

## DRAWING-ASSISTED STRATEGIES IN KEYWORD MNEMONICS

Alfredo CAMPOS<sup>1</sup>, Angeles AMOR<sup>2</sup>, María Angeles GONZÁLEZ<sup>2</sup>

<sup>1</sup>Department of Basic Psychology, University of Santiago de Compostela  
15782 Santiago de Compostela, Spain  
E-mail: pscampos@usc.es

<sup>2</sup>University of A Coruña

*Abstract:* In conventional keyword mnemotechnics for foreign language vocabulary learning, the keywords may be either supplied by the teacher/experimenter, or generated by the learners themselves. Each approach has particular advantages and disadvantages. We have recently proposed an alternative "hybrid" approach (the peer-generated-keyword method), in which keywords are generated previously by subjects of similar sociodemographic characteristics to the intended learners. Here we report an experimental study in which we compared the efficacy of a control method (the subject's habitual method), the experimenter-generated keyword method and the peer-generated keyword method for learning foreign-language words with high or low image value. In both keyword methods, subjects were shown drawings representing an imagined association between the keyword and the target. Both keyword methods were significantly more effective than the control method for immediate recall of high- and low-image-value words. The peer-generated-keyword method was significantly more effective than both the control method and the experimenter-generated-keyword method for immediate recall of low-image-value words.

*Key words:* imagery, mnemonic, keyword

One of the most effective techniques for learning foreign-language vocabulary is the "keyword" technique (Atkinson, 1975). This technique comprises two steps: 1) a verbal step, involving selection of an L1 word (the keyword) that is familiar to the subject, as concrete as possible, and with a sound as similar as possible to that of the L2 word, and 2) a visual step, in which the keyword is visually related to the target word (i.e., the L1 equivalent of the L2 word). Evocation of the keyword and the corresponding interactive image helps the subject to recall the target word. For example: L2 (Latin) word *arcanum*, L1 (English) keyword *ark*, L1 target word *secret*, image relating *ark* and *secret*.

The keyword technique has been widely used since its initial description, in view of its effectiveness for foreign-language

learning (for reviews see e.g., Brigham, Brigham, 1998; Pressley, Levin, Delaney, 1992; Pressley, Levin, McDaniel, 1987). Nevertheless, a number of important questions remain to be resolved: for example, should keywords be supplied by the teacher, or generated by the subjects themselves?

Some studies, such as Hall, Wilson, and Patterson (1981) and King-Sears, Mercer, and Sindelar (1992) obtained better recall when keywords were supplied by the investigators than when they were generated by the subjects. The view that supplied keywords are more effective than subject-generated keywords has been supported by many authors. Raugh and Atkinson (1975) state that supplied keywords are more effective especially when subjects are not familiar with the phonetics of L2. Thomas

and Wang (1996) found better short-term recall with supplied keywords than subject-generated keywords. Higbee (1997) suggested that supplied keywords are more effective for novice learners, but not necessarily for more advanced learners.

The view that keywords should be supplied is supported by a number of arguments. First, keyword generation is time-consuming and difficult, so that many school-age children are not able to generate keywords effectively (Levin, Pressley, McCormick, Miller, Shriberg, 1979). Second, time spent generating keywords is likely to be time *not* spent learning (Willerman, Mervin, 1979). Third, supply of keywords ensures that the learner will use the keyword technique, whereas if subjects are required to generate keywords themselves there is no guarantee that this technique will actually be used (Troutt-Ervin, 1990).

The view that keywords should be generated by the learners themselves has generally not been supported in experimental studies (Hall, 1988; Hall et al., 1981; Thomas, Wang, 1996; Wand, Thomas, Ouellete, 1992), and authors favoring this approach have largely cited theoretical arguments. Notably, the latter two studies argue that subject-generated keywords may be more effective because they can be expected to avoid conflict between the teacher's and the students' modes of coding.

We have recently developed an approach which aims to combine the best aspects of both strategies for keyword generation (Campos, Amor, González, 2002; Campos, González, Amor, 2001). In this approach, keywords are generated by peers of the intended subjects, of the same age and demographic characteristics. In our first study (Campos et al., 2001) we used three

groups: the first group learnt the translation of a list of Latin words using experimenter-supplied keywords, the second subject-generated keywords, and the third peer-generated keywords. We found that subjects using peer-generated keywords showed significantly better short- and long-term recall than subjects in the other two groups.

Another unresolved question about mnemotechnics in general, and keyword mnemotechnics in particular, is whether these strategies are effective for learning words with low image value. Kasper and Glass (1982) and Johnson, Adams and Bruning (1985) suggested that keyword mnemotechnics are not effective for words with low image value; other authors, such as Mastropieri, Scruggs, and Fulk (1990) and Troutt-Ervin (1990) have reported that keyword mnemotechnics are more effective than other strategies, regardless of image value. Paivio (1979) and Foth (1973) state that basically visual mnemotechnic strategies are more effective for words with high-image value than for words with low imaged value.

By definition, it is difficult to form mental images of words with low image value. It has thus been suggested that recall of words with low image value may be improved by the use of symbolic relations (Higbee, 1993; Scruggs, Mastropieri, 1989): thus for example, if the target word is *justice*, the subject might imagine a pair of scales; or if the target word is *religion*, the subject might imagine a church.

One method for helping subjects to form mental images (whether of words with high image value or words with low image value) is to present drawings representing the meaning of the words (for reviews, see Denis, 1979; Paivio, 1979). Several studies have found that in keyword mnemotechnics better results are obtained if words are

accompanied by drawings (Carney, Levin, 2000; Wood, Pressley, Turnure, Walton, 1987).

In the present study, continuing in the line of our previous research, we performed experiments to compare three approaches for foreign-language vocabulary learning: the experimenter-generated-keyword method, the peer-generated-keyword method, and a control method (subject's habitual method). Both high- and low-image-value words were used, and recall was assessed immediately and after one week. Unlike in our previous study of the peer-generated-keyword method, subjects in both keyword groups were presented not only with the keyword but also with a drawing representing an image associating keyword and target word.

## METHOD

### *Participants*

The sample comprised 276 subjects (139 women, 137 men), aged 12 - 15 years (mean 12.8 years). Subjects were from various public schools (1st or 2nd year of *Educación Secundaria Obligatoria*).

### *Materials*

A total of 50 Spanish words (25 with high image value, 25 with low image value) were selected randomly from the lists published by Valle (1998). The high-image-value words all had ratings  $> 5.20$  in Valle's listing, while the low-image-value words all had ratings  $< 4.21$ . Subsequently, an independent Latin expert (not involved in the research) translated the selected words to Latin. Cognates (i.e., words with similar pronunciation and/or spelling in the two languages) were eliminated.

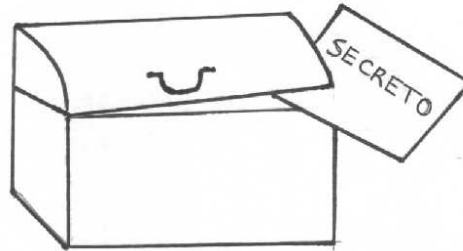
Experimenter-supplied keywords were generated by the authors for each Latin word (pronunciation as similar as possible to the Latin word, preferably with the same first syllable; as concrete as possible). In each case, we also selected an associative image relating the keyword and the target word (i.e., the Spanish translation of the Latin word).

Peer-generated keywords were generated by a group of 56 subjects from the same schools and schooling years as the experimental subjects; for each Latin word, each subject was asked to identify a Spanish keyword with pronunciation as similar as possible to the Latin word, and to write a sentence describing an associative image relating the keyword and the target word. For each word, we then selected the most frequent keyword and most frequent associative image.

In both keyword generation procedures, words with a keyword similar to keywords already selected were eliminated. From the remaining words, 16 words were then selected for each list (experimenter-supplied or peer-generated keywords; high or low image value). Drawings were then created for the total of 32 experimenter-generated keywords/images and the total of 32 peer-generated keywords/images (Figure 1). All final word lists were randomly ordered.

### *Procedure*

The experimental subjects were randomly divided into three groups, who were required to learn the Spanish translations of the 64 Latin words 1) by their habitual method (control group), 2) by the keyword method using experimenter-generated keywords, or 3) by the keyword method using peer-generated keywords. In all three groups each Latin word and its



Arcanum (Arca) Secreto

Figure 1. An example of an interactive drawing

Spanish translation (and where appropriate the keyword) were presented with a slide projector (15 sec each word). Each slide also showed a drawing representing the meaning of the target word (control group) or the image associating keyword and target word (keyword groups). During this 15-sec period, the researcher twice read out aloud the words on the slide (the Latin word, its Spanish translation, and where appropriate the keyword and a description of the associative image). Subjects in the keyword groups were previously instructed to create an interactive mental image using the drawing on the slide, and to use this as an aid to learning the Latin word. All subjects were presented with 4 trial words before the true lists were presented.

As noted, subjects in the control group were instructed to use their habitual method for word learning. This is common practice in studies of this type (see e.g., McGivern, Levin, 1983; Pressley, Levin, 1981; Pressley, Levin, Miller, 1981; Campos et al., 2001), and is justifiable because

it seems reasonable to assume that few or no subjects will use the keyword method.

After presentation of the word list, all subjects received a sheet listing the Latin words, and were asked to write the corresponding Spanish word beside each one, using the specified recall strategy. One week later, and without prior warning, the subjects again received the list of Latin words, and were again asked to recall the Spanish words. All procedures were performed in normal classes, and all subjects took part voluntarily.

## RESULTS

We first analyzed the effects of learning strategy and time-to-recall on recall of high-image-value words. To this end, we performed a mixed-factor analysis of variance (ANOVA), with factors *learning strategy* (3 levels) and *time-to-recall* (2 levels). Mean recalls (i.e., mean number of words recalled per list, maximum 16) are listed for each group in Table 1.

Learning strategy significantly influenced recall of high-image-value words,  $F(2, 264) = 15.22$ ,  $p < .001$ , as did time-to-recall,  $F(1, 264) = 176.65$ ,  $p < .001$ , and the interaction between the two variables,  $F(2, 264) = 27.50$ ,  $p < .001$ . Least significant differences (LSD) tests indicated that recall in the two keyword groups was significantly better than in the control group ( $p < .05$  in both cases).

To assess the effect of learning strategy on immediate recall of high-image value words, we used a single-factor ANOVA, which indicated that learning strategy had a significant effect,  $F(2, 273) = 43.76$ ,  $p < .001$ . LSD tests indicated that recall in the two keyword groups was significantly better than in the control group ( $p < .05$  in both cases). There was no significant difference between the keyword groups. A corresponding single-factor ANOVA with one-week recall as depen-

dent variable indicated that learning strategy had no significant effect on one-week recall of high-image-value words.

We next investigated the influence of learning strategy and time-to-recall on recall of low-image-value words. Again, we performed a mixed-factor analysis of variance (ANOVA), with factors *learning strategy* (3 levels) and *time-to-recall* (2 levels). Mean recalls are listed for each group in Table 2. Learning strategy significantly influenced recall of low-image-value words,  $F(2, 264) = 3.59$ ,  $p < .05$ , as did time-to-recall,  $F(1, 264) = 96.18$ ,  $p < .001$ , and the interaction between the two variables,  $F(2, 264) = 16.46$ ,  $p < .001$ . LSD tests indicated that recall in the peer-generated keyword group was significantly better than in the control group and in the experimenter-generated keyword group ( $p < .05$  in both cases).

Table 1. Mean immediate and one-week recall (no. of words, maximum 16) of high-image-value words in each of the experimental groups. Standard deviations are also shown

	Immediate recall		One-week recall		Overall recall	
	M	SD	M	SD	M	SD
Habitual	4.24	1.72	3.95	2.00	4.14	1.63
Experimenter-generated keyword	6.77	2.35	4.42	3.00	5.58	2.46
Peer-generated keyword	7.00	2.63	4.58	2.86	5.79	2.47

Table 2. Mean immediate and one-week recall (no. of words, maximum 16) of low-image-value words in each of the experimental groups. Standard deviations are also shown

	Immediate recall		One-week recall		Overall recall	
	M	SD	M	SD	M	SD
Habitual	3.05	1.96	2.87	2.12	2.96	1.91
Experimenter-generated keyword	3.55	2.43	2.23	2.22	2.89	2.22
Peer-generated keyword	4.39	2.70	3.00	2.77	3.70	2.57

Single-factor ANOVA to assess the effect of learning strategy on immediate recall of low-image value words indicated that learning strategy had a significant effect,  $F(2, 273) = 8.01, p < .001$ . LSD tests indicated that recall in the peer-generated keyword group was significantly better than in the control group and in the experimenter-generated keyword group ( $p < .05$  in both cases). Single-factor ANOVA to assess the effect of learning strategy on one-week recall of low-image-value words indicated that learning strategy had no significant effect.

#### DISCUSSION

The present results indicate that learning strategy influenced immediate recall of high-image-value words, with subjects who used keyword methods showing better recall than subjects who used their habitual method. This result is in line with numerous previous studies which have supported the efficacy of keyword methods (for reviews, see Brigham, Brigham, 1998; Pressley et al., 1982; Pressley et al., 1987). In one previous study (Campos, González, Amor, in press), we did not find any significant difference between the control group and the keyword group. In this study subjects were allowed to allocate their learning time as they wished and were not given any significant training in use of the keyword method: both conditions have been reported to affect the efficacy of the keyword method. In the present study we did not detect any difference in recall of high-image-value words between the group using experimenter-generated keywords and the group using peer-generated keywords.

Although the subjects using keyword methods showed markedly better immediate recall than subjects using their habitual

method, no such difference was detected in one-week recall. Several researchers (Hall et al., 1981; Johnson et al., 1985; Thomas, Wang, 1996; Wang, Thomas, 1995; Wang, Thomas, Inzana, Primicerio, 1993; Wang et al., 1992) have found that keyword mnemotechnics are not effective for long-term recall.

In addition, we did not detect any significant difference in recall of high-image-value words between the experimenter-generated and peer-generated keyword groups. By contrast, in a previous study (Campos et al., 2001) we found that both immediate and one-week recall were improved by using peer-generated keywords rather than experimenter-generated keywords. The main difference between the present study and this previous study is that in the present study subjects were given drawings representing the image associating keyword with target word: this probably improved recall and mitigated the putative positive effect of peer-generated keywords and images.

As noted above, according to some authors (Johnson et al., 1985; Kasper, Glass, 1982) one of the principal limitations of mnemotechnics in general, and of keyword limitations in particular, is its low efficacy for learning words with low image value. However, in the present study we found that immediate recall of low-image-value words was significantly higher in the peer-generated keywords group than in either the control group or the experimenter-generated keywords group. This suggests that the peer-generated keyword method may be of particular value for low-image-value words.

In conclusion, the results of this and previous studies indicate that the peer-generated keyword method is in many learning contexts more effective than conventional keyword methods. Future studies

will allow us to identify more clearly those contexts in which the peer-generated keyword method is most effective.

Received May 28, 2003

### REFERENCES

- ATKINSON, R.C., 1975, Mnemotechnics in second-language learning. *American Psychologist*, 30, 821-828.
- BRIGHAM, F.J., BRIGHAM, M.M., 1998, Using mnemonic keywords in general music classes: Music history meets cognitive psychology. *Journal of Research and Development in Education*, 31, 205-231.
- CAMPOS, A., AMOR, A., GONZÁLEZ, M.A., 2002, Presentation of keywords by means of interactive drawings. *Spanish Journal of Psychology*, 5, 102-109.
- CAMPOS, A., GONZÁLEZ, M.A., AMOR, A., 2001, Different strategies for keyword generation. Manuscript submitted for publication.
- CAMPOS, A., GONZÁLEZ, M.A., AMOR, A., in press, Limitations of the mnemonic keyword method. *Journal of General Psychology*.
- CARNEY, R.N., LEVIN, J.R., 2000, Fading mnemonic memories: Here's looking anew, again! *Contemporary Educational Psychology*, 25, 499-508.
- DENIS, M., 1979, *Les images mentales*. Paris: Presses Universitaires de France.
- FOTH, D.L., 1973, Mnemonic technique effectiveness as a function of word abstractness and mediation instructions. *Journal of Verbal Learning and Verbal Behavior*, 12, 239-245.
- HALL, J.W., 1988, On the utility of the keyword mnemonic for vocabulary learning. *Journal of Educational Psychology*, 80, 554-562.
- HALL, J.W., WILSON, K.P., PATTERSON, R.J., 1981, Mnemotechnics: Some limitations of the mnemonic keyword method for the study of foreign language vocabulary. *Journal of Educational Psychology*, 73, 345-357.
- HIGBEE, K.L., 1993, *Your memory*. New York: Paragon House.
- HIGBEE, K.L., 1997, Novices, apprentices and mnemonics: Acquiring expertise with the phonetic mnemonic. *Applied Cognitive Psychology*, 11, 147-161.
- JOHNSON, C.W., ADAMS, M., BRUNING, R., 1985, Keywords and vocabulary acquisition: Some words of caution about words of assistance. *Educational Communication and Technology Journal*, 33, 125-138.
- KASPER, L.F., GLASS, A.L., 1982, The role of the keyword method in the acquisition of Spanish nouns. *Human Learning*, 1, 235-250.
- KING-SEARS, M.E., MERCER, C.D., SINDELLAR, P.T., 1992, Toward independence with keyword mnemonics: A strategy for science vocabulary instruction. *Remedial and Special Education*, 13, 22-33.
- LEVIN, J.R., PRESSLEY, M., McCORMICK, C.B., MILLER, G.E., SHRIBERG, L.K., 1979, Assessing the classroom potential of the keyword method. *Journal of Educational Psychology*, 71, 583-594.
- MASTROPIERI, M.A., SCRUGGS, T.E., FULK, B.J.M., 1990, Teaching abstract vocabulary with the keyword method: Effect on recall and comprehension. *Journal of Learning Disabilities*, 23, 92-96.
- McGIVERN, J.E., LEVIN, J.R., 1983, The keyword method and children's vocabulary learning: An interaction with vocabulary knowledge. *Contemporary Educational Psychology*, 8, 46-56.
- PAIVIO, A., 1979, *Imagery and verbal processes*. Hillsdale, NJ: Lawrence Erlbaum.
- PRESSLEY, M., LEVIN, J.R., 1981, The keyword method and recall of vocabulary words from definitions. *Journal of Experimental Psychology: Human Learning and Memory*, 7, 72-76.
- PRESSLEY, M., LEVIN, J.R., DELANEY, H.D., 1982, The mnemonic keyword method. *Review of Educational Research*, 52, 61-91.
- PRESSLEY, M., LEVIN, J.R., McDANIEL, M.A., 1987, Remembering versus inferring what a word means: Mnemonic and contextual approaches. In: M.G. McKeown, M.E. Curtis (Eds.), *The nature of vocabulary instruction* (pp. 107-127). Hillsdale, NJ: Erlbaum.
- PRESSLEY, M., LEVIN, J.R., MILLER, G.E., 1981, How does the keyword method affect vocabulary comprehension and usage? *Reading Research Quarterly*, 16, 213-226.
- ROUGH, M.R., ATKINSON, R.C., 1975, A mnemonic method for the learning of a second language vocabulary. *Journal of Educational Psychology*, 67, 1-16.
- SCRUGGS, T.E., MASTROPIERI, M.A., 1989, Reconstructive elaborations: A model for content area learning. *American Educational Research Journal*, 26, 311-327.
- THOMAS, M.H., WANG, A.Y., 1996, Learning by the keyword mnemonic: Looking for long-term benefits. *Journal of Experimental Psychology: Applied*, 2, 330-342.
- TROUTT-ERVIN, E.D., 1990, Application of keyword mnemonics to learning terminology in the

college classroom. *Journal of Experimental Education*, 59, 31-34.

VALLE, F., 1998, *Normas de imaginabilidad*. Oviedo, Spain: University of Oviedo.

WANG, A.Y., THOMAS, M.H., 1995, Effect of keyword on long-term retention: Help or hindrance? *Journal of Educational Psychology*, 87, 468-475.

WANG, A.Y., THOMAS, M.H., INZANA, C.M., PRIMICERIO, L.J., 1993, Long-term retention under conditions of intentional learning and the keyword mnemonic. *Bulletin of the Psychonomic Society*, 31, 545-547.

WANG, A.Y., THOMAS, M.H., OUELLETTE, J.A., 1992, Keyword mnemonic and retention of second-language vocabulary words. *Journal of Educational Psychology*, 84, 520-528.

WILLERMAN, B., MELVIN, B., 1979, Reservations about the keyword mnemonic. *Canadian Modern Language Review*, 35, 443-453.

WOOD, E., PRESSLEY, M., TURNURE, J.E., WALTON, R., 1987, Enriching children's recall of picture-dictionary definitions with interrogation and elaborated pictures. *Educational Communication and Technology Journal*, 35, 43-52.

## KRESBA AKO POMOCNÁ STRATÉGIA V MNEMOTECHNIKE POUŽITÍM KLÚČOVÝCH SLOV

A. Campos, A. Amor, M. A. González

*Súhrn:* Pri učení sa slovíčiek cudzieho jazyka sa bežne využíva mnemotechnika pomocou kľúčových slov, ktoré ponúkne učiteľ/experimentátor, alebo si ich žiak nájde sám. Oba prístupy majú svoje výhody i nevýhody. Nedávno sme navrhli alternatívny "hybridný" prístup (metódu generovania kľúčových slov rovesníkmi). Táto metóda spočíva v tom, že kľúčové slová vopred generovali jednotlivci s rovnakými sociodemografickými charakteristikami, ako majú žiaci cieľovej skupiny. V štúdií porovnávame efektívnosť učenia sa cudzojazyčných slovíčiek s vysokou a nízkou obrazovou hodnotou pomocou kontrolnej metódy (metódy, akou sa jednotlivci zvykne učíť), metódy generovania kľúčových slov experimentátorom a metódy generovania kľúčových slov rovesníkmi. V oboch prípadoch učenia sa pomocou kľúčových slov sme ukázali jednotlivcom kresby zobrazujúce asociáciu medzi kľúčovým slovom a jeho zobrazením. Obe metódy pomocou kľúčových slov boli pri okamžitej reprodukcii slov s vysokou a nízkou obrazovou hodnotou efektívnejšie v porovnaní s kontrolnou metódou. Metóda generovania kľúčových slov rovesníkmi bola signifikantne efektívnejšia než kontrolná metóda i metóda generovania slov experimentátorom pri okamžitej reprodukcii slov s nízkou obrazovou hodnotou.