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**LEARNING STYLES AND LEXICAL PRESENTATION MODES**

*Zohreh Kassaian  
University of Isfahan, Iran*

*The present study investigated the effect of two types of teaching methods on the retention of unfamiliar words. Sixty-six university students having either auditory or visual learning styles participated in teaching method environments which were either visual or aural. The retention of the vocabulary items was measured by tests of recall and recognition immediately after each training session, and after one week. Data analyses indicated that: 1) the subjects with visual style of learning retained vocabulary items they had learned visually better than the items they had learned aurally, but the subjects with aural style of learning did not show better retention for items they had learned aurally, 2) all the subjects retained visually presented items better than aurally presented items in the immediate and delayed tests, 3) the type of test, that is, recognition or recall, did not have any significant effect on the retention of visually/aurally-presented items, 4) the participants performed better in recognition test than in recall test for both aurally- and visually-presented items, 5) memory loss was greater for visually learned items compared to aurally learned items after one week.*

*Key words: learning style, teaching method, visual, aural*

*En esta investigación se ha estudiado el efecto de dos estilos de enseñanza relacionados con la presentación de vocabulario. Sesenta y seis estudiantes universitarios con estilos de aprendizaje oral y visual participaron en un estudio en dos contextos de aprendizaje en los que se favorecía el aprendizaje oral o visual. La retención de vocabulario se midió con pruebas de memoria y reconocimiento inmediatamente después de cada sesión de aprendizaje y después de una semana. El análisis de la información*

*recabada indicó que: 1) Los sujetos con un estilo visual de aprendizaje retenían mejor el vocabulario aprendido de forma visual, pero lo sujetos con un estilo de aprendizaje oral no mostraban mejor retención de los vocablos que habían aprendido de forma oral, 2) todos los sujetos retuvieron el vocabulario presentado de forma visual mejor que el presentado de forma oral, tanto en las pruebas inmediatas como en las retrasadas, 3) el tipo de prueba, reconocimiento o recuerdo, no tenía una correlación significativa en la retención del vocabulario presentado de forma visual u oral, 4) los participantes obtuvieron mejores resultados en el test de reconocimiento que en el test de recuerdo tanto para el vocabulario presentado de forma oral como el presentado de forma visual, 5) el olvido fue mayor para el vocabulario aprendido de forma visual comparado con el aprendido de forma oral, una semana más tarde.*

*Palabras clave: estilo de aprendizaje, método de enseñanza, visual, oral.*

## **1. Introduction**

Vocabulary has been one of the most actively researched topics in second language acquisition as vocabulary has a great impact on successful communication (Level, 1989; Meara, 1995). According to many teachers of foreign language reading comprehension, when students are faced with an unfamiliar text, the first challenge seems to be its vocabulary (Grabe & Stoller, 1997). Moreover, when students confront a text which includes many new words, they may quickly despair or be discouraged. Knowing that language learning style is one of the factors that help determine how the students learn a second or foreign language (Celce-Murcia, 2001) may help teachers choose more effective teaching methods. It is stated that individual learning styles can work together or conflict with a given instructional methodology. If there is harmony between the student's style of learning and the instructional methodology and materials, then the student is likely to perform well, feel confident, and experience low anxiety. Among numerous distinctions emerging from the literature, being a visual or auditory learner is considered particularly relevant and useful to understanding the process of language learning (Reid, 1995; Ehrman, 1996). This research aims at testing

the hypothesis that a learner with visual/aural style can perform better if he/she is instructed in a matching environment.

## **2. Statement of the Problem**

Vocabulary is basic to communication and often seems as the greatest source of problem by second language learners. No matter how well the student learns grammar, no matter how successfully the sounds of an L2 are mastered, without words to express a wide range of meanings, communication in L2 cannot happen in any meaningful way (McCarthy & Carter, 1990). Clearly, giving the mass of words to the learners does not guarantee that they will learn them all. It would be beneficial if students were given guidance on how to approach this task. If students tried to discover their learning styles and used strategies compatible with their styles of learning, they could help themselves learn vocabulary items more easily and more efficiently.

## **3. Significance of the Study**

The primary objective of this research is finding effective ways for increasing vocabulary breadth. The means for achieving this objective includes training learners to learn new words by means of an instructional method compatible with their learning styles through visual aids, such as reading, or aural aids, such as listening to tapes. The goal of this study is to help teachers and students choose the type of aids or instructions which matches the learner's style in order to achieve the most benefit in memory retention and recall. One way to guide students in dealing with unfamiliar words is teaching them memory strategies (Mercer, 2005). This study will show which type of learning strategy (using visual/aural aids) causes items to be retained in memory for a longer period of time. The outcomes of this research can benefit researchers, teachers and students. The results can provide means for using these techniques in the instructional setting.

#### 4. Research Questions and Hypotheses

For the purpose of this study visual and auditory learning styles of people were checked to see if they worked together with or conflicted with visual and aural methods of instruction. More specifically, this research aimed at testing the hypothesis that a learner with a visual/auditory style can perform better if he/she is instructed in a matching environment. Accordingly, the following questions were addressed:

1. Can a person's style of learning be aided by matching type of instruction?
2. Does the type of test, that is, recognition or recall, demonstrate any significant effect on the retention of visually/aurally-presented items?
3. Which testing procedure (recall/recognition) reveals higher retention?
4. How do visual/aural types of instruction affect short- and long-term memory?

Concerning the above questions the following answers can be hypothesized:

1. A person with visual style of learning can be aided by matching type of instruction.
2. A person with aural style of learning can be aided by matching type of instruction.
3. The type of test, that is, recognition or recall, does not have any significant effect on the retention of visually/aurally-presented items.
4. Participants will perform better in the test of recognition than in the test of recall since the recall test is assumed to be aided by generating information rather than reading it, but recognition test could be accomplished by both of the two processes- a fast acting process like reading, and a slower, more effortful process like generating (Durgunoglu & Roediger, 1987, p. 380).
5. The effect of visual/aural types of instruction will not be the same regarding short- and long-term memory.

## **5. Review of the Literature**

Brown (1994) states that style is a term that refers to consistent and rather enduring tendencies or preferences within an individual. Styles are those general characteristics of intellectual functioning (and personality type, as well) that especially pertain to you as an individual, that differentiate you from someone else. For example, you might be more visually-oriented, more tolerant of ambiguity, or more reflective than someone else. These would be styles that characterize a general pattern in your thinking or feeling. People's styles are determined by the way they internalize their total environment, and since that internalization process is not strictly cognitive, we find that physical, affective, and cognitive domains merge in learning styles.

Keefe and Ferrell (1990, p.16) define style as, "A complexus of related characteristics in which the whole is greater than its parts. Learning style is a gestalt combining internal and external operation derived from the individuals' neurobiology, personality and development, and reflected in learner behavior". Dornyei and Skehan (2003) make a distinction between cognitive style which is defined as a predisposition to process information in a characteristic manner and learning style which is defined as "a typical preference for approaching learning in general" (p. 602).

Ausubel (1968) identified at least 18 different styles. Joseph Hill (1972) defined some 29 different factors that make up the cognitive style 'map' of a learner; these include just about every imaginable sensory, communicative, cultural, affective, cognitive, and intellectual factor. Dunn et al. (1989), Trayer (1991), and Brown (1973) reviewed a number of styles relating to the teaching/learning process in general and specifically to second language learning. However, only a few of the possible number of styles have received the attention of second language researchers in recent years.

Oxford and Anderson (1995, p. 605) state that individual learners have a composite of at least 20 style dimensions, of which eight seem to be particularly important for L2 learning: global vs. analytic; field dependent vs. field independent; feeling vs. thinking; impulsive vs. reflective; intuitive-

random vs. concrete-sequential; closure-oriented vs. open; extroverted vs. introverted; visual vs. auditory vs. hands-on (or tactile/kinesthetic).

Among numerous distinctions emerging from the literature, being visual or auditory is considered particularly relevant and useful to understanding the process of language learning (Reid, 1995; Ehrman, 1996). Language learning style is one of the factors that help to determine how the students learn a second or foreign language (Celce-Murcia, 2001).

Individual learning styles can work together with or conflict with a given instructional methodology and research findings are controversial in this regard. Many educational psychologists believe that there is little evidence for the efficacy of most learning style models, and furthermore, that the models often rest on dubious theoretical grounds (Curry, 1990). According to Stahl (2002) assessing children's learning styles and matching them to instructional methods failed to find any effect on their learning. One of the most widely-known theories assessed by Coffield's team was the learning styles modes of Dunn and Dunn (1984), a VAK model. This model is widely used in schools in the United States, and 177 articles have been published in peer-reviewed journals referring to this model. The conclusion of Coffield et al. (2004) was that forceful claims made for impact are questionable because of the limitations in many of the supporting studies and the lack of independent research on the model. In contrast, a 2005 report provided evidence confirming the validity of Dunn and Dunn's model, concluding that if learning-style preferences of the students were matched with complementary instruction their academic achievement and attitudes toward learning would improve (Lovelace, 2005).

## **6. Methodology**

In this section the procedure for selecting the participants, materials, testing, and statistical analysis are dealt with.

### **6.1. Participants**

Sixty-six first year Isfahan University students including 25 males and 41 females majoring in English language and literature participated in this study. The native language of the participants was Persian and they lived in a Persian speaking environment. English was their L2 and they had learned it as a foreign language. Their age ranged between 18 and 25 years with the average of 19. They were checked for visual and auditory impairments as they were going to be instructed under visual/aural conditions. 37 participants had visual style of learning (eye group) and 29 had aural style (ear group).

### **6.2. Materials**

Different materials were used for the experimental treatment and testing. In order to check the participants' learning styles, VAK (visual, auditory, kinesthetic) test of learning styles (Chislet & Chapman, 2005) was used. The participants completed statements like "when operating a new piece of equipment for the first time, I prefer to ... read the instructions" or "listen to or ask for an explanation". According to the type of answers the participants chose, as the ones most matching their behavior, they were marked as having either a visual or an aural style of learning. The kinesthetic section of the VAK test was omitted because it was irrelevant for the present research as the kinesthetic ability was not considered as a variable.

As the consistency of visual, auditory and kinesthetic preferences were found to be questionable (Coffield et al., 2004), the students' style preferences was double-checked using a self-reporting questionnaire, on which the subjects rated their own preferences. The students rated statements like "When I read instructions, I learn them better", and "I learn more when I listen to instructions as I study" on a five-point scale ranging from "strongly agree" to "strongly disagree". The results of the self-reporting questioner were checked against the results of the VAK measure and the participants were marked as visual/auditory only if the results of the two tests matched.

Three students, whose results of the two tests did not agree, were eliminated and the number of the participants was reduced to 66 students.

40 vocabulary items in an imaginary language were invented by the experimenter to be taught to the participants. Half of these words had one syllable and the other half had two syllables. The reason for limiting the number of syllables was to nullify the effect of the word length as, "the memory span for a sequence of long words (e.g. *university, temperature, ...*) is lower than the span for a sequence of short words (e.g. *deck, list, ...*)" Murray, 1995, p. 97). 40 English words were chosen as the synonyms for the imaginary vocabulary items. The words and their meanings matched in the number of syllables and the initial letter. For example the word "egg" matched with the intended word "epp", and the word "pencil" matched with "peshtil". In order to make sure that all the participants knew the English words, they were selected from among 200 vocabulary items in the first elementary English textbook for Persian students.

Recognition testing materials included 40 multiple-choice questions half of which had one syllable and the other half two syllable words. Three alternatives were presented as possible choices for the intended meanings. The target words and the two distractors were formed by the same methodology. They all began with the same letter and had the same number of syllables. They were imaginary words among which only one previously-instructed word was the right choice as a synonym for the English words. For example, *epp* was the appropriate one-syllable choice for *egg* and *peshtil* was the correct two-syllable choice for *pencil*.

For the test of recall a white piece of paper was given to the participants, on which they were instructed to write as many of the 40 words as they remembered.

### 6.3. Procedure

Instructional and testing procedures were conducted in a language laboratory equipped with instruments to be used for visual and aural instructions. Both eye and ear groups were instructed in both visual and aural styles. All the



teaching and testing materials were recorded on tape for the aural condition. The participants had personal headphones while they were listening to the speaker through individual tape recorders.

The subjects were taking a lab course of instruction and one of the usual sessions was devoted to the experimental task. In order to make sure that all the subjects understood the procedure, the whole process was explained to them in their native language. They were specifically told that some words which were not, in fact, real words would be presented to them in either visual or aural styles. They were also told that they would be tested for the retention of the target words immediately after the instruction phase.

In the instruction phase the targets and their meanings were presented to the participants. The participants were exposed to half of the words and their meanings visually and to the other half aurally. Half of the participants were instructed first visually and then aurally. The order for the other half was reversed. One-syllable words were taught first followed by two-syllable words to half of the participants. This order was reversed for the other half of the participants. Words and their meanings were presented twice with 5-second pause intervals.

The testing procedure included two conditions— immediate and delayed. The participants were tested for each method of instruction once immediately after the instructional phase and once after a week. The testing procedure was the same for the first and the second testing conditions. The participants took the recall test first and then the recognition test. For the test of recall the participants were presented a piece of paper on which they could see the meaning of the intended words (e.g., ... egg, or ... pencil). They were instructed to write down the previously presented words (*epp* as a synonym for egg and *peshtil* as a synonym for pencil). For aural learning, participants were not marked down for spelling errors as far as the written and spoken words matched acoustically. After the recall test the recognition test was applied. The total time assigned to each instruction-testing session was 40 minutes.

## **7. Data Analysis**

At this stage the findings were analyzed and interpreted in order to find out whether the use of teaching methods produced any statistically significant impact on retrieving new words in the eye or ear groups. To accept or reject the stated hypotheses, the scores were analyzed using four ANOVAs and a number of t-tests. The level of significance was .05.

### **7.1. Testing the Hypotheses**

#### **7.1.1. Addressing Hypothesis Number One**

This hypothesis states that: a person with visual style of learning can be aided by matching type of instruction. Within group comparisons revealed that:

7.1.1.1. The eye group retained visually encoded items significantly better ( $p = .001$ ) than aurally encoded items in the test of recall in the first week (mean=10.6757 and 7.2432,  $SD=3.5594$  and 3.3616 for visual and aural instructions respectively) ( $p = .001$ ) (Table 1).

**Table 1. Scheffe Post Hoc Tests: Recall for Eye Students**

Group	Group	Mean Difference	Sig.
1.00	2.00	3.2703*	.002
	3.00	3.4324*	.001
	4.00	4.7027*	.000
2.00	1.00	-3.2703*	.002
	3.00	.1622	.998
	4.00	1.4324	.390
3.00	1.00	-3.4324*	.001
	2.00	-.1622	.998
	4.00	1.2703	.499
4.00	1.00	-4.7027*	.000
	2.00	-1.4324	.390
	3.00	-1.2703	.499

\* The mean difference is significant at the .05 level.

1= Visual week 1    2= Visual week 2    3= Aural week 1    4= Aural week 2

7.1.1.2. The eye group retained visually encoded items better than aurally encoded items in the test of recall in the second week but the difference was not statistically significant ( $p = .390$ ) (Table 1) (mean=7.4054 and 5.9730, SD=3.6168 and 3.6093 for visual and aural instructions respectively).

7.1.1.3. The eye group retained visually encoded items significantly better ( $p = .016$ ) than aurally encoded items in the test of recognition in the first week (Table 2) (mean=17.4324 and 15.4595, SD=2.1672 and 2.5342 for visual and aural instructions respectively).

**Table 2. Scheffe Post Hoc Tests: Recognition for Eye Students**

Group	Group	Mean Difference	Sig.
1.00	2.00	2.2432*	.004
	3.00	1.9730*	.016
	4.00	4.0811*	.000
2.00	1.00	-2.2432*	.004
	3.00	-.2703	.977
	4.00	1.8378*	.029
3.00	1.00	-1.9730*	.016
	2.00	.2703	.977
	4.00	2.1081*	.008
4.00	1.00	-4.0811*	.000
	2.00	-1.8378*	.029
	3.00	-2.1081*	.008

\* The mean difference is significant at the .05 level.

1= Visual week 1    2= Visual week 2    3= Aural week 1    4= Aural week 2

7.1.1.4. The eye group retained visually encoded items significantly better ( $p = .029$ ) than aurally encoded items in the test of recognition in the second week (Table 2) (mean=15.1892 and 13.3514, SD=2.6961 and 2.9175 for visual and aural instructions respectively).

As the result was not significant in one condition (see 7.1.1.2.) a t-test was conducted to compare retention of visually and aurally encoded items for the eye group in the first and second weeks for both recall and

recognition tests. The results showed that the retention of the visually encoded items was significantly higher than the aurally encoded items ( $t=4.261$ ,  $p=.000$ ) (Table 3).

**Table 3. Comparison of Visual and Aural Instruction for Eye Students**

Group	N	Mean	SD	SEM	T	df	P
Visual	37	12.6757	2.1706	.3568	4.261	72	.000
Aural	37	10.5068	2.2083	.3630			

It can be concluded, that the first hypothesis is accepted. A person with visual style of learning can be aided by matching type of instruction.

### 7.1.2. Addressing Hypothesis Number Two

This hypothesis states that: a person with auditory style of learning can be aided by matching type of instruction. Within group comparisons revealed that:

7.1.2.1. The ear group retained visually encoded items significantly better ( $p=.013$ ) than aurally encoded items in the test of recall in the first week (Table 4) (mean=10.5517 and 6.7586, SD=4.7025 and 4.1027 for visual and aural instructions respectively).

**Table 4. Scheffe Post Hoc Tests: Recall for Ear Students**

Group	Group	Mean Difference	Sig.
1.00	2.00	3.4483*	.029
	3.00	3.7931*	.013
	4.00	6.7586*	.000
2.00	1.00	-3.4483*	.029
	3.00	.3448	.993
	4.00	3.3103*	.039
3.00	1.00	-3.7931*	.013
	2.00	-.3448	.993
	4.00	2.9655	.081
4.00	1.00	-6.7586*	.000
	2.00	-3.3103*	.039
	3.00	-2.9655	.081

\* The mean difference is significant at the .05 level.

1= Visual week 1    2= Visual week 2    3= Aural week 1    4= Aural week 2

7.1.2.2. The ear group retained visually encoded items significantly better ( $p = .039$ ) than aurally encoded items in the test of recall in the second week (Table 4) (mean=7.1034 and 3.7931, SD=4.9233 and 3.2445 for visual and aural instructions respectively).

7.1.2.3. The ear group retained visually encoded items significantly better ( $p = .005$ ) than aurally encoded items in the test of recognition in the first week (Table 5) (mean=17.2069 and 14.0345, SD=1.9708 and 3.7842 for visual and aural instructions respectively).

**Table 5. Scheffe Post Hoc Tests: Recognition for Ear Students**

Group	Group	Mean Difference	Sig.
1.00	2.00	2.6207*	.030
	3.00	3.1724*	.005
	4.00	5.4138*	.000
2.00	1.00	-2.6207*	.030
	3.00	.5517	.938
	4.00	2.7931*	.018
3.00	1.00	-3.1724*	.005
	2.00	-.5517	.938
	4.00	2.2414	.086
4.00	1.00	-5.4138*	.000
	2.00	-2.7931*	.018
	3.00	-2.2414	.086

\* The mean difference is significant at the .05 level.

1= Visual week 1    2= Visual week 2    3= Aural week 1    4= Aural week 2

7.1.2.4. The ear group retained visually encoded items significantly better ( $p = .018$ ) than aurally encoded items in the test of recognition in the second week (Table 5) (mean=14.5862 and 11.7931, SD=3.5809 and 3.4783 for visual and aural instructions respectively).

The above findings show that the ear group retained visually instructed items better than aurally instructed items in the first and the second weeks in tests of recall and recognition. Therefore, it can be

concluded that the second hypothesis is rejected. A person with aural style of learning cannot be aided by matching type of instruction.

### **7.1.3. Addressing Hypothesis Number Three**

This hypothesis states that the type of test, that is, recognition or recall does not have any significant effect on the retention of visually/aurally-presented items. Within group comparisons revealed that:

- 7.1.3.1. Both eye and ear groups retained visually encoded items better than aurally encoded items in the first and the second weeks in the test of recall. (Observe the above-mentioned items 7.1.1.1., 7.1.2.1., 7.1.1.2., and 7.1.2.2.).
- 7.1.3.2. Both eye and ear groups retained visually encoded items better than aurally encoded items in the first and the second weeks in the test of recognition. (Observe the above-mentioned items 7.1.1.3., 7.1.2.3., 7.1.1.4., and 7.1.2.4.).

It can be concluded, that the third hypothesis is accepted. The type of test, that is, recognition or recall, does not have any significant effect on the retention of visually/aurally-presented items. This means that both tests of recall and recognition showed that both eye and ear groups retained visually encoded items better than aurally encoded items in the first and the second weeks.

### **7.1.4. Addressing Hypothesis Number Four**

This hypothesis states that participants will perform better in the test of recognition than in the test of recall. Within group comparisons revealed that:

- 7.1.4.1. The eye group performed significantly better in the test of recognition than in the test of recall in the first and second weeks in both visual and aural conditions. ( $t = -13.805$ ,  $p = .000$ ) (Table 6).



**Table 6. Comparison of Tests of Recall and Recognition for Eye Students**

Group	N	Mean	SD	df	t	Sig.
Recall	37	7.8243	2.9076	72	-13.805	.000
Recognition	37	15.3581	1.6014			

7.1.4.2. The ear group also performed significantly better in the test of recognition than in the test of recall in the first and second weeks in both visual and aural conditions. ( $t = -9.781$ ,  $p = .000$ ) (Table 7).

**Table 7. Comparison of Tests of Recall and Recognition for Ear Students**

Group	N	Mean	SD	df	t	Sig.
Recall	29	7.0517	3.5168	56	-9.781	.000
Recognition	29	14.4052	2.0060			

It can be concluded, that the fourth hypothesis is accepted. The participants performed better in the recognition test than in the recall test.

#### **7.1.5. Addressing Hypothesis Number Five**

This hypothesis states that the effect of visual/aural type of instruction will be the same regarding short- and long-term memory. Within group comparisons revealed that:

- 7.1.5.1. The retention of visually-encoded items for the eye group was significantly better in the first week than in the second week in the test of recall ( $p=.002$ ) (Table 2) and in the test of recognition ( $p=.004$ ) (Table 2).
- 7.1.5.2. The retention of visually-encoded items for the ear group was significantly better in the first week than in the second week in the test of recall ( $p=.029$ ) (Table 4) and in the test of recognition ( $p=.030$ ) (Table 5).
- 7.1.5.3. The retention of aurally-encoded items for the eye group was better in the first week than in the second week in the test of recall, but the difference was not significant ( $p=.499$ ) (Table 1). This difference was significant in the test of recognition ( $p=.008$ ) (Table 2).
- 7.1.5.4. The retention of aurally-encoded items for the ear group was better in the first week than in the second week in the test of recall, but the difference was not significant ( $p=.081$ ) (Table 4). This difference was also not significant in the test of recognition ( $p=.086$ ) (Table 5).

Since the retention of the items was significantly better in the first week than in the second week for some groups (see numbers 7.1.5.1. and 7.1.5.2. above), but not significantly better for other groups (see numbers 7.1.5.3. for one part, and 7.1.5.4.) a t-test was conducted to compare retention of items in the first and the second weeks for both eye and ear students. Table 8 shows that the participants retained items significantly better in the first week than in the second week ( $t= 5.975$ ,  $p=.000$ ).

**Table 8. Comparison between 1<sup>st</sup> and 2<sup>nd</sup> weeks for Eye & Ear Students**

Group	N	Mean	SD	SEM	t	df	p
Week 1	66	12.4545	2.2309	.2746	5.975	130	.000
Week 2	66	9.9697	2.5376	.3124			

Therefore, the fifth hypothesis is accepted and two conclusions can be drawn from the above findings:

1. The subjects can remember better in the first week than in the second week.
2. The retention of the aurally encoded items is better than the retention of the visually encoded items regarding the long-term memory. This interesting result was achieved concerning the difference between retention of aurally/visually instructed materials with regards to the immediate and delayed recall. The differences between retention of items in the first and the second weeks were significant for the visually-instructed items (see 7.1.5.1. and 7.1.5.2. above), but not significant for the aurally-instructed items (see 7.1.5.3. and 7.1.5.4. above). As there was one exception and the difference was in one condition significant for the aurally encoded items (7.1.5.3.), in order to find out if the retention of the aurally encoded items regarding the long-term memory was significantly better than the retention of visually-encoded items, a t-test was conducted. The difference between the retention of the items which had been encoded visually or aurally were found by subtracting the number of the items recalled after a week from the number of the items recalled immediately after the treatment. The mean of the difference of the visually encoded items was significantly higher than the mean of the difference of the aurally encoded items. Table 9 shows the difference ( $t= 2.159$ ,  $p= .033$ ). This shows that the memory loss is significantly greater for the visually encoded items.

**Table 9. Comparison between Visually and Aurally Encoded Items for both Eye and Ear Students**

Group	N	Mean	SD	SEM	t	df	p
visual	66	2.8788	1.6986	.2091	2.159	130	.033
aural	66	2.0909	2.4304	.2992			

At this stage the researcher was motivated to find out if there was any difference between eye and ear groups regarding retention of the visually and/or aurally instructed items. A comparison between eye and ear groups in the first and second weeks in recall and recognition tests showed that the difference between the two groups is not statistically significant. Table 10 shows the difference ( $t= 1.547, p= .127$ ).

**Table 10. Comparison between Eye and Ear Students**

Group	N	Mean	SD	SEM	t	df	p
eye	37	11.5912	1.9941	.3278	1.547	64	.127
ear	29	10.7284	2.5386	.4714			

As expected this finding shows that the style of learning does not have an impact on the retention of the encoded materials. People with visual and/or aural styles can learn vocabulary items equally well.

## 8. Discussion and Conclusion

The aim of this study was to find out if learners with visual/auditory styles of learning could perform better if they were instructed in a matching environment. The participants, who were classified into eye and ear groups, were instructed by two types of teaching methods which used either visual or aural aids for instruction. The retention of the learned material was tested immediately after the instruction and one week later by means of tests of recall and recognition. The data were analyzed and the following results were achieved:

1. People with visual styles of learning can be aided by matching types of instruction. The eye group participants retained visually instructed materials better than aurally presented ones in the tests of recall and recognition in the immediate and delayed tests. This finding is in agreement with the idea that if there is harmony between the student's style of learning and the instructional methodology and materials, then the student is likely to perform better (Celce-Murcia, 2001; Lovelace, 2005).
2. People with auditory styles of learning cannot be aided by matching types of instruction. This finding is not in agreement with the idea that learners can be aided if their learning styles will match instructional methods. The ear group participants also retained visually instructed materials better than aurally presented items in the tests of recall and recognition in the immediate and delayed tests. The finding, however, is in agreement with Stahl's finding (2002) that assessing children's learning styles and matching them to instructional methods failed to find any effect on their learning. One reason for better retention of visually encoded items even in the ear group can be that methods of teaching used for the instruction of the participants in high schools were more visual (through reading) rather than aural (through listening), and the subjects may have encoded items better and subsequently retained and retrieved them better as they were more familiar with this type of instruction.
3. The type of test, that is, recognition or recall, does not have any significant effect on the retention of visually/aurally-presented items. Recognition test was used immediately after the recall test to make sure that the obtained results were not by chance, and the similarity of the results can confirm this claim.
4. Performance is better in recognition test than in recall test. As Glover (1989), found before, selecting the correct response is much easier than producing a response from memory. The findings of this research are also consistent with the previous studies in the literature stating that a recognition test of retained information leads to better performance than a recall test (MacDougal, 1904; Postman, Jenkins, & Postman, 1948; Postman, 1950; Miremadi & Kassaian, 2005).

5. The effect of visual/aural types of instruction is not the same regarding short- and long-term memory.

5.1. The learned material is remembered better in the first week than in the second week. This finding is quite expected as information is lost in time and memory traces simply decay in strength with time, “like letters on a tombstone” (Witting & Williams III, 1984, p. 214), or “newspapers dry out, yellow, and eventually rot” (Davedoff, 1981, p. 253).

5.2. Retention of aurally encoded items is better than the visually encoded items regarding the long-term memory. Since the difference between the retention of the items instructed visually in the immediate and delayed tests was significantly higher than the difference between retention of the items instructed aurally, it can be claimed that memory loss is greater for visually encoded items, and that the aurally-encoded materials have better chances for retention regarding the long-term memory. In line with this finding is the literature showing that sensory memory will extinguish about half a second for visual information, and 3 seconds for auditory information (Cooper, 1998).

6. The type of style, that is, visual or auditory style of learning does not have any significant effect on the retention of instructed material. This finding was also quite expected. Any person is expected to be able to learn equally well regardless of his style of learning.

7. Since only the people with visual styles of learning can be aided by matching types of instruction, and people with aural styles of learning cannot, the findings of this research do not confirm the hypothesis that using teaching methods which are compatible with the learners' learning styles will give them better opportunity for learning than methods which are not in agreement with their styles of learning.

The findings of this research regarding the relationship between learning styles and teaching methods will hopefully be examined in future researches testing participants with different styles of learning and teaching methods in different conditions and environments. The better retention of

aurally encoded items in the long term memory is also worth further investigation.

### **9. Implications for Teaching and Learning**

Although the presentation stage of new lexical items in this research is in a kind of made-up language and the teaching environment is rather different from a regular SL teaching/learning situation, since both visual and auditory styles are shown to retain visually presented items better than aurally presented items, including visual aids in SL teaching environments seems to be relevant.

Since retention of aurally encoded items is shown to be better than the visually encoded items regarding the long-term memory, aural aids may also help L2 learners for retention of learned material for a longer period of time.

### **10. Limitations of the Study**

One limitation of this study is that the presentation of vocabulary items is somehow different from the way one might teach vocabulary in a normal classroom where presentation of vocabulary items does not occupy the whole teaching session.

Another limitation is related to the way the subjects were checked for visual and auditory impairments. They were just asked not to take part in the project if they had such impairments. There is the possibility that some existing impairments might not have been reported.

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