often tied to particular prototypes. For example, deGroot (1965) claims that semantic codes of concrete words tend to form a prototypical image, and that people are capable of manipulating and elaborating visual or acoustic information of the sensory input based upon the prototypes they possess. A typical example of this theory is that people are able to form a mental image of a cat when they see the eyes of a cat glowing in the dark. We simply need to select a prototypical image and fill in the necessary features of a cat in our working memory in order to decode the visual information. In addition, concrete entities that are semantically transparent also seem to be less culture/language-specific. Thus, when decoding words that are semantically transparent and concrete, visual working memory does not have to encode all of the visual details and retrieval time is reduced.

In addition, the psychological view of the organization of memory has led to a generally accepted concept that abstract words will have longer retrieval times. According to Tulving (1983, 1984), a word's qualities (e.g., transparency of semantic meaning, and concreteness) will influence the specificity of its mental representation in memory. Tulving hypothesizes that different information is processed at different levels of memory--episodic memory and semantic memory--and that the depth of processing presumably influences how people learn and remember. According to his construct, specific and concrete details of life experience are processed in episodic memory. In contrast, perceptions of facts and abstract notions that are identified by a particular context are stored in semantic memory. Semantic memory, according to Tulving, is not a separate independent system, but rather a sophisticated store of information where details of life experience are contextualized into abstract concepts. For example, the description of the waitress that you met this morning is presumably stored in episodic memory, whereas the abstract perception (in semantic memory) of an ideal wife might consist of your impressions of different women you have met on different occasions. Accordingly, learners might need extra cues (e.g., context) and more retrieval time to visualize the mental image of an abstract concept stored in semantic memory, whereas a concrete word might not require any cues to evoke a mental representation. Tulving's model suggests that the speed of the retrieval of information is determined simply by the concreteness of the input, but this does not explain the effect of other word properties (e.g., frequency of occurrence) on memory.

2.4 Learner-generated vs. Teacher-supplied Mnemonics

Psychological theories do provide partial explanation to how memory interacts with the properties of words. Nonetheless, the mystery is still left unresolved as to the mediocre cued-recall performance of keyword learners after a delay. Wang and Thomas' (1992) research on the effect of imagery-based mnemonics on long-term retention offers a possible explanation to the encoding and recall variability—the way the keyword is provided: teacher-supplied or subject-generated. Considering that the role of the keyword is to help engage learners to associate new materials with existing knowledge in a meaningful way, Wang and Thomas contend that spontaneous subject-generated encoding is more likely to be retained after an extended interval. Teacher-supplied mnemonics may function effectively in the initial phase because the episodic cues that are incorporated in the keyword image are still available in the working memory during the immediate test of recall. However, the evanescent nature of the teacher-supplied keyword images means the learner will be prone to forgetting when recall is

tested after an extended delay. Additionally, learners from different cultural backgrounds might arrive at different interpretations of a given foreign keyword and thus produce different mental images for the foreign words. Learners may not consistently arrive at the same interpretation in the subsequent recall task. Pedagogically speaking, teachers should not lose sight of the importance of the students' ability to discover and apply the encoding they derive from the particular episodic cues that accompany the presentation of the new material.

Craik and Tulving (1975) provide a useful example of mnemonics where learner-constructed meaning has an important role in long-term retention. They demonstrate that a memory might be more effectively retained if the new item is presented in a rich context related to a learner's prior experience. In their experiment, subjects were presented with a set of words that were embedded in two types of sentences that varied in syntactic complexity. The sentences were constructed in such a way that the same word could be used for either a simple or a complex sentence (e.g., "it is a *lizard*" vs. "the *lizard* living on the roof of my home is a lovely creature"). They reported that the subjects were twice as likely to remember a word if it was fit into a sentence of high complexity than into a simple one. In this case, the rich context provided by the complex sentences allowed learners to think about words in relation to what they already knew. In short, learners seemed to have a more distinct memory when integrating their prior experience with the rich context provided by the sentence. Though the properties of words influence the decoding of learned words, it is, as claimed by van Hall and Candia Hahn, the meaningfulness, rather than the word quality, that acts as the most crucial factor affecting the retention span of learned items.

3. Imagery-based Mnemonics in Learning Image-hospitable Languages

In analyzing language-specific effects on hemispheric language processing, Genesee (1988) speculates that language mode determines which hemisphere will dominate language processing. For instance, appositional/ideographic languages that are more perceptually and visually-loaded (e.g., Chinese) rely more on the holistic processor of the right hemisphere. In contrast, prepositional languages (e.g., English) that orient readers from the immediate physical context depend more on the analytic processor of the left hemisphere. Although the degree to which language mode determines language processing has not been clearly defined, the assumption that people rely more on the visual neural cortex to decode ideographic language is a plausible way to discuss the use of imagery-based mnemonics.

Most research assessing the efficacy of imagery-based mnemonics uses phonetic-hospitable languages as the studied medium, rather than image-hospitable languages. Wang and Thomas (1992) studied the long-term effect of imagery-based learning strategies on monolingual speakers of English in learning Chinese, an ideographic (as opposed to phonetic) language. Adopting a 2œ2 between-subjects design, Wang and Thomas manipulate the factors of time (immediate vs. delayed) and learning condition (rote vs. imagery). Unlike the previous research construct, the rote-learning method is not based on vocal rehearsal, but rather on "visual" rehearsal; subjects were asked to hand-write the ideographs together with their English equivalents. In terms of word property, Hasher, Griffin and Johnson (1977)(quoted from Wang & Thomas, 1995) claim that words that carry only distinctive cues (e.g., distinctive phonemes) are less durable in memory than lexical items that are both relational and semantic in nature (e.g., ideographs). Following this view, Wang and Thomas chose the Chinese ideographs that bear both semantic and relational quality to be the target learned items. More specifically, the meaning and the visual qualities of the Chinese ideographs they selected are etymologically based upon a picture. In so doing, they tried to ensure that their subjects would recall the meaning of these ideographs from their corresponding visual images. The following are two examples of Chinese ideographs and their English equivalents:

Water Tree

Figure 1. Examples of Two Chinese ideographs and their English equivalents

The ideograph for “tree” (Figure 1, right) is a combination of a trunk (the vertical line), roots (the bottom curve facing downward), and branches (the top curve facing upward). Similarly, the ideograph for “water” (Figure 1, left) is derived from the flow of the water in the river. Consequently, the ability to associate the ideographs with their etymological origins and produce a phonetically/formally similar keyword would permit learners access to the meaning and thus encourage long-term retention.

In a half-hour learning session, the subjects receiving mnemonic instruction listened to a short briefing about the etymological origin (functioning as the “keyword”) with regard to the visual components of 30 Chinese ideographs. The rote-learning learners were given a pamphlet listing the same 30 Chinese ideographs and their English equivalents; they were given 45 minutes to trace over each Chinese character and write them with their English translation as their rote learning trials.

Using between-participant comparison of immediate- versus delayed-recall performance, the result corroborates previous comparisons of the keyword method with rote rehearsal. In short, learners receiving mnemonic instruction exhibited substantially greater retention in the immediate tests but showed poorer retention in the subsequent delayed test. Generally speaking, rote learners had a better long-term retention. Wang and Thomas (1992) speculated that the experimenter-assigned keyword is not conducive to the formation of interactive imagery and that the spontaneous subject-generated encodings are more likely to be retained in the long term.

In conclusion, Wang and Thomas’ research on the efficacy of mnemonic devices suggests that a mnemonic strategy might not effectively enhance long-term retention in learning an image-based language where sound-letter correspondence is rare. Although visual-stimuli served as effective cues in recalling ideographs that were based on etymological pictures, the mental image assigned by the experimenters did not last long. However, future research might investigate the effect of learner-generated keywords on learning image-hospitable languages. Based on the above experiment, limited evidence shows the robust effect that a keyword mnemonic strategy has on learning an image-based language where a high correspondence between orthography and meaning might be the key to word encoding. On the contrary, as suggested in the previous discussion of the effect of vocal stimuli on learning phonetic-based languages, vocal rehearsal appears to have a positive effect on learning lexical items in phonetic-based languages where words seem be organized phonetically in memory.

4. Relative Effectiveness of Mnemonic Strategies versus Rote Learning

Despite the documented success of the keyword mnemonic strategy in the short term, there remains a practical concern about the efficacy of using keywords for long-term retention. Nonetheless, proponents of the keyword method regard rote learning simply as a meaningless repetition of information and criticize the basis of Rote-Rehearsal, Hebb's (1949) Consolidation Theory, for treating learning as a passive process. According to Consolidation Theory, short-term memory can be transferred to long-term memory, and cause solid structural changes in the brain if the material is rehearsed long enough. More specifically, despite the common belief that short-term memory and long-term memory bear physiological difference, proponents of Consolidation Theory believe that the transfer of information from short-term memory to long-term memory is simply a matter of time and rehearsal.

Craik and Lockart (1972) proposed Rehearsal Theory to modify the insufficiencies of Consolidation Theory; they contend that rote learning does not necessarily have to be meaningless repetition. According to Rehearsal Theory, sensory information is processed at two hierarchically arranged levels of perceptual analysis, from superficial to complex, namely, maintenance rehearsal and elaborative rehearsal. Maintenance rehearsal is the verbal/visual material being processed in a repetitive manner (e.g., the way you try to remember a 7-digit telephone number). In contrast, elaborative rehearsal involves conscious or unconscious organization of input information based on prior experience.

Consider the following 12-digit number:

5 0 4 6 9 7 8 6 1 3 9 8

Due to the memory constraint of human beings, it might be necessary to use "chunking" to remember the above string of numbers. The total amount of information a human being can store in working/short-term memory depends on the particular rules (e.g., chunking) used to organize them. The retention span of information stored in short-term memory is contingent on how much meaning is assigned to it, which is often done in an explicit manner. According to this theory, people tend to process information with interplay between the above two types of rehearsal, depending on the relatedness of the information to their prior experience.

Defenders of rote-rehearsal posit that implicit learning can also take place in the process of rehearsal, and that there is unconscious reconstruction of meaning on the basis of prior knowledge. In a now-classical experiment, Bartlett (1932) asked his subjects to read a passage as many times as possible within a limited time frame before he asked them to re-tell the story several times. Due to the constraints of memory, the subjects remembered only some striking details of the passage, which were shaped by their own expectations contained in semantic memory. In retelling the story, the subjects tended to revise the original passage a little more coherently each time, according to their own conceptions of reality. In Barlett's experiment, the creative process of referring to prior knowledge occurred in the process of rote learning. According to Atkinson and Shiffrin (1968), the best retention seems to occur in the interconnectedness among different regions of the cortex, and among sensory memory, short-term memory (new information), and long-term memory (old information). Hence, the combination of prior knowledge (schemata) and new information via various channels (e.g., acoustic vs. visual) is what enhances the meaningfulness of encoding and the vividness of study items. In effect, drawing support from the above evidence, rote rehearsal might not totally eliminate the activation of implicit learning. Considering the moderate retention rate in delayed-recall performance, rehearsal is not

necessarily meaningless and remembering could be automatic and implicit.

5. Conclusion and General Discussion

To sum up, the keyword mnemonic device appears to be less efficient in learning image-hospitable languages (e.g., Chinese). On the other hand, learners of phonetic-hospitable languages seem to benefit from vocal rehearsal under rote-learning conditions. In terms of retention span, a concrete way to enhance the long-term retention of keyword mnemonic strategies has not been proposed. Future research should investigate techniques designed to enhance the initial benefits of mnemonics in long-term retention. In terms of word property, studies have shown that people tend to process concrete words faster than abstract or obscure words (e.g., Wang & Thomas, 1995). Some researchers posit that the retention of learned items may be dependent on the link between the keyword and the interactive image (Tulving 1983, 1984; van Hall and Candia Mahn, 1997). In terms of the operationalization of mnemonics, research done by Craik and Tulving (1975) has shown that a rich context can greatly improve the durability of memory. Only when a rich context is provided can learners enhance the "depth" of their learning and fit new items into their own schemata. Long-term retention might be more successful when the keyword, context, or mental image is learner-generated, rather than experimenter-supplied. However, in discussing the impact of word property on the efficacy of encoding, most studies examine word property mainly in terms of linguistic dimensions, such as core semantics (e.g., concreteness or semantic relatedness). Considering that prototype analysis is more psychological than linguistic (Hatch & Brown, 1995), future psycholinguistic research of mnemonics might investigate the effect of prototype on language processing and retention.

Although different learning conditions (i.e., mnemonics and rote learning) seem to influence learners' perceptions of input (e.g., visual vs. acoustic) and levels of processing (Craik & Lockhart, 1972) to a certain extent, a reconciliation between mnemonics and non-mnemonic devices, such as rote-learning, might serve as the optimal learning condition. The immediate positive effect of mnemonic learning and the durability of memory of rote-rehearsal are suggestive of the differential strengths of each learning strategy. However, both keyword mnemonic devices and rote learning have their own pedagogical constraints. For example, in teaching semantically ambiguous words that fall into the same semantic category (e.g., pretty/beautiful/attractive/sexy), teachers might find the keyword mnemonic device less effective in creating clear-cut mental images. In this regard, consciousness-raising activities such as using audio-visual aids (e.g., photos) might help disambiguate the fuzzy words, although, since such words are highly personalized matters of judgment, non-student selected pictures are problematic. In addition, according to Gardiner, Craik, and Birtwistle (1972), in learning semantically similar lexical items (e.g., rose, tulip, and carnation) in successive trials (rote learning), people tend to encounter interference with the process of retrieval in short-term memory (proactive inhibition). In other words, the retention of words of similar semantic nature under rote learning conditions becomes progressively worse. They indicate that release from proactive inhibition will occur as soon as people are presented with words of different semantic categories. Thus, unless a combination of various strategies presented in various channels is adopted, teachers might want to avoid teaching students words that are either semantically ambiguous or similar at the same time.

Since most mnemonic strategies have been observed in the context of learning discrete lexical items, it seems that no single method suits a given teaching situation perfectly. Teachers might need to adopt an integrated teaching strategy where both mnemonic and non-mnemonic devices (e.g., dramatic, kinesthetic strategies or even rote learning) are employed, depending on different contexts. Thus, this line of reasoning suggests that researchers should investigate the long-term effectiveness of mnemonic strategies relative to non-mnemonic learning strategies in learning second language vocabulary in context.

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