The effects of captioning texts and caption ordering on L2 listening comprehension and vocabulary learning

Ali Roohani
(Assistant Professor, Shahrekord University, Shahrekord, Islamic Republic of Iran)
roohani.ali@gmail.com
Masood Rahimi Domakani
(Assistant Professor, Shahrekord University, Shahrekord, Islamic Republic of Iran)
FatemehAlikhani
(MA Graduate, Shahrekord University, Shahrekord, Islamic Republic of Iran)

Abstract
This study investigated the effects of captioned texts on second/foreign (L2) listening comprehension and vocabulary gains using a computer multimedia program. Additionally, it explored the caption ordering effect (i.e. captions displayed during the first or second listening), and the interaction of captioning order with the L2 proficiency level of language learners in listening comprehension and vocabulary performance. To these ends, a computer software program was designed and 200 EFL learners (100 high-intermediate and 100 low-intermediate level students) were asked to participate in the experiment. They were randomly assigned into four groups: captioned (listening to texts twice with captions), noncaptioned (listening to texts twice without captions), first captioned (listening to texts first with captions and then without captions), and second captioned (listening to texts first without captions and then with captions) groups. They listened to four audio texts (i.e. short stories) twice and took the listening and vocabulary tests, administered through the software. Results from *t*-tests and two-way ANOVAs showed that the captioned stories were more effective than the non-captioned ones. Moreover, the caption ordering had no significant effect on the participants' L2 listening comprehension and vocabulary performance. Finally, L2 proficiency level differences did not affect performance derived from caption ordering.

Keywords: Captions, captioning order, computer Software, listening Comprehension, vocabulary

Introduction

Computers entered school life in the late 1950s in developed countries and have been developing throughout the world since then (Gunduz, 2005). Initially, they were mostly brought to educational settings for the purpose of processing and displaying information and their applicability to teaching was not greatly emphasized. However, as Brett (1995, p. 77) states, "increase in the speed, storage capacity and memory size of computers, together with developments in the sophistication of software, now enable computers to deliver video, sound, text and graphics", greatly assisting the process of teaching and making computers part of most classrooms. Nowadays a large amount of L2 materials such as textbooks, dictionaries, compact discs (CDs), and videos require computers

and technologies. And drawing on multimedia software programs, computer assisted language learning (CALL), an approach to language teaching and learning in which computers are used as an aid to the presentation, reinforcement and assessment of materials (Davies, 2002), is used for learning/teaching language skills. With CALL finding its stable floor in educational settings, listening skill (i.e. the ability to understand language which is used by native speakers) is no exception in making use of multimedia CALL.

Traditionally, second language (L2) listening comprehension was considered as a passive and receptive skill, meriting little attention, and listening activities in L2 classrooms mostly consisted of listening to a tape and repeating after the teacher or dictation with a focus on bottom-up processing, which made L2 classrooms somewhat boring (Hayati& Vahid, 2012). However, with listening as an active process in which listeners attempt to discriminate between sounds, understand vocabulary and structures within the context of the utterance, CALL programs, appropriately selected and organized, have offered a range of opportunities to develop L2 listening skill and vocabulary learning; the attractive capability of multimedia CALL in controlling and arranging various media has introduced audiovisual materials enhanced with captions as a potential pedagogical tool in helping L2 learners improve their listening comprehension skill and vocabulary learning. However, the use of captions in listening materials (i.e. textual versions of the audio dialogues displayed at the bottom of the screen) with L2 learners at different proficiency levels has not been without controversy (Danan, 2004; Pujola, 2002). On the one hand, it is claimed that captions can promote L2 learning by helping learners visualize what they hear,

particularly if the input is a little beyond their linguistic control level (Danan, 2004). Besides, visual clues and soundtracks in captioned listening materials can create an authentic culture and language environment in which incidental learning can take place (Yang-dong &Cai-fen, 2007). Furthermore, captions might be conducive to language comprehension by facilitating additional cognitive processes, such as greater depth of oral-word processing (Bird & Williams, 2002). On the other hand, it is claimed that captions are more of a distraction in natural and meaning focused learning than help for L2 learners, particularly for those at low levels (Taylor, 2005). It is believed that "misuse" of captions in listening can potentially prevent the development of listening strategies (Pujola, 2002, p. 252). Creating a gap in L2 research, the above issues are motivating enough for us to explore the impacts of captioning and order of its presentation on L2 listening comprehension and vocabulary gains across two different L2 (i.e. English) proficiency levels through a computer multimedia software with the hope of helping L2 teachers and material developers in the development of more effective computer-based listening activities. This objective can achieve more significance in the English as a foreign language (EFL) context of Iran where not much attempt has been made to develop computer programs in spite of the potential of recent computer technology in facilitating L2 learning.

Review of literature
The arrival of personal computers in the late 1970s resulted in an increase in the development of Computer Assisted Language Instruction (CALI). With the use of computers in language education, gradually CALI changed into CALL, the expression chosen at the 1983 TESOL convention in Toronto (Tuncok, 2010).

Since 1980s, CALL has continued its progress and, for the last decade or so, a number of studies (e.g., Cushion & Dominique, 2002; deHaan, 2011; Jayachandran, 2007) have been conducted to identify the effect of CALL on L2 listening comprehension. Although there are some studies (e.g., Chang, 2002; Dupagna, Stacks, & Giroux, 2007) which show the negative effect of CALL on L2 listening comprehension, most of the studies (e.g., Pujola, 2002; Volle, 2005) have revealed the positive effect of CALL on L2 learners' listening.

For instance, Verdugo and Belmonte (2007) examined the effects that digital stories might have on the understanding of spoken English by a group of Spanish learners. Results showed that computer and internet-based technology could improve English listening comprehension. Also, in the EFL context of Iran, Khoii and Aghabeig (2009) and Barani (2011) investigated the effect of using computer software on the improvement of listening comprehension of elementary and intermediate L2 students respectively. Results of both studies showed that the use of computer software could improve the students' listening ability, as compared with the traditional way of listening to tapes and answering some questions from their book.

Captions are "on-screen text in a given language combined with a soundtrack in the same language" (Markham & Peter, 2003, p. 332). The processing of converting the audio content into text and displaying it on a screen or monitor may be a bonus in language learning. Inspired by this claim, Bird and Williams (2002) examined how a bimodal presentation (aural and visual) of novel words would impact the learning of the words. Vocabulary was presented to advanced learners of English in three conditions: (a) text with sound, (b) text without sound, and (c) sound without text. Results demonstrated that vocabulary presented with text and sound (i.e. captioning) could result in better recognition memory for spoken words when compared to the other two presentation modalities. Also, Pujola (2002) studied the strategies used by Spanish-speaking ESL learners who utilized web-based multimedia videos. She wanted to find out whether the learners would choose to use captions or transcripts while watching videos. She found that those learners with poorer listening skills used captions more for help with comprehension. In addition, the Spanish learners generally had better experiences with captions than with transcripts. Similarly, Grgurović and Hegelheimer (2007) reported that students who used captions in a multimedia video environment would utilize them more frequently and for longer periods of time than those who used transcripts. In another study, Markham and Peter (2003) investigated the effects of using Spanish (L1) captions, English (L2) captions, and no captions on L2 students' listening comprehension; results revealed that the captions groups outperformed the no captions group. Along the same lines, Taylor (2005) examined whether captioned video could benefit beginning-level learners. Two groups of Spanish learners (one in their first year of Spanish and one with three or four years of Spanish) viewed a video with or without Spanish captioning. Third- and fourth-year learners who watched the videos with captions performed better than first-year students, but scores for those who did not view captions did not differ regardless of level. Also, unlike Markham and Peter's (2003) study, Spanish first-year learners in Taylor's study found the captions distracting. They reported it was difficult for them to attend to sound, image, and captions. To strike a balance between two

sides, Guillory (1998) have reported that captions are beneficial for beginning-level learners when only key words are presented as captions, rather than having entire sentences on screen as captions (i.e., the full text of what was spoken).

Captions can be overused (Pujola, 2002), so it may be important to see whether listening materials should be played once with captions and once without, that is, whether captioning should be in the first viewing. Having gone beyond the comparison of captioned versus non-captioned materials, Winke, Gass, and Sydorenko (2010) investigated the effects of order of captioning during video-based listening activities in Spanish and less-commonly taught languages with non-Latin scripts in the US (i.e. Arabic, Chinese, and Russian). All the participants watched video materials twice. The findings indicated that captioning during the first showing of the videos was more effective for the performance on listening comprehension and vocabulary for Spanish and Russian learners. They have suggested that "learners of a language whose orthography is closer to that of the target language are better able to use the written modality as an initial source of information" (p. 80).

The above studies mostly investigated the role of captioning in L2 listening comprehension, but it is very difficult to generalize findings; most of the above studies did not group subjects by proficiency levels; the differences might be due to proficiency levels or the type of materials or tests used in the study. Moreover, there has been very little empirical research in EFL contexts about the role of captioning and almost none, except one (Winke et al. 2010) about the order of captioning in L2 listening comprehension and vocabulary. It is important to know when EFL learners

should be exposed to captioning in audio materials to better avoid the misuse of captions. None of the studies have addressed the aforementioned issues in the Iranian EFL context. To fill this gap, the present study is aimed to investigate the impacts of captioning and captioning order on L2 (i.e. English) listening comprehension and vocabulary gains through a multimedia computer program in an Iranian EFL context. To these ends, the following research questions have been developed:

1. Do captions improve L2 learners' comprehension of English texts and learning of English vocabulary?
2. When an English text is listened to twice, is captioning more effective when the first listening is with captions or when the second listening is with captions?
3. Does English proficiency level interact with captioning order to affect L2 learners' comprehension of English texts and learning of English vocabulary?

Method
Participants
For the purposes of this study, 200 intermediate EFL learners were selected nonrandomly through a placement test (OPT) from a larger sample of 240 EFL learners from four private language institutes (i.e. AvayeDanesh, HomayeZarrin, Payam Parsa, PejvakeDanesh) in Zarrinshahr, a city in Isfahan Province, where they could be accessed by the present researchers. They included both male (n = 82) and female (n = 118) students whose age ranged from 18 to 24, with Persian as their L1. They consisted of 100 high- and 100 low-intermediate learners of English. Meanwhile, a prerequisite was that all the

participants had passed at least eight terms in language institutes; therefore, it was assumed that these students were familiar with multiple-choice listening and vocabulary tests and had an adequate command of listening skill for the purpose of the study.

Instruments and materials

To collect data, this study made use of several instruments: The first instrument was the Objective Placement Test (OPT, 2008) consisting 20 multiple-choice listening, 20 multiple-choice reading, and 30 multiple-choice language use items. This study used the OPT to select 200 intermediate EFL learners and place them into two L2 ability groups (i.e., high and low). In the current study, the Cronbach Alpha reliability of this test was found to be acceptable (0.80). Besides, the correlation coefficient between the scores obtained from the OPT and a retired paper-based TOEFL was found to be high (see procedures). The second one was a listening comprehension test, consisting of 24 true/false items and 32 multiple-choice (MC) items. The participants had to click on the choice *true* or *false* in 15 seconds and the best alternative in MC in 30 seconds after the audio prompts were presented to them (see Figure 1).
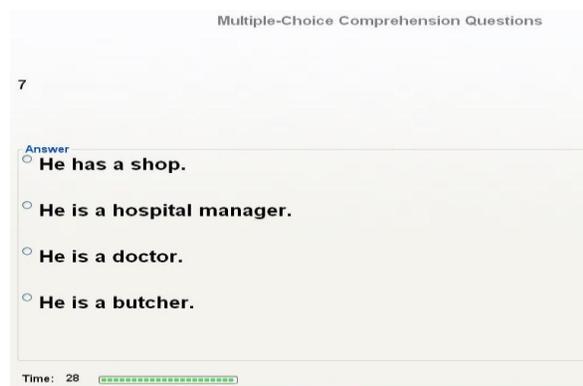

Figure 1: A Sample Shot of the Listening Comprehension MC Items

Finally, the third one was a vocabulary test, consisting of 36 multiple-choice items with the key target vocabulary selected from the audio texts and no cognates. Each test had five choices, one of which was **"**I knew this word before listening to the text" (Figure 2). Meanwhile, the validity of the listening comprehension and vocabulary tests was established through factor analysis, using principle component analysis (PCA) on a group of 100 participants. Moreover, the reliability of the listening comprehension and vocabulary tests as measured by Cronbach's alpha in the current study was found to be 0.81 and .0.85 respectively.
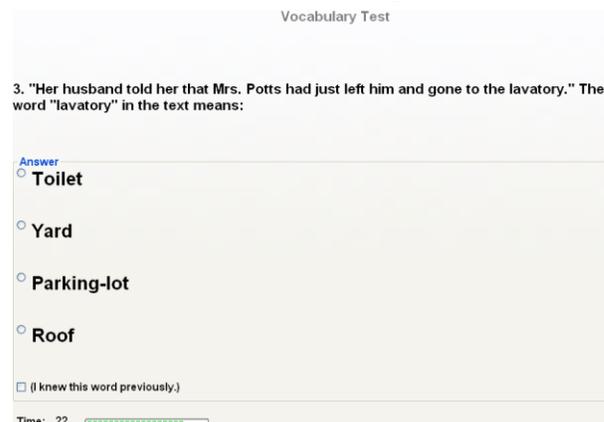

Figure 2: A Sample Shot of the Vocabulary MC Items

The audio texts used in this study included four English short stories, selected on the basis of length, conceptual difficulty, and readability from the *Steps to Understanding* (Hill, 1988), presenting audio materials at the intermediate level. Each short story, approximately one minute in length, had a single narrator telling the story.

Procedure

To collect the data, the OPT was given to 240 L2 students. Following guidelines of the OPT (Hansen & Lesley, 2005), their OPT scores were used to select 200 intermediate (i.e., 100 high- and 100 low-intermediate) EFL learners. Moreover, to ensure the

dependability of the data, 25 of the selected participants (12 males and 13 females) also answered a retired version of TOEFL (2004), and the correlation between their OPT and TOEFL scores was investigated using the Pearson product-moment correlation coefficient, which turned out to be high (0.85). Meanwhile, the computer software through which the listening and vocabulary tests were administered was piloted on a sample of 20 intermediate level L2 learners to assess the appropriacy of the materials, time, wordings and instruction. In addition, the construct validity of the tests was examined by PCA in a sample of 100 intermediate EFL students. Using Catell's (1966) scree test, 56 listening and 36 vocabulary items with acceptable eigenvalues were retained for the further data collection. To assess the potential impacts of captioning and order of captioning on L2 listening comprehension and vocabulary, the selected participants were then randomly assigned into four groups, each with 50 EFL learners: the caption group (CG), noncaption group (NCG), the first caption group (FCG), and the second caption group (SCG). For the main trial,

1. the CG listened to the audio short stories twice, both times with captioning (Figure 3);

2. the NCG listened to the audio short stories twice, both times without captioning;

3. the FCG listened to the audio short stories twice, first time with captioning;

4. the SCG listened to the audio short stories twice, second time with captioning.

After the second listening of each audio text, the corresponding listening comprehension test items, followed by the corresponding

vocabulary test items, were administered to the participants of the main study. Finally, discrete-point scoring procedures (i.e. 0 for false and 1 for right answers) were utilized to obtain each participant's total listening and vocabulary scores through the software.
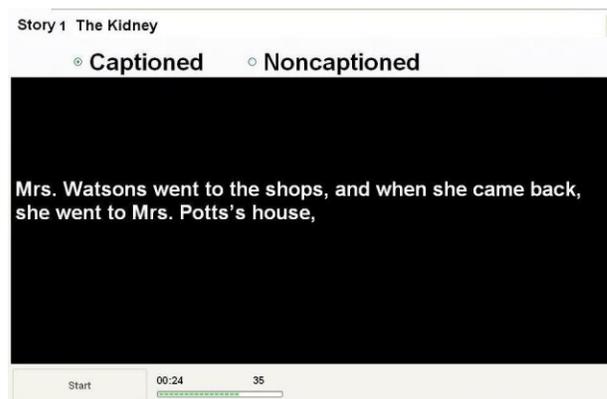

Figure 3: A Sample Shot of the Listening Part

Results
Table 1 shows the descriptive statistics (mean and standard deviations) of the L2 (i.e., English) listening comprehension and vocabulary scores for the four groups across the two proficiency levels. As demonstrated in the table, the high-intermediate participants in the four groups received a higher mean score than the low-intermediate ones on both listening and vocabulary items, with the highest listening and vocabulary mean scores belonging to the caption group (M = 51.12, M = 31.48 respectively). Moreover, the standard deviations in the four groups did not show great variability in the listening and vocabulary scores.

To answer the first research question, which concerned the overall impact of captioning on the English listening comprehension and vocabulary scores, independent *t*-tests were used, with the captioning (i.e. captions/noncaptions) as the independent variable and the listening comprehension and vocabulary scores as the independent variables in the analysis. As demonstrated in

Tables 2 and 3, there was a statistically significant difference between the listening mean scores of the CG (*M* = 48.84, *SD* = 2.77) and the NCG participants (*M* = 46.74, *SD* = 3.25) at the 0.01 level, *t* (98) = 3.47, **p* < .01. That is, the CG participants outperformed the NCG ones on the L2 listening comprehension test. Moreover, the eta squared, showing the magnitude of the mean difference, was found to be moderate (0.10). Along the same lines, a statistically significant difference between the vocabulary mean scores of the CG (*M* = 29.22, *SD* = 2.72) and the NCG participants (*M* = 27.52, *SD* = 2.96) was found, *t* (98) = 2.98, **p* < .01. That is, the CG participants performed better on the vocabulary test than the NCG participants did. However, the magnitude of the difference in the means was not large (eta squared = .083).

Table 1: Listening Comprehension and Vocabulary Scores

Groups	Proficiency Level	*Listening*		Vocabulary	
		M	SD	M	SD
CG	High (n = 25)	51.12	1.09	31.48	1.38
	Low (n = 25)	46.56	1.91	26.96	1.59
NCG	High (n = 25)	49.48	1.50	29.96	1.64
	Low (n = 25)	44.00	1.93	25.08	1.68
FCG	High (n = 25)	47.96	1.61	29.76	1.66
	Low (n = 25)	42.68	1.51	23.96	1.33
SCG	High (n = 25)	48.76	1.53	28.28	2.52
	Low (n = 25)	43.80	1.70	23.32	1.65

Table 2: t-Test for the Captioning Effect on the Listening Comprehension scores

	Levene's Test		*t*-test for Equality of Means		
	F	Sig	t	df	Sig
Equal Variances Assumed	2.23	.139	3.47	98	.001

Table 3: t-Test for the Captioning Effect on the Vocabulary scores

	Levene's Test		*t*-test for Equality of Means		
	F	Sig	t	df	Sig
Equal Variances Assumed	.331	.567	2.98	98	.004

The focus of enquiry in the second research question was the effect of captioning order on the L2 listening comprehension and vocabulary scores. To respond, independent *t*-tests were employed with the order of captioning (first/second captioning) as the independent variable and listening comprehension and vocabulary scores as dependent variables involved in the analysis. As exhibited in Table 4, there was not a statistically significant difference between the listening mean scores of the FCG (*M* = 45.32, *SD* = 3.08) and SCG participants (*M* = 46.28, *SD* = 2.97) at 0.01, *t* (98) = -1.58, *p* = .117. That is, the FCG participants' performance on the listening comprehension test was not significantly different from that of the SCG participants. Naturally, the magnitude of the mean difference was small (eta squared = 0.02). In line with these results, as depicted in Table 5, no significant difference between the mean scores of the FCG (*M* = 26.86, *SD* = 3.28) and SCG participants (*M* = 25.80, *SD* = 3.27) was reported, *t* (98) = 1.61, *p* = .110. And, the eta squared was found to be so small (0.02). That is, the FCG participants' performance on the L2 vocabulary test was not significantly different from that of the SCG participants.

Table 4: t-Test for the Captioning Effect on the Listening Comprehension Scores

	Levene's Test		*t*-test for Equality of Means		
	F	Sig	t	df	Sig
Equal Variances Assumed	.256	.614	-1.58	98	.117

Table 5: t-Test for the Captioning Effect on the Vocabulary Scores

|	Levene's Test		t-test for Equality of Means		
	F	Sig	t	df	Sig
Equal Variances Assumed	1.32	.254	1.61	98	.110

The third research question explored whether L2 proficiency level interacted with the captioning order to impact the participants' L2 listening comprehension and vocabulary scores. To respond, separate two-way between-groups ANOVAs were run. The results are shown in Tables 6 and 7.

Table 6: Tests of Between-Subjects Effects on the L2 Listening Comprehension

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1622.6	7	231.8	87.9	.000	.762
Intercept	437954.4	1	437954.4	1.66	.000	.999
Proficiency Level	1285.2	1	1285.2	487.7	.000	.718
Captioning * Level	6.1	3	2.01	.766	.514	.012
Error	506	192	2.6			
Total	440083	200				

The ANOVA revealed that there was a statistically significant effect for the L2 proficiency level on the listening comprehension scores, $F (1, 192) = 487$, *$p<$ .01. Based on Cohen's (1988) guidelines, the effect size for the proficiency level was large (partial eta squared = .71). But, the interaction effect between captioning and proficiency level for the listening comprehension scores was not statistically significant, $F (3, 192) = .766$, $p = .514$. Figure 4 displays a clear picture of the participants' performance in the two proficiency levels. The pattern of performance was somehow similar in the two proficiency level groups, with the CG receiving a higher listening mean score and FCG receiving a lower one. Likewise, the post hoc test showed that the CG performed significantly better than other groups including the FCG and SCG. Also, the performance of the SCG was better than that of FCG on the listening scores even though the difference was not significant at .01 (mean difference = .96, $p = .018$).
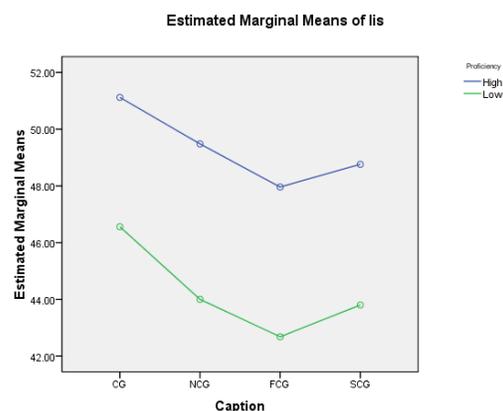
Figure 4: Interaction between Proficiency Level and Captioning for the L2 Listening Comprehension

Furthermore, as depicted in Table 7, there was a statistically significant effect for the L2 proficiency level on the vocabulary scores, $F (1, 192) = 429$ *$p< .01$, with the effect size of .69. Following Cohen's (1988) guidelines, this effect size could be large. In line with the results on the listening comprehension scores, the interaction effect between captioning and proficiency level for the vocabulary scores was not statistically significant, $F (3, 192) = 1.20$, $p = .297$.

Figure 5 displays how the participants in the two proficiency levels performed on the vocabulary test. Again, the pattern of performance was almost similar in the two proficiency level groups, suggesting no interaction between the proficiency and captioning order; the CG received the highest vocabulary mean score and SCG

received the lower one in the two proficiency level groups. Also, the post hoc test showed that the CG performed significantly better than other groups including the FCG and SCG. However, unlike the listening test, the performance of the FCG was better than that of SCG on the vocabulary scores though the difference was not significant at .01 (mean difference = 1.06, $p = .013$).

Table 7: Tests of Between-Subjects Effects on the L2 Vocabulary Test

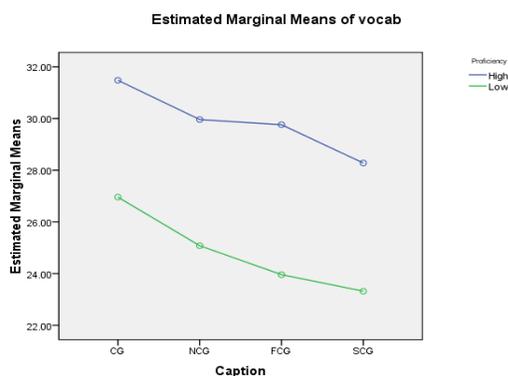| Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1589.5	7	227.1	76.8	.000	.737
Intercept	149604.5	1	149604.5	5.057	.000	.996
Proficiency Level	1270.1	1	1270.1	429.3	.000	.691
Captioning * Level	11.0	3	3.6	1.2	.297	.019
Error	568.0	192	2.9			
Total	151762.0	200				

Figure 5: Interaction between Proficiency Level and Captioning for the L2 for the L2 Vocabulary

Discussion

Captioned video and audio materials for L2 learning are becoming more common. However, there is controversy over whether they bring more native voices into the learning environment. The present study sets out to investigate L2 learners' use of captions while listening to short stories. In relation to the first research question, it was found that captioned audios aided L2 listening comprehension and vocabulary gains to a greater degree than non-captioned audios did. In other words, the captioned group outperformed the non-captioned in both the listening comprehension and the vocabulary tests. The benefit of captioning could be due to a bimodal presentation provided in the caption group. Perhaps, if one of the channels (audio or visual) failed, the other one compensated for the failure. This is plausible given that listening comprehension and vocabulary learning are dependent on the multiple input modalities. The other possible reason is that listening twice to the audios with captions might have reduced the difficulty of input to reach the optimal level or, in Krashen's (2003) terms, i +1. Besides, providing the two channels could help in reducing the level of stress or anxiety on the part of participants or, in Krashen's words, lowering the affective filter so that the participants in the caption group could take in more comprehensible input. Vanderplank (1993) suggests that captions are not affected by variations in accent or audio quality. If so, the captions could reduce stress and positively facilitate their aural comprehension or implicit vocabulary learning. This justification is also supported by the results of the study by Bird and Williams (2002), who found that vocabulary presented with text and sound (i.e. captioning) could result in better recognition memory for spoken words. Markham and Peter (2003) also found that captioning could improve Spanish ESL learners' listening comprehension effectively. Zarei's (2009) study, in which the bimodal subtitling was reported to be an effective mode for EFL learners for comprehending English movies and picking

up new words, can also partially support the above result.

The other concern of this study was to investigate the ordering effect of caption presentation. The results pointed out that when a short story was listened to twice, once with captioning and once without, the order of viewing had no significant impact on either L2 listening comprehension or vocabulary. Winke et al. (2010) argued that the order of captioning had an impact on the overall comprehension and vocabulary recognition. They found that Spanish and Russian learners presented with captions in the first viewing were better able to perform on the listening comprehension and the vocabulary tests than learners presented with captions in the second viewing. They suggested that this was due to the important role of attention in L2 learning. The results of the present study likewise showed the participants had a better performance on the vocabulary test with the captions in the first viewing, but unlike the study by Winke et al. (2010), its effect was not found to be so significant since the mean score of the first captioning group was marginally better than the second captioning group. Besides, second captioning group performed better on the listening comprehension, though not significantly. It can be argued that the captions in the first viewing seemed to help isolate key vocabulary that the L2 learners were not encountered for the first time or perceived to be important, so they might have paid more attention to new vocabulary in the subsequent listening or confirmed their hypotheses on the meaning of unknown words, hence having a better performance on the vocabulary test. That is, the first caption viewing might help further information-gathering on the vocabulary during the second listening. If so, the second listening in the present study provided additional confirmatory/non-confirmatory

evidence of form-meaning as regards vocabulary. At the same time, the first caption viewing could not be very facilitative for L2 listening comprehension when the second listening was presented without captioning perhaps because most participants in the first caption group might have lost track of plots or the main idea in the audio stories. And, zero captioning in the second listening could not greatly help them compensate for their failure. Rather, non-captioning in this context might have put more stress on them, hence not displaying a good performance on the listening comprehension test in comparison with the vocabulary one. But when the first listening was presented without captioning, the participants' attention might have been better drawn to the incidents and theme of the audio stories and the second listening with captions could have provided additional confirmatory/non-confirmatory evidence of their comprehension or, at least, reduced the anxiety associated with listening. All said, the effect of ordering needs further studies before making a strong statement about its effect given that the effect of this variable was not found to so effective in L2 listening comprehension and vocabulary performance at a less conservative level of significance, and there are not enough studies in the literature to compare and generalize the above findings broadly.

Finally, the participants' English proficiency level difference did not provide any major benefits taken from captioning order. In clear terms, listening twice to a short story with captions was most effective for both high- and low-intermediate L2 participants; that is, captioning helped both. Similarly, listening to a short story with captions the first rather than the second time was equally beneficial for the vocabulary performance, and listening to a short story with captions secondarily was equally useful for the

listening comprehension regardless of the L2 proficiency level. Thus, it is assumed that captioning can be a pedagogical tool, which aids language processing, and function similarly for upper and lower L2 proficiency levels. Ellis (2003) states that "learning to understand a language involves parsing the speech stream into chunks which reliably mark meaning" (p. 77). It can be argued that the captions presented twice might have helped the L2 learners see and be able to parse patterns or chunks in the audio listening materials. This might have aided both high- and low-intermediate participants in remembering and learning from the chunks when they were repeated (i.e. presented in written form twice). Meanwhile, the better mean scores obtained by high-intermediate participants, in general, as compared with low-intermediate ones, could be due to better L2 ability, which was observed in all four groups of the study. That is to say, it was regardless of caption ordering. The investigation of patterns of performance by the two proficiency level groups in Figures 4 and 5 suggest that captioning in repeated listening can be beneficial for a range of proficiency levels, perhaps, so long as the listening materials are suitable in terms of content and difficulty to L2 learners' proficiency levels. However, in Taylor's (2005) study, the lower-level learners reportedly had difficulty with attending to captions than upper-level students perhaps because they had a harder time with the content of the video materials; the content might have been too difficult for them. In line with Winke et al.'s (2010) claim, the above results of the present study suggest that the question over whether lower-level students can benefit from captions in the same way as upper-level learners should focus more on the appropriateness of the complexity level of L2 listening materials rather than the appropriateness of the captioning for L2 lower-level learners.

Conclusion

According to Hashemi and Aziznezhad (2011), "CALL offers modern English language teachers many facilities and novel techniques for teaching and learning" (p. 833). Thus, the effect of CALL on listening comprehension and vocabulary learning has shown great consideration among language teachers and researchers. Despite the significance of CALL in listening comprehension or vocabulary learning and captioning, supported by a number of empirical studies conducted in L1 (Bird & Williams, 2002), there is a paucity of research on CALL-facilitated captioning techniques in L2 listening comprehension and vocabulary learning, particularly in EFL contexts. The present study then took a further step to help fill this gap by investigating, firstly, the impact of captioning; secondly, the effect of captioning order; and, finally, the effect of possible interaction between L2 (i.e. English) proficiency and captioning on L2 listening comprehension and vocabulary gains.

The results indicated that captions had a beneficial effect on both L2 listening comprehension and vocabulary gains. They can result in greater depth of language processing by presenting multiple input modalities and reducing anxiety, and assist the implicit learning of vocabulary through the unpacking of language chunks or mapping form-meaning. Also, the results revealed that the captioning order played no significant role in the L2 listening comprehension and vocabulary performance. In other words, listening twice to a short story, first with captions and then without, did not significantly affect the L2 learners' performance on the listening

comprehension and vocabulary tests. However, this issue is due further investigation since small contributions sometimes cannot totally be ignored in educational settings. Finally, this study did not find that L2 proficiency level differences would affect performance derived from captions ordering. Constrained by the time, this study did not explore whether additional listening with captions or captioning order would result in greater vocabulary and comprehension gains. Possibly there is a ceiling effect for captioning. Besides, the L2 participants in this study were not allowed to toggle captions on and off in the program. Perhaps allowing L2 learners to toggle captions on and off can provide more information when captions might be useful or useless to them. Thus, future research can transcend limitations observed in this study in addressing captioning in a multimedia environment.

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