Mnemonics and Research on Using the Keyword Method in the Classroom

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Memory techniques are often called mnemonics or mnemonic techniques and several of them go back thousands of years (Yates, 1966).[1] Mnemonics are considered cognitive strategies (Brown, H. D., 2007), but unfortunately, they fell into disuse in the West and are not often taught in schools today. This is likely due to ignorance of the techniques as well as a lingering stigma of trickery or pseudo-science surrounding them (Higbee 1996, Lorayne & Lucas, 1974). This paper will look at some mnemonic methods and some of the research into the use of the keyword method in the classroom.

Mnemonics techniques include simple techniques such as acronyms, as well as more complex methods such as the loci, the keyword, and the peg methods. Higbee (2007, p103) lists five reasons that mnemonics work as well as they do: (a) meaningfulness, (b) organization, (c) association, (d) visualization, and (e) attention. These apply even in a simple acronym like HOMES for remembering the names of the Great Lakes. The world homes has meaning; it organizes the information in a way that aids recall; it can easily be associated with lakes or water or anything else that will help set the context; it is easy to visualize that association; and thinking about it, working out each letter and the corresponding lake focuses the attention on the facts to be recalled, strengthening the memory. Association and visualization play especially large roles in the more systemic methods.

The loci method involves associating information with known places, in the order a person would move through the location. This is one of the oldest systems for which any evidence remains (Yates, 1966). D. Brown (2006) gives an example of remembering all of Shakespeare's plays, in order, by walking through the Globe theater. Some uses of this system are also known as "Memory Palaces."

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1   In this paper, I will use the words technique, system, and method interchangeably.

In the peg method the student must first remember a list of words that have a specific order to them. One way is to use words that sound like the corresponding number. One might be bun, two could be shoe, three is tree, etc. These words act as "pegs" on which to hang information. (Higbee, 1996) By associating information with each peg word in order, the information can be recalled later in any order. This is similar to paired-associate learning and is an improvement over simple linking, where each item is associated with the next item in the list. Linking has the advantage of not requiring the memorization of a list of peg words, however.

A further advance on the peg system is to associate each number, zero to nine, with a letter of the alphabet, usually a consonant. This allows the memorization of any number of items because any number can be turned into a word by converting to consonants and then adding vowels to create words. Higbee (2007, p172) calls this the "phonetic mnemonic."

The keyword method is probably the most widely studied method, especially in relation to language learning. To remember a new piece of information, a suitable substitution word (the keyword) is chosen and then associated with the meaning of the original word in a mental image. (Mental images are not limited to the keyword method, most visually-oriented mnemonic systems use them.) By recalling the keyword, the original word and its meaning can be recalled.

D. Brown (2006), Higbee (1996), and Lorayne & Lucas (1974) describe the keyword method in detail and list several factors that make the associative images more effective. These include exaggeration, interaction, vividness, and substitution. Lorayne & Lucas recommend what Higbee calls "bizzareness", but Higbee says the research is inconclusive. D. Brown claims that adding emotional impact to the mental image increases the vividness by giving the image an affective dimension. There does not seem to be any research on this at all, though it seems reasonable that the vividness of the image would be increased. Whether that increase would help recall or not is a question for future research to address.

Lorayne & Lucas (1974) claim that occasionally refreshing the image by retrieving it helps strengthen the memory such that it can be remembered for as long as necessary. Unfortunately, much of the academic research on this topic treats this sort of retrieval practice as a separate memorization strategy instead of considering it a third step in the keyword (or other) method. While it is important to know the extent to which a given technique is aiding memorization, it seems incomplete to test "long term" recall a week or ten days after the original memorization, with little or no usage of the information or memorization strategy during that time.

The keyword method has been widely studied in connection to foreign language teaching (Fritz, Morris, Acton, Voelkel, & Etkind, 2007; Gray, 1997; Rodriguez & Sadoski, 2000). Gray's work is of particular interest because it did not involve memorizing lists of vocabulary but rather the internalization of English preposition usage. Although Gray's results are anecdotal they do suggest that research into a wider variety of applications of memory techniques might be beneficial.

Foreign language learning is not the only area in which the keyword method can be used. T. S. Brown and Perry (1991) used the keyword method in an intensive English program in Cairo; Scruggs and Mastropieri (1992) studied its use with science content for learning disabled students. Fontana, Scruggs, and Mastropieri (2007) taught world history to high school students in inclusive classes using the keyword method. Uberti, Scruggs, & Mastropieri (2003) used it with 3rd graders in inclusive language arts classes and Avila & Sadoski (1996) successfully used Spanish language keywords with Spanish-speaking (L1) elementary school ESL students. As a cognitive skill, mnemonics can be successfully applied wherever students need to remember new information of any sort.

The keyword and other mnemonic techniques are not replacements for studying. They assist in recalling information but require that the information already be in memory somewhere. However, the act of creating an image may sometimes be sufficient to add the information to memory (Lorayne & Lucas, 1974). As touched on above, whichever mnemonic technique is applied the uses go beyond memorizing lists of vocabulary. With practice, any sort of information such as faces, names, dates, and second or foreign language vocabulary and grammar can be remembered (Brown, 2006; Higbee, 1996; Lorayne & Lucas).

The studies cited in this paper support the usefulness of the keyword method for increasing both short- and long-term recall especially when compared to rote learning. The only exception is that Wang, Thomas, & Ouellette (1992) found that if no immediate recall test is given, forgetting increases on the delayed-recall test compared with rote learning. However, in a classroom environment such conditions would be unlikely.

The research issue today is not so much the usefulness of the keyword method but when that method is more useful than other strategies; the most effective ways to incorporate the method into the classroom; and which groups of students might benefit most from it. An important area of ongoing research involves the creation of associative images: when is it more appropriate for the teacher to provide imagery for the students, and when would learners be better served by creating their own imagery?

Personally created imagery should be more effective than teacher-prepared imagery, but creating self-generated imagery can be difficult as well as time consuming (Higbee, 1996). Further, novice users of the keyword method may come up with images that are not effective. Teacher-prepared associations allow for individual variation in the images generated by each student. For various reasons researchers at least, seem to use similar, often boring, associations. For example, Fritz, et al. (2007, p 523) provided learners with associations like "The French for

hedgehog is herrison. Imagine your hairy son looks like a hedgehog." Some interesting and imagery is possible, but the association is not as vivid or as interactive as it could be. Nor is a hairy son necessarily the most personalized imagery for students. In all of the research studies cited herein, the researchers used at least teacher-prepared imagery and in some cases, such as those with elementary school students, the students were provided with drawings of the imagery.

Recently, Campos and Amor (2004, abstract only) tested a hybrid system for image generation. Instead of teachers or researchers making the associations (as with herrison and hairy son above), they chose from a collection of associations created by students whose sociodemographic status was similar to that of the target students. This is exciting research but I was not able to read the entire article. The system sounds like an effective compromise that can provide high quality, student-appropriate associations and, when appropriate, imagery. If the hybrid system provides students with associations that the students can be maximally creative with, in less time and with less effort that it would take to come up with their own, it would be a wonderful improvement to the keyword system. Further research on this hybrid system is needed.

Further, as mentioned above, Lorayne & Lucas (1974) recommend a form of spaced recall for firmly planting an image in memory. Fritz, et al. (2007) did this in their research on German as a foreign language but the results were inconclusive. Classroom instruction that included that technique as well may be most beneficial but further research is needed.

The goal of much of the research on the keyword method is determining the value of the technique for memorizing facts, often lists of vocabulary words. More research on the direct use of the technique in the classroom would be useful. Research done in the classroom with students obviously gives a clearer idea of how teachers can incorporate mnemonic techniques into their classrooms effectively. Avila & Sadoski (1996), for example, showed that the keyword method

can be helpful for limited English proficiency (LEP) students in an ESL setting in American schools. One important aspect of that study was the use of L1 keywords by the students, who were all native Spanish speakers. In this case, Avila & Sadoski prepared keyword associations and drawings for the students to use, which was most appropriate for the age level and language background of the students.

Some research is more problematic for the classroom teacher because of unnatural restrictions intended to limit the test solely to the effectiveness of a technique in isolation. A study of students' memorization of a handful of Tagalog words (Wang, et al. 1992) provides little insight into how well ESL students might apply the keyword method in their English-language science class. Especially if that class meets three or more times a week, providing plenty of opportunity for repetition and reinforcement of the vocabulary words as well as the mental imagery used to remember the word and its meaning. More research on the value of different techniques with specific populations would certainly be valuable.

Mnemonics, especially the more complicated systems like the keyword method, are useful cognitive tools but unfortunately they are not widely used outside of research classrooms. In this paper, I have described several of the more common and useful mnemonic systems, briefly covered current research showing the effectiveness of the keyword method as well as some areas for future research, and looked at the actual use of the memory techniques in the classroom.

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