Cumhuriyet Üniversitesi Fen Fakültesi
Fen Bilimleri Dergisi (CFD), Cilt:36, No: 3 Ozel Sayı (2015)
ISSN: 1300-1949

Cumhuriyet University Faculty of Science
Science Journal (CSJ), Vol. 36, No: 3 Special Issue (2015)
ISSN: 1300-1949

The effect of audiovisual semantic priming on vocabulary retention

Samira DEZFOULIAN[1,*], Mohammad Taghi HASSANI[2], Abbas Ali ZAREI[2]

[1]*M.A. of TEFL, Department of Humanities, Faculty of Teaching English and Translation, Takestan Branch, Islamic Azad University, Takestan, Iran.*

[2]*Ph.D. of TEFL, Department of Humanities, Faculty of Teaching English and Translation, Takestan Branch, Islamic Azad University, Takestan, Iran.*

Received: 01.02.2015; Accepted: 05.05.2015

Abstract. The present study sought to investigate the effect of visual semantic priming, audio semantic priming and audiovisual semantic priming on L2 vocabulary retention. 30 male and female B.A level students of (Shahid Beheshti University) in Tehran majoring in Law in one group participated in this study. The software named Res Meter was presented to each subject with the same SOA in three pair word groups and parts: a) audio semantic priming, b) visual semantic priming, and c) audiovisual semantic priming. At the end of the experimental period, the participants received vocabulary retention posttests. Two separate one-way ANOVA procedures were used to analyze the obtained data. The results indicated Audio semantic priming and Audio Visual semantic priming has significant differences among the effects of visual semantic priming on L2 vocabulary retention. The findings of the present study may have implications for L2 learners and teachers.

Keywords: semantic priming, vocabulary retention, priming,

1. INTRODUCTION

The process of vocabulary retention involves not only meaning (sentence) but also form (association of idea). This information is important for a learner when he or she face with a new vocabulary. One of the most important ideas in word retention is that of priming. It involves presenting the word before the target word, which supposed to response if learners found out primes and targets are related or not. The first word is named prime and is usually presented for a very short period of time in scale of tens or hundreds of milliseconds and the second word is called target, the one to which response has to be made. Onset, the time between prime presentation and the target presentation is called stimulus onset asynchrony, or SOA (Harley, 2005).

These pressures may be used pictures or sentence or auditory so we are focused on audio, visual and audiovisual semantic priming. One motivation for resolving the question of the nature of the priming effect is that this effect often has been used to elucidate fundamental principles about the structure and processes of semantic memory. Specifically, the underlying nature of the priming effect has implications for the plausibility of distributed models of semantic memory. This integration can help a learner to need less time to retain vocabulary. The aspect of word retention is the extent to which similar processes and representations that are used during reading and listening process, seldom investigated. The broad goal of the current experiments was to compare more directly the time course of written and spoken word retention and determine if there are differences that reflect the modality constraints audio, visual and audiovisual on retention processes. These experiments utilized a word pair semantic priming

* Corresponding author. Samira DEZFOULIAN

Special Issue: The Second National Conference on Applied Research in Science and Technology

paradigm in which it has been shown that words are recognized faster when they are preceded by a semantically related word than when they are preceded by a semantically unrelated word (Meyer & Schvaneveldt, 1971; Neely, 1977). Therefore, we selected semantically related word in three modalities: audio semantic priming, visual semantic priming and audiovisual semantic priming to consider which one is more effective than others for retention vocabulary. It is evident that input has great importance in second language acquisition (SLA). This implies that a greater level of attention needs to be paid to the modality of input in language learning (Sydorenko, 2010).

The present investigation is aimed to the effect of different aspects of semantic priming (audio, visual, audio visual) on improving L2 learners' vocabulary retention these three modalities of effect to vocabulary retention.

2. STATEMENT OF THE PROBLEM

Until recent years, traditional methods were used for teaching vocabulary. Most teachers have not paid enough attention to effective ways of teaching vocabulary development. As Huh (2009) stated, in the past, teachers often ignored vocabulary learning and learning and enough attention had not been paid to them because they believed that vocabulary could easily be learned by learner themselves. Therefore, they prefer to teach vocabulary indirectly .

Methods and strategies dealing with vocabulary items are very important and useful one of the strategies is semantic priming through vocabulary retention which enables students to retain words and improve vocabulary knowledge and better understand unknown words. So far, there has been more research about the semantic priming on vocabulary retention, but there has been a considerable gap in the relationship between effectiveness of the audio and visual semantic priming in vocabulary retention of Iranian EFL learner at different level of language learning.

3. REVIEW OF LITERATURE

3.1. Vocabulary retention

As mentioned before, word knowledge has a major role in communication (Krashen, 1989), and it is essential for both production and comprehension of verbal and written texts in a second language. Therefore, a variety of strategies are required in order to gain a wide range of word knowledge. According to "Depth of Processing Hypothesis", more cognitive energy a person exerts when manipulating and thinking about a word, the more likely it is that they will be able to recall and use it later (Craik and Lockhart, 1972; Craik and Tulving, 1975). This hypothesis implies that it is not important how recently learners have learnt something. What is of more importance in learning is, in fact, the depth of processing; in other words, students must be taught on how to process information deeply. Such implications extend to pedagogy as well, suggesting that exercise and learning strategies which involve a deeper engagement with words should lead to higher retention compared to shallow activities .

Studies such as O'Malley and Chamot (1990) corroborate that most language learning strategies are used for vocabulary tasks too. In the same vain, all memory strategies based on Oxford taxonomy can be used for vocabulary learning tasks the effect of which has been a motive to conduct the present research on vocabulary retention.

Nemati (2009) confirms that teaching should target at increasing retention without increasing study time. Because students forget much of what they learn, applying memory strategies is a good way to benefit from learning that provides long lasting knowledge. The importance of applying images for learning new items are related to long-term memory is clear. There are three main activities attributes to long-term memory viz, storage, retrieval and forgetting. First,

chunks of information will transfer to long-term memory by applying visual images. Second, visual images may be the most potent device to aid recall. And the last one, applying memory strategies can promote long-lasting retention which is the aim of education. In addition, as Oxford (1990), put the mind storage capacity for visual information exceed its information for verbal materials furthermore, a large proportion of learners have preference for visual images.

Hulstijn (1992) compared the retention of words inferred from a context with words provided with glosses or sample sentences reporting that inferred words were better retained compared to given words, when certain cues were available. Joe (1995) found that attention to new words, retrieval, and especially use in novel contexts ("generation") contributed to word retention. He emphasized the importance of language output in incidental learning. Hulstijn et al. (1996) compared retention of new words in the following three conditions of conveying the meaning of words: through gloss, availability of an electronic dictionary, and control. Their study demonstrated that word frequency contributed to learning when reading was supported by gloss or dictionary. In another study, Laufer and Hill (2000) provided explanations of words in English, L1 translation, sound, root, and "extra" information to learners. They showed that the use of multiple dictionary information such as word explanation in English, L1 translation, sound and root reinforced incidental acquisition. In line with previous research, Hulstijn (2001) conceptualized the notions of incidental and intentional learning, asserting that although the distinction between them could be operationalized in research, such a distinction had no significance for word retention. Webb (2007) examined the effects of context on grammatical functions, syntagmatic association, paradigmatic association, orthography, and meaning and form by measuring receptive and productive knowledge of orthography, meaning, paradigmatic association, syntagmatic association, and grammatical functions. Brown (2008) studied L2 vocabulary acquisition using the following three input modes: reading, reading while listening, and listening to stories. The lowest uptake was in the listening mode.

As Schmitt (2008) and Hulstijn (1992) observed, there is a dilemma in the selection of an effective approach for vocabulary instruction. Hence, the present study intended to investigate the effect of three different ways of conveying meanings of vocabulary items – namely, using context, using dictionary definitions, and using synonyms – on acquisition and retention.

3.2. Priming

One of the most important ideas in word recognition is that of priming. It involves presenting material before the word to which a response has to be made. Most common paradigm involves presenting one word prior to the target word to which participant is supposed to respond. The first word is called prime, and is usually presented for a very short period of time (in tens or hundreds of milliseconds), and the second word is called target, the one to which response has to be made. The time between prime presentation (onset) and the target presentation is called stimulus onset asynchrony, or SOA (Harley, 2005). Target word can be preceded by a sentence or a picture, and priming can also be auditory, as well. In this paper, however, we are focused on how (written) words prime words .

According to Gulan and Valerjev (2010), priming refers to an increased sensitivity to certain stimuli due to prior experience. Because priming is believed to occur outside of conscious awareness, it differs from memory that relies on the direct retrieval of information. Direct retrieval utilizes explicit memory, while priming relies on implicit memory, and it is assumed to be an involuntary and perhaps unconscious phenomenon. Research has also shown that the effects of priming can influence the decision making process (Jacoby, 1983). In other words, priming is the implicit memory effect in which exposure to a stimulus influences response to a subsequent stimulus. It can occur following perceptual, semantic or conceptual stimulus repetition. Priming effect, in a form that identification of a word can be facilitated by prior exposure to a word related in meaning, has been known for over a century (Cattel 1888/ 1947;

Harley, 2005). Mayer and Schvaneveldt (1971) provide one of the first recent demonstrations of what is one of the robust and important findings about word recognition. Using lexical decision task they demonstrated that word is recognized faster if it is immediately preceded by another word related in meaning. Priming can affect word recognition in two different ways; it can speed up target word processing, or slow it down. If a prime make word processing faster than it is called facilitation, and if it slows down the processing then it is considered to be inhibition. Whether the prime will affect target word in one of two ways depends on both word choices – prime and target word. In addition, of course, it depends on what type of priming we want to use (see section below for information about types of priming). It is considered that if two words are connected in any way (orthographic, semantic etc.), it should have a facilitator effect, and if they are not connected then the effect should be inhibitory (or there should be no effect at all). However, this is far more complex issue as we will see in the rest of the paper. Furthermore, several models give an explanation why things like inhibition or facilitation even occur.

3.3 Semantic priming

The most common type of priming in word recognition tasks is semantic priming, which is considered a type of context effect (Harley, 2005). The semantic in semantic priming implies that true relations of meaning produce priming. This term dates back in seventies when Meyer and Schvaneveldt (1971), entitled "Facilitation in recognizing pair of words: Evidence of dependence between retrieval operations." In that research, participants were asked to decide whether two simultaneously presented strings of letters were both words (e.g., table-grass) or not (marb, bread). Of the word-word pairs, half were semantically related (e.g., nurse-doctor) and half were not (e.g., bread door). On the average, responses were 85 milliseconds (ms) faster to related pairs than to unrelated pairs. This phenomenon later came to be known as "semantic priming" (Namara, 2005).

One can see that the effect might have some advantages for processing. Words are rarely seen or heard in isolation; also word related in meaning often co-occur in sentence. Hence, processing might be speeded up if words related to word you are currently reading are somehow made more easily available, as they are more likely to come next than random words.

As the study of Gulan and Valerjev (2010) showed, semantic priming is a broad area of research, and here only the main forms, results and models concerning that phenomenon have been explained. Semantic priming is a simple demonstration of one of the most basic properties of cognitive systems; this refers to constantly relying on context in which the given information is being processed. According to definition alone, and given paradigm it can be seen that semantic priming is in the first place a context effect. That effect shows how primes, that are context words, can affect adjacent word recognition efficiency. By simply manipulating that context it can be demonstrated how visual word recognition can be either speeded up or slowed down. Semantic priming came to be used as a tool to investigate some aspects of perception and cognition, such as word recognition, sentence and discourse comprehension, and knowledge representation.

Semantic priming is explained as follows. When the prime is recognized, semantic information about the word becomes available and word detectors in lexical memory are activated according to their semantic similarity to the prime (Morton, 1969). Plaut's model (Plaut, 1995; Plaut and Booth, 2000) distinguishes semantic priming, which is attributed to overlapping semantic features, from associative priming. Associative priming occurs in this model because the network learns to make efficient transitions from primes to targets that co-occur frequently during training.

4. RESEARCH QUESTION

This study intends to answer the following question:

RQ: Is there a significant difference between the effect of visual semantic priming, audio semantic priming and audiovisual semantic priming on L2 vocabulary retention?

5. METHODOLOGY OF THE STUDY

The methodology of the present study, including participants, the instruments and the procedures applied to answer the research question will be presented in this section.

5.1. Participants

The participants of the study were initially 48 B.A level students of Shahid Beheshti University in Tehran. The major field of study of 48 students was Law. The participants' age ranged from 18 to 28. The L1 of all students was Persian. There were 20 male and 28 female students. 18 students, who were not present in all sessions, were excluded from the study. Thus, only 30 of them remained. To homogenize the students and to assess their proficiency level, the standard test of Nelson was administered. Based on their performance on the proficiency test, out of the 48 participants, 30 students who scored was between one standard deviation above and below the mean were selected. There were 30 participants in one group which included 12 male and 18 female students. It should be mentioned that there was no control group in this study and the number of male and female students was not equal in the group. The level of the subjects that participated in this investigation was intermediate.

5.2. Instruments

The materials and data collection instruments utilized in this study included the following:

1. In order to homogenize the participants in terms of their vocabulary knowledge, a standard language proficiency test was needed. Therefore, a multiple-choice vocabulary subtest of the Nelson Test was used for determining the students' proficiency level. It consisted of 50 vocabulary items to discriminate which of the subject's level is intermediate.
2. 'Res Meter' is the name of the software designed to record the reaction time of vocabulary retention for subjects who participated in the investigation. The total time duration of the process was 10 minutes.
3. The stimulus collection of this study consisted of 240 words, 80 pairs for each experiment that contained 40 words constructed for prim and 40 word for target. All of these stimuli are related. We used the vocabulary of Thompson-Schill, Kurtz, and Gabrieli (1998), used in their investigation.

5.3. Procedure

In order to achieve the purpose of the study, the following procedures were gone through.48 participants were selected from Shahid Beheshti University and then they were homogenized by the vocabulary subtest of the Nelson language proficiency test, which consisted of 50 vocabulary items in multiple-choice format; it was administered to the students in the first session. The time duration of this test was 30 minutes. So 30 participants were selected.

Each subject was presented with total 240 stimulus pairs. Each third audio, visual and audiovisual was made up of semantically related. In the three experiments, reported on here, lexical decision tasks were used in which subjects were presented with pairs of words that were related pairs. As in previous semantic priming experiment, related target were expected to yield

quicker and more accurate response than unrelated targets but in this study we wanted to consider which of audio, visual or audiovisual with the same SOA and conditions subjects and were retention vocabulary better. the first experiment stimuli, the stimuli were presented in the audio modality; the second experiment, the stimuli were presented visual modality with the same subject; the third experiments, the stimuli were presented in audiovisual modality. We notice before all of three Experiments, had the same SOA and conditions.

Experiment 1: Audio presentation

N In the first Experiment, the time course of audio semantic priming across one prime – target intervals was examined. We presented word pairs to subjects, in audio lexical decision task using one SOA: 1000 ms. There was 1000 ms interval between prime and target, there was 1500 ms SOA between per two pairs. Participants were tested individually in a sound-damped room. General task instructions were displayed on the monitor and the stimuli were broadcasted by a native male in Webster dictionary and were digitized (16kHz, 24pole V,9-kHz Butterworth filter) by a Data Translations analog-to-digital converter (12 bit resolution).

In 'Res Meter', the Software we designed for this study allowed subjects to listen to stimulus in both right and left ear, in our software design we asked subjects to press space key in the keyboard if they understand each prime and target are related so 'Res Meter' was save the reaction time of participant.

Experiment 2: Visual presentation

In the next step, the same procedures that were used in Experiment 1 were used in Experiment 2, except that the modality of presentation was visual. The stimuli were presented to the same subject, of Experiment 1 in a visual lexical decision task using the same SOAs: 1000 ms to interval between prime and target and 1500 ms until the next trial began. Stimuli were presented on a 20-in. monitor (NEC 5D) controlled by PC-compatible computer. Stimuli were displayed as black lower case letters on a white background. Each word subtended from 0.5˚ to 1.8˚ of horizontal and 0.4˚ of vertical visual angle. The subjects sat in comfortable chair and were asked to press apace key on the keyboard as soon as possible till they understand two pairs were related to each other, if they thought pairs are not related so they should do nothing then next trial began. Subjects were instructed to keep their eyes to monitor and were asked to concentrate, vocabularies they saw on monitor .

Experiment 3: Audiovisual presentation

The third experiment was conducted using the same procedure but in the audiovisual modality with the same subject, the stimuli were broadcasted by native male whose pronunciations are used in Webster dictionary and were digitized (16kHz, 24pole V,9-kHz Butterworth filter) by a Data Translations analog-to-digital converter (12 bit resolution). 'Res Meter' the Software allowed us to listen to a stimulus while visually positioning its orthographic on 20-in. monitor (NEC 5D) controlled by PC-compatible computer. The stimuli were displayed as black lower case letters on a white background. Each word subtended from 0.5˚ to 1.8˚ of horizontal and 0.4˚ of vertical visual angle.

The same SOAs were contrived for audiovisual presentation: 1000 ms to interval prime and target and 1500 ms between the next pairs.The subject, should press space key on keyboard as soon as possible when they understand that pairs are related. Although all of stimuli in three experiments are related but the participant were not inform about it; we asked them to diagnose if each pair was related or not. In this investigation, semantic priming was taught to subjects for two hours before the test began.

6. RESULTS

The main purpose of this study was to investigate the effectiveness of visual semantic priming, audio semantic priming, and audio-visual semantic priming on L2 vocabulary retention. The data collection procedures were carefully performed and the raw data was entered into SPSS (version 19.0) to compute the required statistical analyses in order to address the research questions and hypothesis of this study. Every step which was taken in analyzing the obtained data is presented in form of tables and figures in this part.

6.1 Nelson proficiency test results

Nelson Test was administered to 44 participants to show the homogeneity of intermediate participants. Table 6.1 depicts the descriptive statistics of the participant's scores on Nelson Test. The table shows that the mean, median and mode of the Nelson scores were 34.55, 34, and 33 respectively. The normality of the Nelson Test scores is verified since the ratios of skewness and kurtosis over their respective standard errors are not beyond the ranges of +/- 1.96.

Table 6.1. Descriptive statistics for Nelson Homogenizing Test.

N	Range	Mean	Median	Mode	SD	Skewness	Kurtosis
44	22	34.55	34.00	33	5.40	.170	-.605

After the pretest, that those students ($N = 30$) whose scores were one standard deviation (5.40) above and below the mean (34.55) were chosen as homogeneous intermediate participants for the purposes of the current study (scores between 29 and 40). Figure 6.1 below depicts the distribution of the Nelson scores on a normal curve.

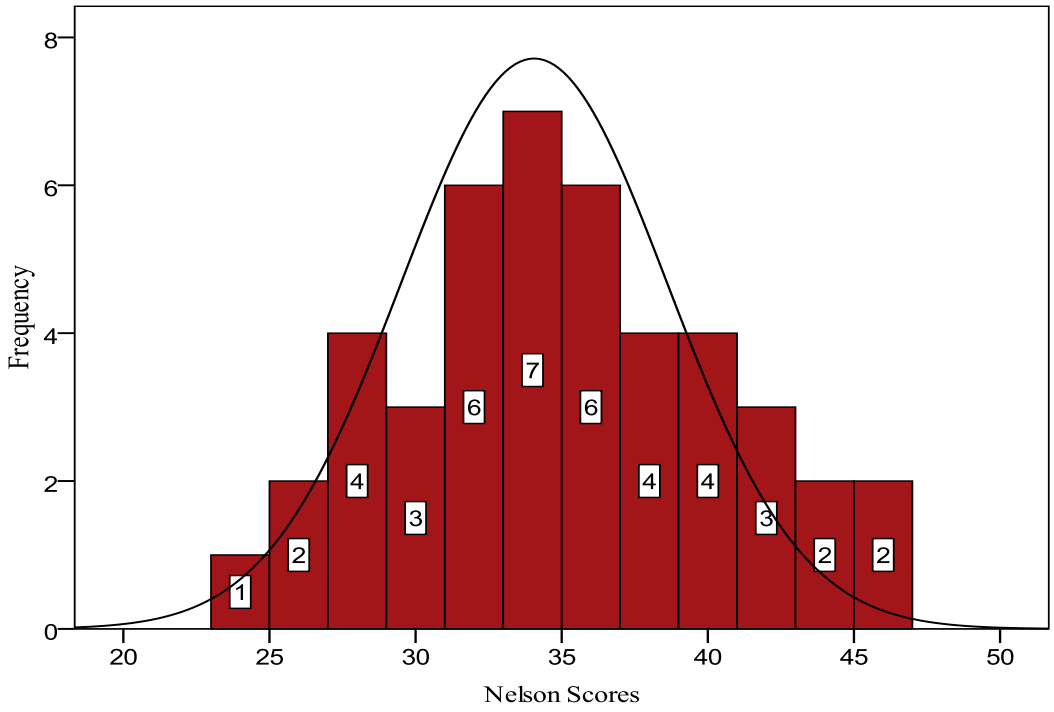

Figure 6.1. Distribution of Nelson results.

6.2 Investigation of the research question

The first research question of this study asked whether there is a significant difference between the effect of audio semantic priming, visual semantic priming and audio-visual semantic priming on L2 vocabulary retention. In order to answer this research question a repeated measures one-way ANOVA was employed. The results of the descriptive statistics on semantic priming types are represented in Table 6. 2.

Table 6.2. Descriptive statistics for time spent on vocabulary retention in Audio Semantic Priming.

Semantic Priming	N	Mean	*SD*
Audio	30	384.91	55.12
Audio-visual	30	408.48	53.15
Visual	30	469.62	72.91

Table 6.1 shows that the lowest mean time of semantic priming is for audio (*M* = 384.91, *SD* = 55.12), followed by the audio-visual (*M* = 408.48, *SD* = 53.15), and then visual (*M* = 469.62, *SD* = 72.91). In fact, there is a decrease in mean time of L2 vocabulary retention on the three types of semantic priming.

Figure6.2, Figure 6.3, and Figure 6.4 below illustrate vocabulary retention times of three semantic priming types on normal curves. As can be seen in the figures, the audio semantic priming is the slowest for vocabulary retention, followed by audio-visual semantic priming, and then visual semantic priming. Figure 6.2 below shows that the mean time on audio semantic priming is 384.92 with the standard deviation of 55.12, which is quite low in quantity. In addition, Figure 6.2 indicates that the mini mum mean was 290.57 occurred by one student, and the maximum score was 477.67 recorded by one student as well. Besides as clear from Figure 6. 2, the means have formed a curve normal shape implying normality.

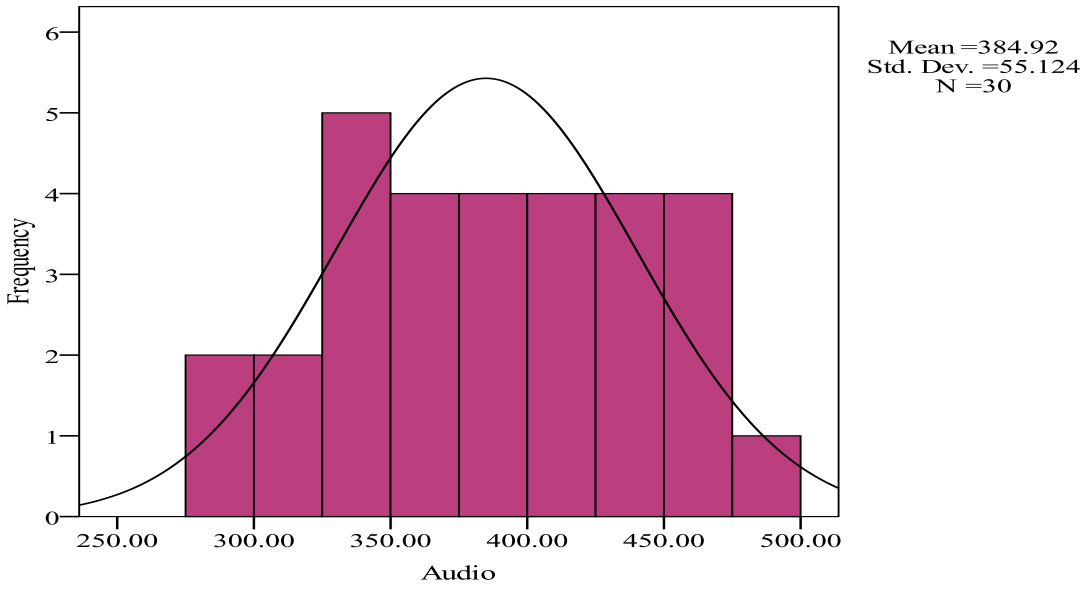

Figure 6.2. Times and their frequencies for vocabulary retention on a normal curve in Audio semantic priming.

Figure 6.3 below illustrates that the mean time on audio-visual semantic priming is 408.49 with the standard deviation of 53.15, which is relatively low in amount. In addition, Figure 6. 3 displays that the minimum mean was 324.29 took place by one student, and the maximum score was 502.13 recorded by one student too. Also as obvious from Figure 6.3, the means have formed a curve normal shape denoting normal distribution.

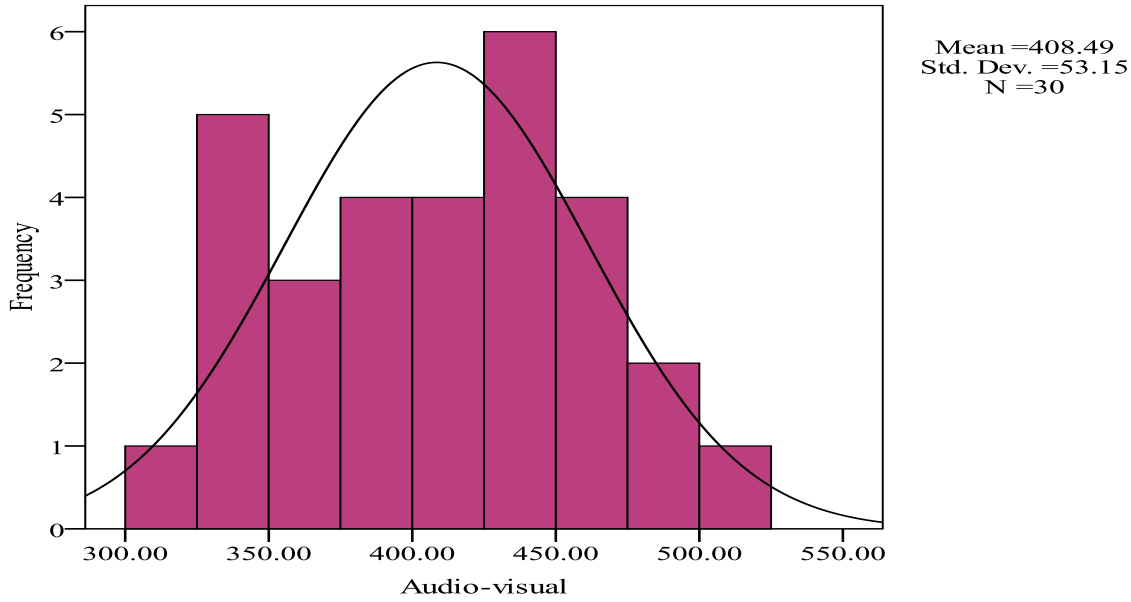

Figure 6.3. Times and their frequencies for vocabulary retention on a normal curve in Audio-visual semantic priming.

Besides, Figure 6.4 below indicates that the mean time on visual semantic priming is 469.63 with the standard deviation of 72.91, which is high in comparison with audio and audio-visual priming. Moreover, Figure 6.4 demonstrates that the minimum mean was 341.04, and the maximum score was 591.32 reported by one student as well. Besides it is as clear from Figure 4.4, the means have formed a curve normal shape implying normality.

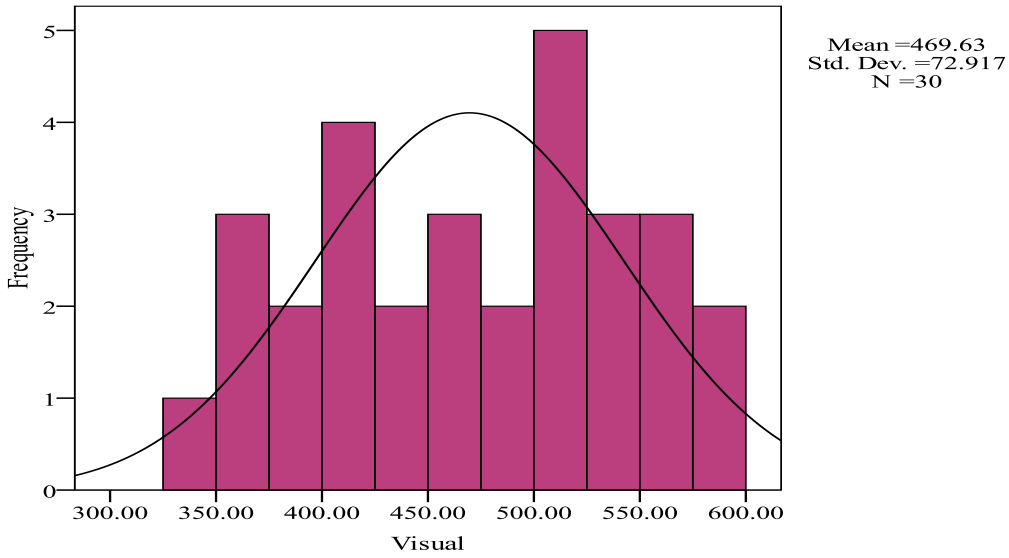

Figure 6.4. Times and their frequencies for vocabulary retention on a normal curve in visual semantic priming.

Moreover, the RM one-way ANOVA was employed to find out whether or not these mean time differences for vocabulary retention are statistically significant. One main assumption of RM one-way ANOVA is the Sphericity that shows the variance of the population difference scores for any other two conditions. The Sphericity is tested using Mauchly's test (Table 6.3).

Table 6.3. Mauchly's test of Sphericity.

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.
Factor	.842	5.299	2	.063

Table 6.3 reveals that the Sphericity assumption was met since the Sig. value of Mauchly's test (.06) was greater than.05. The results of RM one-way ANOVA are laid out in Table 4.4.

Table 6.4. Test of within subjects effects for the RM ANOVA on Semantic Priming.

Source		Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Semantic priming	Sphericity Assumed	114697.95	2	57348.97	15.38	.000	.347
	Greenhouse-Geisser	114697.95	1.60	71318.39	15.38	.000	.347
	Huynh-Feldt	114697.95	1.68	67933.90	15.38	.000	.347
	Lower-bound	114697.95	1.00	114697.95	15.38	.000	.347

Table 6.5. Multivariate tests[b] for the RM ANOVA on Semantic Priming.

Effect		Value	*F*	Hypothesis *df*	Error *df*	*Sig.*	Partial Eta Squared
Factor	Pillai's Trace	.416	9.974[a]	2.000	28.000	.001	.416
	Wilks' Lambda	.584	9.974[a]	2.000	28.000	.001	.416
	Hotelling's Trace	.712	9.974[a]	2.000	28.000	.001	.416
	Roy's Largest Root	.712	9.974[a]	2.000	28.000	.001	.416

a. Exact statistic

b. Design: Intercept Within Subjects Design: factor

According to Table 6.2, Greenhouse-Geisser correction shows that the three mean time differences for vocabulary retention were statistically significant (F = 15.38, P =.000, P <.05); as a result the null hypothesis of this study which states there is not any significant difference between the effect of audio semantic priming, visual semantic priming and audio-visual semantic priming on L2 vocabulary retention is rejected. Multivariate tests for the RM ANOVA (Table 6. 5) corroborate this result.

As it can be seen in Table 6.5 (multivariate tests), partial eta square is.41, which shows that 41 percent of variance in the times for vocabulary retention is the result of semantic priming; this is relatively a large effect size (.416 >.138). The reported results for Wilks' Lambda ($F_{(2, 28)}$ = 9.97, P <.05) reflected that semantic priming affected the vocabulary retention significantly.

In order to show the results more obviously, we made the line chart below (Figure 6.5). As Figure 6.4 demonstrate, mean time for vocabulary retention increases from audio to audio-visual, and then to visual.

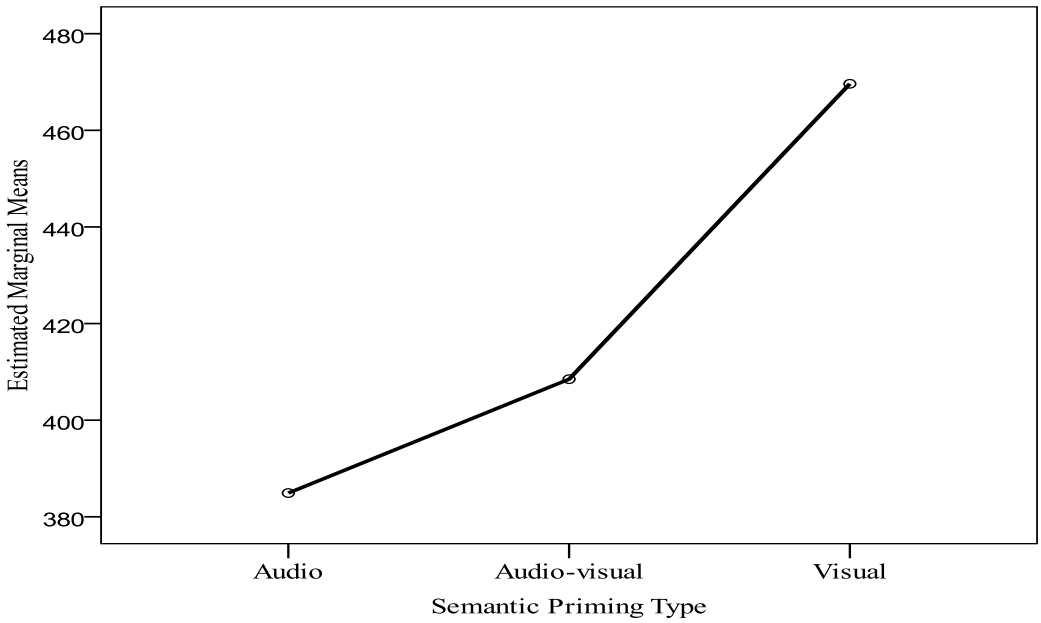

Figure 6.5. Means time spent on vocabulary retention in the three semantic priming.

7. DISCUSSION

The main purpose of the current study was to investigate the effectiveness of visual semantic priming, audio semantic priming and audio-visual semantic priming on L2 vocabulary retention. To achieve the above mentioned goal, two questions were raised. The first research question asked whether there is any significant difference between the effect of audio semantic priming, visual semantic priming and audio-visual semantic priming on L2 vocabulary retention.

Greenhouse-Geisser correction ($F = 15.38$, $P = .000$, $P < .05$) and Wilks' Lambda in RM-ANOVA ($F(2, 28) = 9.97$, $P < .05$) indicated that the three mean time differences for vocabulary retention were statistically significant; consequently the answer to this question was positive and it was proved that the difference between the effect of audio semantic priming, visual semantic priming and audio-visual semantic priming on L2 vocabulary retention was significant .

Additionally, the second research question asked which type of semantic priming (audio, visual and audio-visual) is superior to improve L2 vocabulary retention.

Post-hoc pairwise comparisons revealed that the mean time for vocabulary retention in both audio ($P = .000$, $P < .05$), and audio-visual ($P = .001$, $P < .05$) differ significantly from visual semantic priming. But the mean time for vocabulary retention in audio was not significantly different from audio-visual ($P = .18$, $P > .05$); thus we could conclude that both audio and audio-visual semantic priming were more effective than visual semantic priming in developing vocabulary retention. Meanwhile audio semantic priming ($M = 384.91$) was somewhat faster than audio-visual semantic priming ($M = 408.48$) for vocabulary retention but the difference was not considerable, and both these two types were quicker than visual semantic priming ($M = 469.62$).

8. CONCLUSIONS AND IMPLICATIONS

The present study succeeded to find meaningful differences among the effects of different modality of semantic priming on related pair word on L2 vocabulary retention. Two research questions were examined if there are significant differences among the effect of audio, visual, and audiovisual semantic priming on vocabulary retention. The result of semantic priming test in 'Res Meter' software displayed that both hypothesis were rejected. The implication is that there are significant differences among the three modality of semantic priming on vocabulary retention .

The result shows that the mean time for vocabulary retention in both, and audio-visual differ significantly from visual semantic priming. However, the mean time for vocabulary retention in audio was not significantly different from audio-visual. It can be concluded that both audio and audio-visual semantic priming are more effective than visual semantic priming in developing vocabulary retention. Meanwhile the performance of the subjects who were exposed to audio semantic priming was somewhat quicker than the performance those who were exposed to audio-visual semantic priming for vocabulary retention but the difference was not dramatic, and the performance of both of these two groups were quicker than visual semantic priming group. The result shows that between three modality of semantic priming, audio semantic priming is more effective than others on vocabulary retention are and visual semantic priming is less effective on vocabulary retention**.**

The findings of the present study may have implications for teachers, learners and materials developers. Language teachers can improve L2 learners' vocabulary retention by using this method .

This study indicates that working memory can be effect on vocabulary learning and recall or retention rather than method and instruction through awareness. The observations in all treatment sessions showed that audio and audiovisual semantic priming was very useful way for students to retain vocabulary. In addition, the findings of this study can be useful for material developers and instructional book designers to consider the effects of semantic priming on vocabulary learning.

ACKNOWLEDGMENT

We would like to appreciate the enthusiastic efforts made by Dr. M. Amini Farasani. We are also grateful to the students of Law in Shahid Behshti University of Tehran, for their support.

REFERENCES

[1] Catherine J. Doughty and Michael H. Long. (2005), the Handbook of Second Language Acquisition,

[2] Christopher Charles Rowson. (2011), combinatorial semantics in the visual world: A representational account of real-time event processing.

[3] Caroline H. Barratt- Pugh. (1990), The development to grammatical morphemes in the speech of young second language learners within a conversational context, The University of Leeds School of Education.

[4] David C. Plaut. (1995), Semantic and Associative Priming in a Distributed Attractor Network. In Proceedings of the 17th Annual Conference of the Cognitive Science Society, pages 37–42, Pittsburgh, PA, July, 1995. Hillsdale, NJ: Lawrence Erlbaum Associates. Carnegie Mellon University, and Center for the Neural Basis of Cognition

[5] Endel Tulving, Daniel L. Schacter, Donald R. Mclachlan, and Moris Moscovitch. (1988). Priming of Semantic Autobiographical Knowledge: A Case Study of Retrograde Amnesia. Brain and Cognition 8, 3-20 (1988). Unit for Memory Disorders, University of Toronto.

[6] Eva Van den Bussche. (2008), Mechanisms of masked semantic priming: A meta-analysis. Master dissertation submitted to obtain the degree of Master of Statistical Data Analysis.

[7] Edward C. Carterette. (1999), Handbook of Perception and Cognition 2nd Edition. Department of Psychology, Stanford University Stanford, California.
[8] Hulstijn, J. H. (2003). Incidental and intentional learning. In C. Doughty & M. H. Log (Eds.), The handbook of second language acquisition. (pp. 349- 381). Oxford: Blackwell.
[9] Irving B. Weiner, editor-in-chief. (2003), Handbook of psychology.
[10] James H. Neely. (1977), Semantic Priming and Retrieval from Lexical Memory: Roles of Inhibitionless Spreading Activation and Limited-Capacity Attention. Journal of Experimental Psychology. Yale University.
[11] Jones, L. (2004). Testing L2 vocabulary recognition and recall using pictorial and written test items. Language Learning & Technology, 8 (3), 122- 143.
[12] Juan J. Ortells*, Concepción Vellido, María Teresa Daza and Carmen Noguera. (2006), Semantic priming effects with and without perceptual awareness. Psicológica. Universidad de Almería.
[13] Jakke Johannes Tamminen. (2010), Effects of meaning, memory consolidation, and sleep, University of York Department of Psychology.
[14] Keith A. Hutchison & David A. Balota & James H. Neely & Michael J. Cortese & Emily R. Cohen-Shikora & Chi-Shing Tse & Melvin J. Yap & Jesse J. Bengson & Dale Niemeyer & Erin Buchanan. (2013), The semantic priming project. Psychonomic Society, Inc.
[15] Karamitroglou, F. (2000). Towards a methodology for the investigation of norms in audiovisual translation. Amsterdam and Atlanta: Rodopi.
[16] Krashen, S. D. (1985). The input hypothesis: Issues and implications. London and New York: Longman.
[17] Krashen, S. D. (1989). Principle and practice in second language acquisition. London: Prentice-Hall International (UK) Ltd.
[18] Louisa M. Slowiaczek, (1994). Semantic priming in a single-word shadowing task, The American Journal of Psychology,Vol. 107, No. 2 (Summer, 1994), pp. 245-260. University at Albany, State University of New York.
[19] Lawson, M. J., & Hogben, D. (1996). The vocabulary learning strategies of foreign language students. Language Learning, 46 (1), 101-135.
[20] Levie, W. H., & Lentz, R. (1982). Effect of text illustrations: A review of research. Educational Communication and Technology Journal, 30 (4), 195- 232.
[21] Margery Lucas.(2000), Semantic priming without association:A meta-analytic review, Psychonomic Bulletin & Review, 7 (4), 618-630, Wellesley College, Wellesley, Massachusetts.
[22] Mattewh J.Traxler. (2006), Handbook of pchycolinguistics, Academic Press is an imprint of Elsevier.
[23] Meringoff, L. (1982). What pictures can and can't do for children's story understanding. New York: American Educational Research.
[24] Miller, G. A. (1991). The science of words. New York: Scientific American Library.
[25] Minsky, M. A. (1975). A framework for representing knowledge. In P. H. Winston (Ed.), The psychology of computer vision. (pp. 211-280). New York: McGraw-Hill.
[26] Nation, I. S. P. (2001). Learning vocabulary in another language. Cambridge: Cambridge University Press .
[27] Nelson, T. (1974). Computer lib. Redmond, Washington: Tempus Book/ Microsoft Press.
[28] Neuman, S. B., & Koskinen, P. (1992). Captioned television as comprehensible input: Effects of incidental word learning from context for language minority students. Reading Research Quarterly, 27 (1), 94- 106.
[29] Nugent, G. C. (1982). Pictures, audio, and print: Symbolic representation and effect on learning. Educational Communication and Technology Journal, 30 (3), 163- 174.
[30] Oxford, R. (1990). Language learning strategies: What every teacher should know. New York: Newbury House.
[31] Oxford, R., & Crookall, D. (1990). Vocabulary learning: A critical analysis of techniques. TESL Canada Journal/ Revue TESL DU Canada, 7(2), 9-30.

[32] Pourhosein Gilakjani, A. (2012). The significant role of multimedia in motivating EFL learners' interest in English language learning. I. J. Modern Education and Computer Science, 4 (1), 57- 66.
[33] Pressley, M. (1977). Imagery and children's learning: Putting the pictures in developmental perspective. Review of Educational Research, 47(4), 585- 622.
[34] Ram Frostt and Shlomo Bentint. (1992), Processing Phonological and Semantic Ambiguity: Evidence from Semantic Priming at Different SOAs. Haskins Laboratories Status Report on Speech Research.
[35] Rebecca S. Betjemann and Janice M. Keenan.(2008), Phonological and Semantic Priming in Children With Reading Disability. Child Development, Vol. 79, No. 4.pp. 1086-1102. University of Denver.
[36] Shalyn Oberle and Lori E. James. (2012), Semantically- and phonologically-related primes improve name retrieval in young and older adults, LANGUAGE AND COGNITIVE PROCESSES, Vol. 28, No. 9, 1378 1393, Department of Psychology, University of Colorado, Colorado Springs,CO, USA
[37] Sharon L. Thompson-Schill, Kenneth J. Kurtz, and John D. E. Gabrieli. (1998), Effects of Semantic and Associative Relatedness on Automatic Priming. JOURNAL OF MEMORY AND LANGUAGE 38, 440–458. Stanford University.
[38] Sean C. Draine and Anthony G. Greenwald. (1998), Replicable Unconscious Semantic Priming. Journal of Expcrimcnlal Psychology. University of Washington.
[39] Susan L. Rossell and Anna C. Nobre. (2004), Semantic Priming of Different Affective Categories. The American Psychological Association. University of Oxford.
[40] Salomon, G. (1988). AI in reverse: Computer tools that turns cognitive. Journal of Education Computing Research, 4 (2), 123-139.
[41] Schmitt, N. (1997). Vocabulary learning strategies. In N. Schmitt & M. McCarthy (Eds.). Vocabulary: Description, Description, acquisition and pedagogy (pp. 199- 227). Cambridge: Cambridge University Press.
[42] Schmitt, N. (2002b). Vocabulary in language teaching. Cambridge: Cambridge University Press.
[43] Syndorenko, T. (2010). Modality of input and vocabulary acquisition. Language Learning & Teaching, 14 (2), 50-73.
[44] Timothy P. Mcnamara. (2005). semantic priming perspectives from memory and word recognition. Essays in Cognitive Psychology.
[45] Tanja Gulan and Pavle valerjev. (2010), Semantic and related types of priming as a context in word recognition, Review of Psychology, Vol. 17, No 1, 53-58
[46] Terrell, T. D. (1986). Acquisition in the natural approach: The binding/Access framework. The Modern Language Journal, 70 (3), 213- 227.
[47] Tuan, L. T. (2011). An empirical research on self-learning vocabulary. Theory and Practice in Language Studies, 1(12), 1688- 1695.
[48] Underwood, J. (1989). HyperCard and interactive video. CALICO Journal. 6 (3), 7-20.
[49] Vanderplank, R. (1993). A very verbal medium: Language learning through closed captions. TESOL journal, 3 (1), 13-17.
[50] Vygotsky, L. S. (1978). Mind in society. Cambridge, MA: Harvard University Press.
[51] Wendy S. Francis and Norma P. Fernandez. (2010), Conceptual and non-conceptual repetition priming in category exemplar generation: Evidence from bilinguals, Psychology Press, an imprint of the Taylor & Francis Group, University of Texas at El Paso, TX, USA
[52] Wang, Y. C. (2012). Learning L2 vocabulary with American TV drama from the learner's perspective. English Language Teaching, 5 (8), 217-225.
[53] Wilkins, D. A. (1972). Linguistics in language teaching. London: Edward Arnold.
[54] Yuko Hoshino. (2010), The Categorical Facilitation Effects on L2 Vocabulary Learning in a Classroom Setting. sagepub.co.uk/journalsPermissions.nav. Tokyo Fuji University, Japan.
[55] Yoshii, M. (2006). L1 and L2 glosses: Their effects on incidental vocabulary learning. Language Learning & Technology, 10 (3), 58- 101.