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## An experimental study of the effect of keyword mnemonics, derivatives, and pictures on the vocabulary learning of foreign language high school students

Paula Rubolino  
*University of Dayton*

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An Experimental Study of the  
Effect of Keyword Mnemonics, Derivatives, and Pictures  
on the Vocabulary Learning of Foreign Language High School Students

Thesis

Submitted to the Department of Education  
University of Dayton, in Fulfillment  
of the Requirements for the Degree  
Master of Science in Education

by

Paula Rubolino  
University of Dayton  
Dayton, OH  
Dec. 1999

Approved by:



Official Advisor



Reader



Reader

## Table of Contents

Introduction	1
Review of Literature	4
Methods	11
Results	15
Discussion	17
References	19
Appendix A	25
Appendix B	27
Appendix C	29
Appendix D	31

## Chapter I

### Introduction

The study of a foreign language can be beneficial for students (Masciantonio, 1977; Cooper, 1987). According to Cooper (1987) students who study a foreign language "develop a better understanding of English grammar; they add to their knowledge of abstract vocabulary items; and they improve their reading and writing skills" (p. 381). He also states that the study of a foreign language is a good way for students to improve their scores on the verbal sections of the Scholastic Aptitude Test (SAT) and the American College Test (ACT). The benefit of the study of a foreign language has been established. However, these benefits can only be reaped if the students have a strong understanding of the target language.

In order to establish a strong understanding of a foreign language high school students must learn a new pronunciation, a new grammar, a new style of using language, and a new vocabulary (Miller and Gildea, 1987). The pronunciation, grammar, and style of the target language can be explained and modeled by the teacher. However, the acquisition of vocabulary relies heavily on students' ability to memorize the words. A major concern for a foreign language instructor is how best to teach vocabulary to increase retention by the

students.

There are many techniques available that can be effective methods of vocabulary instruction. Some researchers have proposed the technique of keyword mnemonics to improve vocabulary learning in a foreign language. (e.g. Atkinson & Raugh, 1975; Pressley & Levin, 1978; Pressley, Levin, and McCormick, 1980; Wang, Thomas, and Ouellette, 1992). A keyword is a familiar word that bears an acoustic or orthographical resemblance to a novel word (Raugh and Atkinson, 1975). The method involves placing the keyword and the definition of the vocabulary word in a meaningful sentence (Pressley, et al, 1982). A keyword mnemonic allows students to develop a systematic procedure for enhancing memory and allows the instructor to relate new information to information students already have locked in long term memory (Mastropieri and Scruggs, 1998).

Another technique that can be used to instruct vocabulary is using derivatives as a way of enhancing meaning. According to Mastropieri and Scruggs (1998) enhanced meaning relates the content being discussed to the student's prior knowledge. Derivatives are effective because they allow students to draw parallels to their own lives (Masciantonio, 1977).

Another technique that can be used to instruct vocabulary is the use of pictures. Visual imagery is one of the most powerful factors influencing memory of verbal materials (Kieras, 1978). It is effective because it allows the students to generate a visual image linked

to the vocabulary word (Wang, et al., 1992). According to Mastropieri and Scruggs (1998) pictures can provide a substantial memory advantage.

The purpose of this study was to investigate the effectiveness of keyword mnemonics, derivatives, and pictures on the vocabulary learning of foreign language students. Foreign language students whose vocabulary instruction incorporated derivatives had a higher retention of vocabulary than those students who used pictures, the keyword method, or an unstructured technique. Foreign language students who used an unstructured technique had a lower retention of vocabulary than those students whose vocabulary instruction incorporated a mnemonic technique.

## Chapter II

### Review of Literature

There are a variety of techniques available that can be effective methods of instruction for vocabulary in the foreign language classroom. Much research has been done to test the effectiveness of keyword mnemonics, derivatives, and pictures.

#### *The Keyword Method*

Some researchers have suggested the technique of keyword mnemonics to improve vocabulary learning in a foreign language over other techniques (e.g. Pressley, et.al., 1982; Levin, et.al., 1992). Reading theorists have contended that a good way for people to learn vocabulary words is to place them in a verbal context (Dale, O'Rourke, and Bammam, 1971). However the results in Pressley, Levin, and Miller's (1982) study of vocabulary acquisition showed that the keyword method proved superior to competing contextual approaches. In a later study by Levin, J., Levin, M., Glasman, and Nordwall (1992) the keyword mnemonic method was again compared to a contextual approach where students' knowledge is activated through the use of semantic contexts (sentences, paragraphs) that clarify and elaborate an



unfamiliar word's meaning. The keyword method again proved to be a more effective vocabulary-remembering technique (as measured by definition recall) and a more effective vocabulary-applying technique (as measured by vocabulary usage) in comparison to semantic (meaning-based) techniques.

Researchers have also compared the effectiveness of the keyword method against the absence of a structured technique (e.g. Atkinson, 1975; Raugh and Atkinson, 1975; Atkinson and Raugh, 1975; Pressley, et. al., 1980; Levin, et. al., 1982; Scruggs and Mastropieri, 1992). In all the studies where the keyword method was compared to the absence of a structured technique ( free study method, where students are free to choose their own best method of studying from presented vocabulary lists) the outcomes were consistent resulting in substantial increases in vocabulary acquisition. Students using the keyword method were able to recall substantially more English translations.

The keyword method has been more conducive to concrete meanings than abstract meanings.. In a study by Johnson, Adams, and Bruning, (1985) the type of vocabulary applied to the keyword method was studied and what was discovered was that concrete meanings were better attained than abstract meanings. In a later study by Mastropieri, Scruggs, and Fulk (1990), they also concluded that the keyword method was effective in facilitating learning of concrete words, but ineffective in facilitating learning of abstract

vocabulary words.

The keyword method has been more conducive to short term recall. The retention rate of the keyword method was compared to rote rehearsal in a study by Wang, Thomas and Ouellette (1992). Their study concluded that the long term forgetting was greater for learners instructed in the keyword method than for learners using rote rehearsal. Their study also concluded that keyword learners performed significantly better on the immediate tests than rote rehearsal learners.

The keyword method has been established as an effective method for students to recall definitions. In a study by Pressley, Levin, and Miller (1981), they studied the effect of the keyword method on comprehension of vocabulary items in context and concluded that the keyword method increases comprehension of vocabulary in context. The results showed that use of the keyword method promoted more than definitional response to a given vocabulary item. The method also improved performance on tasks in which knowledge of the definition is critical, such as comprehension and appropriate usage of vocabulary.

The keyword method is an effective technique for vocabulary instruction. The method is superior to contextual approaches as well as unstructured techniques. The method is conducive to the recall of concrete meanings over a short period of time and can also improve comprehension and appropriate usage of vocabulary.

*The Derivative Method*

In addition to the keyword method, the use of derivatives can be an effective technique to improve vocabulary learning in a foreign language. Derivatives are a technique that can be used to enhance meaning. According to Mastropieri and Scruggs (1998), enhanced meaning relates the content being discussed to student's prior knowledge. In a foreign language it would relate to student's prior knowledge of the English language. According to Kibby (1995) it is important to relate a new word to a word students already know without this association the word would be forgotten (p. 220).

The derivative method is most applicable in the study of Romance language (Latin based languages) or in the study of the Latin language (Krill, 1990). Between sixty to eighty percent of English words are derived from Latin (Masciantonio, 1985). According to Masciantonio (1977), the linguistic relevance of Latin originates from the fact that the English vocabulary that students hear, speak, read, and write is derived largely from Latin. Latin has much in common lexically with English and can be used for building the English vocabulary of students (Masciantonio, 1977). When Latin was taught in such a way that emphasized the derivation of English words, knowledge of English vocabulary was increased (Berelson and Steiner, 1964).

### *The Picture Method*

The derivative technique can be an effective means of vocabulary instruction in a foreign language because it is based on students' prior knowledge and represents a large percentage of English vocabulary. In addition to the keyword method and the use of derivatives, the use of pictures can be an effective technique to improve vocabulary learning in a foreign language. Pictures are one of the most powerful factors influencing memory for verbal materials (Kieras, 1978). Memory for pictures is generally superior to memory for their labels (Nelson, et.al., 1976).

The reason that pictures have been superior is the dual-code system which according to Pavo (1972) allows the pictorial stimuli to be automatically stored in imaginal and verbal systems. Visually presented words and pictures are both recalled at high levels, words somewhat better as a result of the dual storage of pictorial stimuli (e.g. Nelson and Reed, 1976; Hasher, et. al. 1976; Pellegrino, et. al., 1975; Roediger, 1980; Burton and Bruning, 1982).

The use of pictures has been more effective when used with concrete meanings. According to Pellegrino, et.al. (1975) recall and recognition of pictures and concrete words is consistently better than that of abstract words. The presence of dual memory codes for pictorial (contrasted to verbal) stimuli was facilitative in short term retention (Pellegrino,

et.al., 1975, p.100; Tversky and Sherman, 1975).

Previous studies have demonstrated powerful effects from the use of pictures to learn word pair associations (Bulgelski, Kidd, and Segman, 1968; Bower, 1970). In a foreign language, vocabulary learning can be viewed as learning a series of paired associations (consider the word itself as one member of the pair and its meaning as the other member). A picture can be effectively utilized to tie a sound of an unfamiliar foreign word to its meaning (Ott, et.al., 1973). In a study by Ott, et.al. (1973) concluded that the use of interactive pictures aided significantly in learning the meanings of foreign words.

The use of pictures can be an effective technique because it relies on the dual code system which allows information to be stored in both imaginal and verbal systems. It has been an effective technique for the memory of concrete meanings in short term recall. The technique has been an effective means of associating foreign words and their meanings.

### *Summary*

The research has established the use of the keyword method, derivatives and pictures as effective techniques that can be used in the learning of foreign language vocabulary.

The use of a mnemonic technique can greatly aid students in learning vocabulary. Each of the techniques has their own benefits as well as their limitations in the foreign language classroom. The purpose of this study was to examine the effectiveness of the keyword

method, derivatives, and pictures in the foreign language classroom. Foreign language students whose vocabulary instruction incorporated derivatives had a higher retention of vocabulary than those students who used pictures, the keyword method, or an unstructured mnemonic technique. Foreign language students who used an unstructured technique had a lower retention of vocabulary than those students whose vocabulary instruction incorporated a mnemonic technique.

## Chapter III

### Methods

#### *Subjects*

The subjects included were seventy-six students enrolled in a Latin I course in a suburban Ohio school. All subjects had no prior exposure to second declension neuter nouns. The seventy-six students were assigned (convenience sampling) to four sections of Latin I. Groups were then randomly assigned to a condition.

#### *Materials*

The students in all conditions were asked to learn fifteen Latin neuter nouns and their English meanings. Each noun had the Latin form and a keyword, a derivative, picture, or meaning.

The keyword condition involved a keyword that bared an acoustic or orthographical resemblance to the foreign word. The condition involved placing the keyword and the definition of the vocabulary word in a meaningful sentence. In the keyword condition, during the study, the students used fifteen 7.6 x 12.7 cm white cards, each with the Latin

vocabulary word and its keyword. Students in the derivative condition used fifteen cards with the Latin vocabulary word and its defined derivative. The materials involved an English word that etymologically originated from the foreign word and its definition. The technique relied on student's knowledge of English vocabulary to enhance the meaning of the foreign vocabulary. In the picture condition students used fifteen cards with the Latin vocabulary word and a pictorial representation of the meaning. The method involved the use of paired associations representing the foreign word as one member and the its meaning as the other member. In the unstructured condition the students were given a list of the fifteen Latin vocabulary words and their English meanings. All stimuli (Latin word, keyword, derivative, and English equivalent) are listed in Appendix A. All pictorial stimuli (Latin word and picture) are listed in Appendix B.

### *Procedure*

Students were tested in a quiet room in the school building. In all conditions, students were told that they would be asked to learn the meanings of some Latin nouns during these sessions.

**Keyword Condition.** For each sample word, students were given the Latin word as well as the keyword and the translation (e.g., *argentum*, silver, and Argentina). They were instructed in use of the keyword method and practiced with the cards for each word.



**Derivative Condition.** For each sample word students were given the Latin word and the derivative with definition (e.g., *argentum*, *argentic*, and containing silver). They were instructed in use of the derivative method and practiced with the cards for each word.

**Picture Condition.** For each sample word students were given the Latin word and a picture representing the meaning. They were instructed in the use of the picture method and practiced with the cards for each word.

**Unstructured Condition.** Students in this condition were given a list of the words and their meanings. They were told only to try to remember each word and its meaning.

After presentation of the sample words, students were allotted ten minutes to study with the materials. Following the study time, students were given a ten question multiple choice test. In Experiment 1, the test consisted of ten questions which presented the Latin word and five English choices. A copy of the test is presented in Appendix C.

The following day the students were again given the materials and allotted ten minutes to study. Following the study time, students were given a ten question multiple choice test. In Experiment 2, the test consisted of ten questions which presented the English word and five Latin choices. A copy of the test is presented in Appendix D.

It was hypothesized that the vocabulary retained by the subjects would differ according to which technique was used and that foreign language students whose vocabulary

instruction incorporated mnemonic method had a higher retention of vocabulary than those students who used pictures, the derivatives, or the unstructured technique. Foreign language students who used an unstructured technique had a lower retention of vocabulary than those students whose vocabulary incorporated a mnemonic technique. The null hypothesis was that the vocabulary retained by the subjects would not differ according to which mnemonic technique was used.

## Chapter IV

### Results

Students' responses were scored on a strict criterion (subjects were given credit for recalling a word only if it was recalled next to the appropriate numbered position on the answer sheet). Performance differences among conditions were assessed using ANOVA.

An alpha level of .05 was used as the criterion of statistical analysis.

#### *Experiment 1: Forward Recall (Latin to English)*

<u>Sum of Variance</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F Ratio</u>
Between	10.5	(K-1) 3	3.5	2.96
Within	85.2	(N-K) 72	1.18	
Total	95.7	75	1.27	

This analysis,  $F(3, 72) = 2.76$ ,  $MSe = 2.96$ ,  $p < .05$  showed a difference between the conditions. The null hypothesis was rejected. The vocabulary retained by the subjects differed according to which mnemonic technique was used. Since there was significance, the Scheffe Test was applied to ascertain where significance occurred.

*Scheffe Tests:*

Derivative vs. Vocabulary List	.624
Derivative vs. Picture	.854
Derivative vs. Keyword	.101
Vocabulary List vs. Picture	2.93
Vocabulary List vs. Keyword	.221
Pictures vs. Keyword	.101

Since  $2.93 > 2.76$ , it was concluded that the unstructured vocabulary condition showed significant difference over the picture condition.

*Experiment 2: Backward Recall (English to Latin)*

Sum of Variance	Sum of Squares	df	Mean Square	F Ratio
Between	369.7	(K-1) 3	123.2	-30.49
Within	-290.9	(N-K) 72	-4.04	
Total	78.8	75	119.16	

This analysis,  $F(3, 72) = 2.76$ ,  $MSe = -30.49$ ,  $p < .05$  showed no difference between the conditions. The null hypothesis was accepted. There was no difference in the vocabulary retained by subjects according to which mnemonic technique was used.

## Chapter V

### Discussion

The use of mnemonic techniques to aid in recall has been used since the time of the ancient Greeks (Yates, 1966). Lately mnemonic techniques have been the subject of research interest because it offers an effective means of remembering certain kinds of information (Bugelski, 1972). Prior research has established the keyword method, derivatives, and the use of pictures as effective mnemonic techniques to aid in the retention of foreign language vocabulary.

This study set out to examine the effectiveness of the various techniques to see if one technique was superior over the others. In Experiment 1, the forward recall of Latin vocabulary was examined to see which technique (the keyword, derivative, picture, or unstructured method) would be more effective. The results showed that all four methods were effective, with the picture method being the least effective especially when compared to the unstructured vocabulary list. The result most likely occurred because of the interpretative nature of the pictures. In Experiment 2, the backward recall of Latin

vocabulary was examined to see which technique would be more effective. The results showed that there was no significant difference between the methods. The keyword, derivative, picture, and unstructured method were all effective.

Some important limitations of the study need to be pointed out. The vocabulary was limited to one language and only included concrete nouns. The vocabulary did not include abstract nouns, verbs, or idioms which would be more difficult to construct mnemonics for. The study also focused only on short term retention of the vocabulary. The effectiveness of the methods could be quite different in long term retention which could be a topic of study in later research. The study also did not take into account the impact the native language might have had on retrieval of the Latin vocabulary.

The experiments were effective in supporting the keyword, derivative, and picture method as effective techniques in the short term recall of foreign language vocabulary. The results also showed that the unstructured vocabulary lists were also an effective technique. Any of these methods can be effective. The methods may not be appropriate for all learners, but there is the possibility that some, especially those who have difficulty with foreign languages, will receive particular benefits from any one of these techniques.

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## Appendix A

### Vocabulary used in Experiments

## Vocabulary used in the experiments

Word	Meaning	Mnemonic	Derivative
Aedificium	Building	Ed affix him to a building	Edifice: A large building
Argentum	Silver	Silver can be found in Argentina	Argentive: Containing silver
Arma	Weapon	There are no weapons on the arm chair	Armory: A place weapons are held
Atrium	Hall	The hall trees could use a trim	Atrium: The upper chambers of the
Aurum	Gold	Gold has a special aura	Auric: Containing gold
Bellum	War	War has no belles	Bellicose: Eager to fight
Consilium	Help	If you need to help go counsel them	Counselor: A legal advisor
Donum	Gift	A donut makes a great present	Donor: A giver
Fruentum	Wheat	There's no fruit in my creme of wheat	Fruentacious: Having the nature of wheat
Ovum	Egg	I cooked the eggs in the oven	Oval: Having the shape of an egg
Saxum	Rock	The saxophone rocks	Saxicolous: Growing among rocks
Scutum	Shield	With a shield there's no need to scoot	Scutiferous: Carrying a shield
Telum	Sword	Tell him to put his sword away	Scutellum: A small horny scale
Ventum	Wind	The wind went to him	Ventilate: To circulate air
Vitrum	Glass	Take the vitamins with a glass of water	Vitric: Having the nature of glass

## Appendix B

### Pictures used in Experiments

Pictures used in experiments

WORD

PICTURE

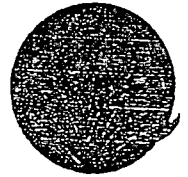
WORD

PICTURE

AEDIFICIUM



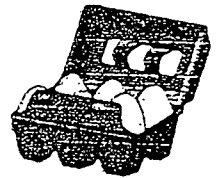
FRUMENTUM



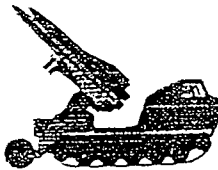
ARGENTUM



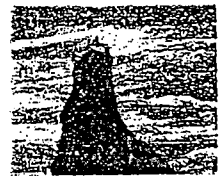
OVUM



ARMA



SAXUM



ATRIUM



SCUTUM



AURUM



TELUM



BELLUM



VENTUM



CONSILIUM



VITRUM



DONUM



## Appendix C

Test used in Experiment 1



Test used in Experiment 1

Directions: Choose the correct meaning for the following Latin words.

1. Aedificium

- a. silver
- b. hall
- c. building
- d. help
- e. gold

2. Aurum

- a. silver
- b. hall
- c. gold
- d. weapons
- e. sword

3. Atrium

- a. hall
- b. building
- c. gold
- d. wind
- e. war

4. Frumentum

- a. egg
- b. wheat
- c. gift
- d. wind
- e. glass

5. Consilium

- a. wheat
- b. help
- c. gift
- d. war
- e. building

6. Scutum

- a. shield
- b. war
- c. weapons
- d. sword
- e. rock

7. Telum

- a. weapons
- b. shield
- c. sword
- d. war
- e. silver

8. Ventum

- a. glass
- b. wind
- c. hall
- d. rock
- e. gift

9. Saxum

- a. shield
- b. gift
- c. glass
- d. rock
- e. egg

10. Vitrum

- a. wind
- b. hall
- c. gift
- d. glass
- e. shield

## Appendix D

Test used in Experiment 2

R00258579Z

## Test used in Experiment 2

Directions: Choose the correct Latin word for the following meanings.

### 1. Weapons

- a. aedificium
- b. aurum
- c. bellum
- d. telum
- e. arma

### 6. Gift

- a. consilium
- b. donum
- c. frumentum
- d. ovum
- e. vitrum

### 2. Glass

- a. telum
- b. ventum
- c. vitrum
- d. frumentum
- e. saxum

### 7. Sword

- a. bellum
- b. arma
- c. scutum
- d. telum
- e. atrium

### 3. Building

- a. consilium
- b. aedificium
- c. argentum
- d. frumentum
- e. bellum

### 8. Rock

- a. scutum
- b. saxum
- c. aurum
- d. ventum
- e. telum

### 4. Gold

- a. argentum
- b. atrium
- c. aurum
- d. arma
- e. telum

### 9. Shield

- a. scutum
- b. bellum
- c. arma
- d. telum
- e. consilium

### 5. Egg

- a. frumentum
- b. donum
- c. aurum
- d. ovum
- e. saxum

### 10. Wind

- a. saxum
- b. vitrum
- c. ventum
- d. telum
- e. ovum