THE EFFECTS OF CAPTIONING VIDEOS USED FOR FOREIGN LANGUAGE LISTENING ACTIVITIES[1]

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This study investigated the effects of captioning during video-based listening activities. Second- and fourth-year learners of Arabic, Chinese, Spanish, and Russian watched three short videos with and without captioning in randomized order. Spanish learners had two additional groups: one watched the videos twice with no captioning, and another watched them twice with captioning. After the second showing of the video, learners took comprehension and vocabulary tests based on the video. Twenty-six learners participated in interviews following the actual experiment. They were asked about their general reactions to the videos (captioned and noncaptioned). Results from *t*-tests and two-way ANOVAs indicated that captioning was more effective than no captioning. Captioning during the first showing of the videos was more effective for performance on aural vocabulary tests. For Spanish and Russian, captioning first was generally more effective than captioning second; while for Arabic and Chinese, there was a trend toward captioning second being more effective. The interview data revealed that learners used captions to increase their attention, improve processing, reinforce previous knowledge, and analyze language. Learners also reported using captions as a crutch.

INTRODUCTION

The purpose of this study is to investigate L2 learners' use of captions[2] while watching videos in a foreign language. Audiovisual materials enhanced with captions are powerful pedagogical tools that are believed to help improve L2 listening and reading comprehension skills (Borras & Lafayette, 1994; Danan, 2004; Garza, 1991; Markham & Peter, 2003). Captions facilitate language learning by helping learners visualize what they hear, especially if the input is slightly beyond their linguistic ability (Danan, 2004). Captions may also serve to increase language comprehension by facilitating additional cognitive processes, such as greater depth of spoken-word processing (Bird & Williams, 2002).

Captioned video is increasingly used in foreign language classes, most likely because of the recent accessibility of authentic videos (e.g., via DVD, YouTube, ViewPoint) which, if not already captioned, can be easily captioned by teachers and curriculum developers using software such as Adobe Premier, iMovie, or ViewPoint. Many universities, overwhelmed by increased interest in foreign language learning (Welles, 2004), are turning to online foreign language course offerings, normally by implementing hybrid or blended-instruction courses, in which part of the instruction is in the classroom and part is conducted independently online (Blake, 2005; Chenoweth & Murday, 2003; Chenoweth, Ushida, & Murday, 2006; Sanders, 2005; Scida & Saury, 2006). Such classes incorporate more online and automated content, which often includes captioned videos. It is especially true for language programs such as Arabic and Chinese, mostly because it is difficult to find enough qualified instructors (Dahbi, 2004; Freedman, 2004), and because videos are a good resource for presenting native speaker voices.

Captioning may be a bonus because it helps language learners connect auditory to visual input (Garza, 1991), which may aid form-meaning mapping,[3] an essential process for foreign language acquisition (Doughty, 2004). With regard to the present study, the mapping of form to meaning is facilitated since captioning helps identify word boundaries. In other words, it helps learners segment what might otherwise be an incomprehensible stream of speech. However, a question that concerns both theory and pedagogy is what learners actually do with captions when they are presented with them. We do not know

whether they read captions fully or only in part, and if in part, what part. In other words, where is the learner's attention focused? How do learners balance the intake of audio, video, and text? Another question concerns the level of proficiency required to make captions beneficial. Past research has found that captions are more of a distraction than help for lower-level learners (Taylor, 2005), but that lower-level as well as upper-level learners have positive attitudes toward captions.[4] Could teachers simplify captions for certain learners (for example, only present key words or italicize or embolden key words within the text) to make them more salient? A final important area that has not been addressed is how learners of languages with non-Roman scripts, such as Arabic, Chinese, and Russian, process captions. It is for this reason that this study investigated the use of captions by learners of Arabic, Chinese, Russian and Spanish to understand better how captions aid comprehension. The present study also investigated how the support captions provide may be mediated by the target language script and/or by the proficiency level of the learners.

LITERATURE REVIEW

Four areas of research on captions informed this study. The first area involves investigations into whether and how captions increase the depth of processing for language learners. When captioning was first introduced for use in foreign language classrooms in the 1980s, it was thought to be a way to increase learners' attention, reduce anxiety, give students instant confirmation of their understanding of what was heard, and increase motivation (Burger, 1989; Froehlich, 1988; Grimmer, 1992; Vanderplank, 1988). Following that initial period, the bulk of studies that investigated captioning looked at whether captioned video is more beneficial than noncaptioned video (Baltova, 1999; Danan, 1992; Garza, 1991; Markham, 1993, 1999; Neuman & Koskinen, 1992). The general consensus was that captioning leads to superior performance on subsequent comprehension and vocabulary tests. One of the most robust experiments along this line was conducted by Bird and Williams (2002), who investigated the claim that captioning is a beneficial language learning tool by looking at how a bimodal presentation (aural and visual) of novel words would affect the learning of the words. In their study, vocabulary was presented to advanced learners of English under three conditions: (a) text with sound, (b) text without sound, and (c) sound without text. Bird and Williams considered the effects of these conditions on word learning, as measured by both improvements in spoken word recognition efficiency (how long it took the learners to remember the words) and recognition memory. Results showed that vocabulary presented with text and sound resulted in better recognition memory for spoken words and nonwords when compared to the other two presentation modalities. The researchers concluded that bimodal presentation aids novel word learning, as suggested by previous studies, by increasing or facilitating spoken-word processing. They further concluded that their results provide evidence that cognitive systems dealing with auditory and visual processing are indeed interactive and interconnected, thus suggesting that captions aid comprehension because they increase processing depth.

The second line of research that informed this study concerns the level of proficiency at which learners benefit most from captions. The results of past research are mixed. For example, Markham (1993) found that captions were more helpful to advanced learners when the video materials were more abstract or complex. He concluded that for intermediate to advanced learners, captioning should be used only when the video material is difficult for the learners. Guillory (1998) found that captions are beneficial for beginning-level learners. However, she found that beginning-level students benefit more when only key words are presented as captions, rather than having entire sentences (i.e., the full text of what was spoken) presented on screen as captions. She noted that key-word captioning might be better for beginning-level learners because it may not impose as large of a cognitive load. Taylor (2005) looked at whether captioned video was beneficial for beginning-level learners. Two groups of Spanish learners, one in their first year of Spanish and one with three or four years of Spanish, watched a Spanish-language video with or without Spanish captioning. The groups' comprehension scores were compared. Third- and fourth-year students who viewed the videos with captions performed better than first-year students who also used

captions, but scores for those who did not view captions did not differ regardless of level. Taylor interviewed the learners and found that those who used captions were able to describe how they used the pictures, sound, and captioning to understand the video. First-year students reported that they found the captions distracting and made it difficult to attend to sound, image, and captions. At the same time, like the third- and fourth-year learners, the first-year students expressed a positive attitude toward captions. The issue Taylor raised is whether, with exposure and practice, captioned video could become a valuable comprehension aid for beginning language learners' comprehension.

The third research area that informed this study concerns the individual strategies used by learners when watching captioned video. Vanderplank (1990) examined how learners of English used captions over a three-month period. Those who took notes while watching captioned videos produced more accurate language on subsequent comprehension exercises. Those who did not take notes comprehended as well as the note-taking group (according to self-reports), but did not retain specific language used in the videos. Vanderplank concluded that attention (form-focused) and processing (meaning-focused) are important for the intake and long-term retention of forms through captions. Even though captions attract attention, more specific strategies that involve rehearsal or practice (processing) of what is taken in through the captions are also important and can make captions more beneficial. Danan (2004) reviewed the benefits and limitations of audiovisual materials as well as strategies that might optimize the use of captioned material. She suggested that researchers look at more successful language learners as models because they seemed better able to process information through captions. She noted that overall caption use improved over time. The general conclusion was that captions can lead to significant improvement in learners' listening comprehension as long as they are taught to take advantage of relevant strategies.

Several newer studies have looked at the effects of *caption availability* on foreign language learning. In Web- and computer-based multimedia environments, learners and teachers can switch captions on or off. Markham (2001) investigated whether the presence of captions affects learning. He also explored whether familiarity with the content of the video differentially affects the usefulness of captions. He presented Muslim, Buddhist, and non-Muslim/Buddhist ESL students with videos in English about their respective religions. Within each of the three groups, half of the students were shown the videos with captions, and half without. Results revealed that both background knowledge and captions contributed substantially to the learners' comprehension of the videos. Grgurović and Hegelheimer (2007) conducted an empirical study to explore whether captions or transcripts were more effective in a multimedia video environment. They found that students who used captions used them more frequently and for longer periods of time than those who used transcripts. They concluded that an important challenge in investigating video options lies in finding ways to promote the appropriate use of those options. Similarly, Pujola (2002) researched the strategies used by Spanish-speaking ESL learners who used Web-based multimedia videos. She tracked whether the learners chose to use captions or transcripts when watching videos and found that those with poorer listening skills used captions and transcripts more for help with comprehension. On the other hand, the learners generally had better experiences with captions than with transcripts because they felt that their listening was improving along with caption use, whereas with transcripts they were only practicing their reading. Pujola concluded that some learners based their listening comprehension on reading instead of listening. She stressed that this "misuse" of captions can potentially inhibit the development of listening strategies, and explained that students need to be advised when to use captions (2002, p. 252).

It is difficult to generalize the findings of the studies reviewed above. First, several studies did not group subjects by proficiency levels. Thus, differences in comprehension may have been more related to proficiency than to effective use of captions. Second, the types of tests used to measure the effects of language learners' processing of captions varied widely. Most researchers used listening or reading comprehension tests and/or various forms of vocabulary tests. The use of comprehension and vocabulary tests may demonstrate that captions were beneficial and were processed by the learners, but we still do not

know *how* captions were processed by the learners. Results from these past studies only indicate that the captions were of beneficial use. Third, with one exception (Garza, 1991),[5] none of the studies involved the acquisition of less-commonly taught languages with non-Latin scripts. Notably absent were studies on the captioning and the acquisition of Arabic, Chinese, and Russian. This is important because we do not know if the conclusions from the studies above are generalizable to the learning of languages with orthographies that differ from those of the native language of the participants. And finally, a pedagogical question that has been raised by several researchers but has not been investigated is when learners should be exposed to captioning. We know from research by Pujola (2002) that captions, even though beneficial, can be overused. Some researchers suggested that to avoid overuse of captions, videos can be played once with captions and once without. However, the ordering effects of captions have not been investigated, that is, should captions be used on the first or on the second exposure?

LITERATURE SUMMARY AND RESEARCH QUESTIONS

In sum, captioned videos for foreign language learning are becoming more common because they are more accessible, easy to produce, and fit well into online course offerings. They are viewed as an important pedagogical tool because they bring more native voices into the learning environment and help learners integrate written and aural information, which supports language acquisition. Robust research needs to be conducted to understand (a) the ordering effects of captions (captions shown during the first or second viewing), and (b) what the processing issues surrounding captions are and how those issues may be tied to learners' individual differences in proficiency and/or the target languages, especially those with non-Latin scripts. The following research questions guide the present study. Languages used to address each question are given in parentheses.

1. Do captioned videos result in better comprehension of video content and learning of vocabulary than noncaptioned ones? (Spanish)

2. When a video is viewed twice, is captioning more effective (as measured by comprehension tests and vocabulary learning tests) when the first viewing is with captions or when the second viewing is with captions? (all languages)

3. Are there different benefits derived from captioning order depending on the target language? (all languages)

4. Do proficiency differences affect the benefits of captioning derived from captioning order? (Russian and Spanish)

Based on prior research, the first hypothesis is that captioning will result in comprehension and vocabulary gains. We cannot hypothesize, based on prior literature, (a) the ordering effects of captions, (b) the differential benefits of captioning order depending on the target language, or (c) whether proficiency differences affect any benefits derived from the ordering of captions. Thus, in relation to the last three research questions, we assume null hypotheses, that is, that there is no ordering effect of captions, no differential effects from captioning order in relation to the language being learned, and that proficiency will not affect the benefits of any ordering effect of captions.

METHOD

Participants

One hundred fifty foreign language learners from a large Midwestern university in the U.S. participated in the current study. They were second- or fourth-year learners of Spanish ($N = 67$) and Russian ($N = 41$) and second-year learners of Arabic ($N = 29$) and Chinese ($N = 13$). Because we relied on volunteers, the participant pool is not balanced across languages. In Table 1 we present a summary of the participant data with regard to age, gender,[6] and distribution by language and proficiency.[7]

Table 1. *Information about Participants*

Language	Year of study	N	Male	Female	Average age
Spanish	2nd	47	13	34	20
	4th	20	2	18	21
Russian	2nd	24	13	11	20
	4th	17	10	7	22
Arabic	2nd	29	12	17	22
Chinese	2nd	13	9	4	21
Total		150	59	91	

All participants, except one who spoke Kannada, were native speakers of English. Some had also studied German, French, Polish, Finnish, Spanish, Farsi, and Korean. Heritage learners or those learners whose L1 was the same as the target language were not included in the study. Learners of Spanish participated in the study outside of class and received extra credit for their participation; all other learners participated in the study during their regular class.

Materials

Videos

Videos for this project were prepared from three short English-language documentaries about three animals: salmon, bears, and dolphins.[8] Each video, approximately 3-5 minutes in length, had a single narrator who described the scene and told the story. The original English-language videos were transcribed, translated,[9] and then dubbed into the four target languages, with the original background music and sounds preserved. Female native speakers recorded the sound tracks for the 12 videos. Target language captions were added to the videos using iMovie on a Macintosh computer. The videos were converted to DVD using Apple iDVD, with the final outcome being 12 videos with captions, and the same 12 videos without captions.

Vocabulary tests

There were two vocabulary tests for each target language.[10] Each test had the same key target language vocabulary words from the videos. None of the key words had English cognates. On each test, half of the vocabulary words were presented in their written form. The other half were presented aurally via voice recordings on the Web. There were two versions of the vocabulary tests, A and B. Words in written form on version A were presented aurally on version B, and vice versa. Each participant was given either version A or B at random with an equal distribution of A and B tests across groups. The participants were asked to translate the target words into English. They could read the written words and listen to the recorded words as many times as they wanted. When presenting and discussing results from the vocabulary tests, we will refer to the modality of the presentation of the vocabulary on the tests— vocabulary input that was written or aural.

Test of prior knowledge of key vocabulary

A test of prior knowledge of the key vocabulary targeted in this study was used to identify participants' knowledge of the key words prior to watching the videos. For each key word the learners were asked to respond to the following scale:

1 = I didn't know this word before watching the video.

2 = I don't think I knew this word before watching the video.

3 = I have no idea if I knew this word before watching the video.

4 = I think I knew this word before watching the video.

5 = I definitely knew this word before watching the video.

Comprehension tests

There was a comprehension test after each video. Each test included multiple-choice questions in English about the main points of the stories.

Procedure

The study took place in a computer lab. The participants first filled out a background questionnaire,[11] followed by a presentation explaining the order of the tasks. They then watched a series of three videos. Each video was shown two times, once with captioning and once without. For each target language, one group saw captions during the first viewing of the video and another saw captions during the second viewing. The Spanish cohort included two extra groups, one which saw the videos twice without captions and one which saw them twice with captions. After the second viewing of each video, participants took the comprehension test and two vocabulary tests.

Following Al-Seghayer (2001), Bird and Williams (2002), and Danan (1992), the prior knowledge test for each video was not given before the study so as not to cause the subjects to pay special attention to these words. Rather, this test was given after the vocabulary test but before the comprehension test.

After the video and testing sessions, 26 learners (12 who saw the captioned videos first, 11 who saw them second, and 3 who saw them both times) volunteered to participate in a stimulated recall protocol, following procedure used in Gass and Mackey (2000). This was followed by an oral interview, in which general questions were asked relating to the usefulness of captions. These data were used as a way of further understanding our research questions, although in this paper we only report on the interview data. In the interview, the participants were asked about their experience watching the videos and what they did when the captions were presented on screen. The participants' responses were audiotaped and transcribed. As mentioned above, these data were intended to further elucidate the quantitative results. The goal was to learn how learners dealt with captions in the input and how they perceived issues of ordering effects. The following questions were asked:

- What did you think of the videos?

- What did you think of when you saw the video for the first/second time?

- Were you able to learn new vocabulary from the videos? Why or why not? Did the captions help in learning vocabulary? If so, why do you think they helped?

- Did you like the captioning?

- Do you prefer seeing the video with subtitles first or second?

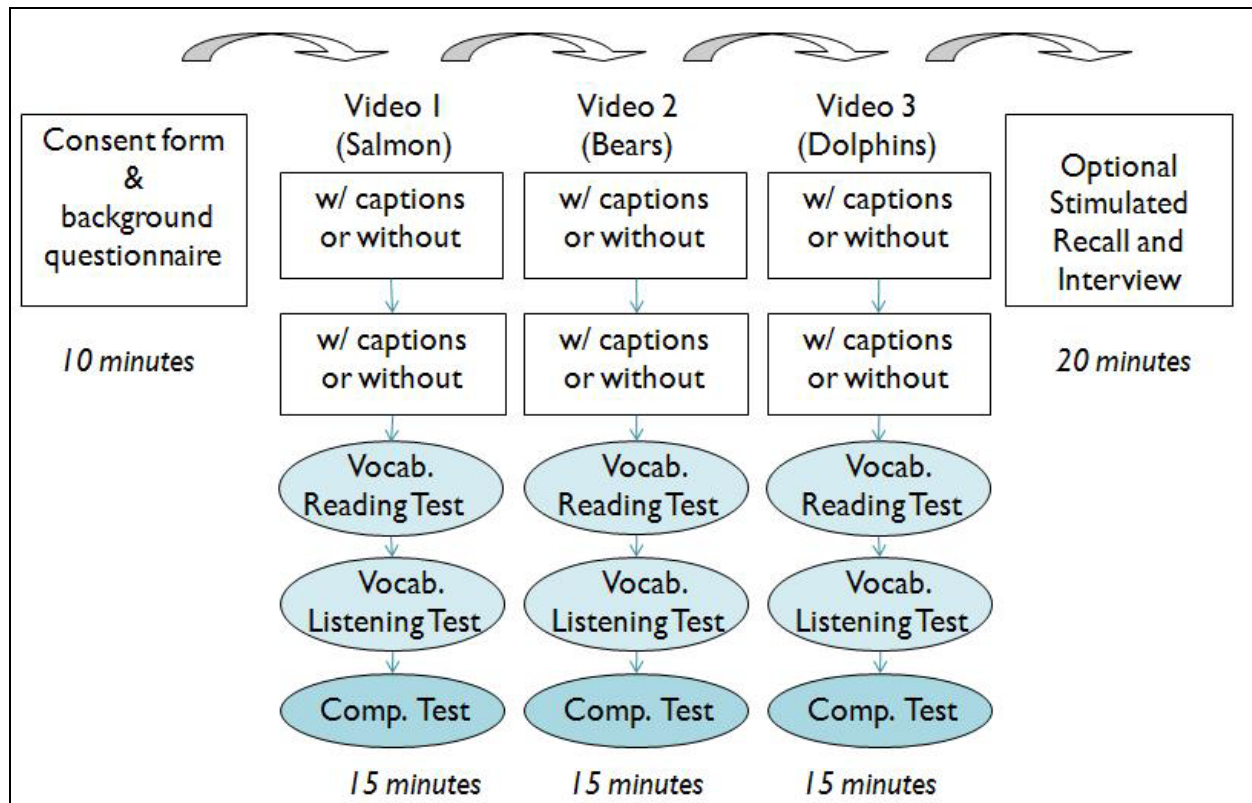A flowchart of the data collection procedure is shown in Figure 1.

Figure 1. The study procedure.

Scoring

Vocabulary tests

Exact translations or synonyms received full credit (1 point), for example, *put eggs* instead of *lay eggs*. Translations which were not synonyms but from the same semantic field received partial credit (.5 point), for example, *sleepy* instead of *tired*. Incorrect translations were given no credit (0 points).

Test of prior knowledge of key words

Learners were presented with all vocabulary from the vocabulary tests and were asked to rate the words as to if they knew the word before seeing the videos. Based on the results, for each student, a list of previously unfamiliar words was established. Points for unfamiliar words translated correctly or almost correctly on the vocabulary tests were summed to obtain a raw vocabulary score. For data analysis, the raw vocabulary score was divided by the number of unfamiliar words, following Smith (2004).

Comprehension test

For the comprehension test, one point was given for each correct answer. No partial credit was given.

Analysis

Independent *t*-tests and two-way ANOVAs were used to compare group means. For the *t*-tests, Levene's test for equality of variances was used. The results reported in Table 2 reflect the appropriate *t*-value according to whether equal variances could or could not be assumed. The alpha level for all tests was set at $p < .05$.

RESULTS

Quantitative

Table 2 presents the number of participants and their mean scores on the vocabulary and comprehension tests, grouped by language, proficiency level, and captions order.

Table 2. *Language, Proficiency Level, and Captions Order*

| Language | Proficiency Level | Captions Order | | Vocabulary Tests | | Comprehension Test |
				Written input	Aural input	
Arabic	2nd year	Captions first	N	16	16	16
			M	.05	.03	.35
			SD	.05	.02	.09
		Captions second	N	13	13	13
			M	.06	.02	.40
			SD	.03	.02	.11
		Total	N	29	29	29
			M	.05	.03	.37
			SD	.04	.02	.10
Chinese	2nd year	Captions first	N	8	8	8
			M	.03	.03	.38
			SD	.04	.02	.09
		Captions second	N	5	5	5
			M	.04	.04	.36
			SD	.08	.04	.08
		Total	N	13	13	13
			M	.04	.03	.37
			SD	.06	.03	.08
Spanish	2nd year	Captions first	N	14	14	14
			M	.15	.11	.49
			SD	.12	.09	.11
		Captions second	N	16	16	16
			M	.14	.07	.49
			SD	.08	.06	.13
		No captions	N	8	8	8
			M	.04	.04	.36
			SD	.02	.04	.12
		Captions both times	N	9	9	9
			M	.17	.14	.53
			SD	.11	.10	.18
		Total	N	47	47	47

Table 2. *Language, Proficiency Level, and Captions Order (continued)*

Language	Proficiency Level	Captions Order		Vocabulary Tests		Comprehension Test
				Written input	Aural input	
			M	.13	.09	.48
			SD	.10	.08	.14
	4th year	Captions first	N	10	10	10
			M	.28	.30	.68
			SD	.15	.17	.11
		Captions second	N	10	10	10
			M	.18	.17	.68
			SD	.14	.17	.12
		Total	N	20	20	20
			M	.23	.24	.68
			SD	.15	.18	.11
	Total	Captions first	N	24	24	24
			M	.21	.19	.57
			SD	.14	.16	.14
		Captions second	N	26	26	26
			M	.15	.11	.56
			SD	.11	.12	.15
		No captions	N	8	8	8
			M	.04	.04	.36
			SD	.02	.04	.12
		Captions both times	N	9	9	9
			M	.17	.14	.53
			SD	.11	.10	.18
		Total	N	67	67	67
			M	.16	.14	.54
			SD	.13	.13	.16
Russian	2nd year	Captions first	N	11	11	11
			M	.10	.08	.39
			SD	.07	.07	.11
		Captions second	N	13	13	13
			M	.07	.03	.39
			SD	.06	.03	.08
		Total	N	24	24	24
			M	.08	.05	.39
			SD	.07	.05	.09

Table 2. *Language, Proficiency Level, and Captions Order (continued)*

Language	Proficiency Level	Captions Order		Vocabulary Tests		Comprehension Test
				Written input	Aural input	
	4th year	Captions first	*N*	9	9	9
			M	.19	.16	.54
			SD	.15	.13	.11
		Captions second	*N*	8	8	8
			M	.17	.11	.48
			SD	.08	.09	.10
		Total	*N*	17	17	17
			M	.18	.14	.51
			SD	.12	.11	.11
	Total	Captions first	*N*	20	20	20
			M	.14	.11	.46
			SD	.12	.11	.13
		Captions second	*N*	21	21	21
			M	.11	.06	.42
			SD	.08	.07	.10
		Total	*N*	41	41	41
			M	.12	.09	.44
			SD	.10	.09	.11
Total	2nd year	Captions first	*N*	49	49	49
			M	.09	.06	.40
			SD	.09	.07	.11
		Captions second	*N*	47	47	47
			M	.08	.04	.42
			SD	.07	.05	.12
		No captions	*N*	8	8	8
			M	.04	.04	.36
			SD	.02	.04	.12
		Captions both times	*N*	9	9	9
			M	.17	.14	.53
			SD	.11	.10	.18
		Total	*N*	113	113	113
			M	.09	.06	.42
			SD	.08	.07	.13

Table 2. *Language, Proficiency Level, and Captions Order (continued)*

Language	Proficiency Level	Captions Order		Written input	Aural input	Comprehension Test
				Vocabulary Tests		
4th year		Captions first	*N*	19	19	19
			M	.24	.24	.61
			SD	.16	.17	.13
		Captions second	*N*	18	18	18
			M	.17	.14	.59
			SD	.11	.14	.14
		Total	*N*	37	37	37
			M	.21	.19	.60
			SD	.14	.16	.14
Total		Captions first	*N*	68	68	68
			M	.13	.11	.46
			SD	.13	.13	.15
		Captions 2nd	*N*	65	65	65
			M	.11	.07	.47
			SD	.09	.09	.14
		No captions	*N*	8	8	8
			M	.04	.04	.36
			SD	.02	.04	.12
		Captions both times	*N*	9	9	9
			M	.17	.14	.53
			SD	.11	.10	.18
		Total	*N*	150	150	150
			M	.12	.09	.46
			SD	.11	.11	.15

Research question 1

We used the results from Table 2 to first answer our research questions. The first question that we address concerns the overall effect of captioning. To respond, we consider only the Spanish second-year students, as this group was the only one that included learners who viewed the videos twice, both times with or without captions. Learners who saw the videos with captions both times performed significantly higher on the vocabulary test with written input than those who saw the videos without captions both times according to a *t*-test adjusted for inequality of variances, $t(9.031) = 3.33$, $p = .00$, $d = 1.6$. Likewise, watching the videos with captions both times resulted in significantly higher scores on the vocabulary test with aural input than watching without captions both times, $t(15) = 2.346$, $p = .03$, $d = 1.3$. In line with these results, captions both times also resulted in significantly higher comprehension test scores than no captions, $t(15) = 2.209$, $p = .04$, $d = 1.1$.

Research question 2

To address the second research question, which investigates the effect of the order of caption presentation, all languages were combined. Learners who saw captions during the first viewing performed significantly higher on the aural vocabulary test than those who saw captions on the second viewing according to a *t*-test adjusted for inequality of variances, $t(124.89) = 2.12$, $p = .03$, $d = .36$. The effect of order was not significant for the written vocabulary or comprehension test. Learners who viewed captions first obtained slightly higher scores on the written vocabulary test than those who saw captions second, but this difference was not significantly different, $t(131) = .95$, $p = .34$, and learners with captions first obtained approximately the same scores on the comprehension test as those who saw captions second, $t(131) = -.23$, $p = .81$.

Research question 3

This question explored the differential benefits derived from the ordering effect of captioning depending on the target language. To not have proficiency level as a potential intervening variable, we only considered the results from second-year students. The results of *t*-tests were not significant, but there was a trend differentiating Russian and Spanish, where captions first always appeared to be more beneficial, as opposed to Arabic and Chinese, where the results are mixed, but where captions second appeared to be more effective. These trends are presented in Table 3.

Table 3. *The Differential Beneficial Effects of the Ordering of Captions by Language and Test*

	Arabic	Chinese	Russian	Spanish
Vocabulary Learning, Written Input	Captions second	Captions second	Captions first	Captions first
Vocabulary Learning, Aural Input	Captions first	Captions second	Captions first	Captions first
Comprehension	Captions second	Captions first	Captions first	Captions first

Research question 4

This research question considered whether proficiency differences affect any benefits related to the ordering effects of captions. For this analysis, we consider only data from Spanish and Russian, as they were the only two languages for which there were data from two proficiency groups. A two-way ANOVA was conducted for each of the three tests. Results indicate that there were no significant interactions among language, year, or captions ordering for any test. The results are shown in Table 4.

Table 4. *Results of Two-way ANOVA for effects of language, caption order, and proficiency level*

Test	Source	*df*	*F*	h_p^2	*p*
Vocabulary, Written Input	Language	1	5.37	.06	.02*
	Caption Order	1	3.07	.03	.08
	Proficiency Level	1	14.03	.14	.00*
	Language x Caption Order	1	.59	.00	.44

Table 4. *Results of Two-way ANOVA for effects of language, caption order, and proficiency level (continued)*

Test	Source	df	F	h_p^2	p
Vocabulary, Written Input (continued)	Language x Proficiency Level	1	.05	.00	.81
	Caption Order x Proficiency Level	1	.64	.00	.42
	Language x Capt. Order x Prof. Level	1	1.13	.01	.28
	Subjects within-group error	83	(.01)		
Vocabulary, Aural Input	Language	1	9.44	.10	.00*
	Capt. Order	1	23.77	.22	.00*
	Prof. Level	1	8.16	.09	.00*
	Language x Capt. Order	1	1.83	.02	.17
	Language x Prof. Level	1	.52	.00	.47
	Capt. Order x Prof. Level	1	1.01	.01	.31
	Language x Capt. Order x Prof. Level	1	.86	.01	.35
	Subjects within-group error	83	(.01)		
Comprehension	Language	1	29.37	.26	.00*
	Capt. Order	1	.46	.00	.49
	Prof. Level	1	38.58	.31	.00*
	Language * Capt. Order	1	2.18	.02	.14
	Language * Prof. Level	1	.27	.00	.60
	Capt. Order * Prof. Level	1	.41	.00	.52
	Language x Capt. Order x Prof. Level	1	.41	.00	.52
	Subjects within-group error	83	(.01)		

Note. Values enclosed in parentheses represent mean square errors. *$p < .05$.

Interview Data

Using an inductive approach in which themes and patterns emerged from the data, we identified five themes underlying the interview comments:

1. Learners have a need for multiple input modalities.

2. Captions reinforce and confirm what is taken in aurally.

3. Captions affect learners' attention to the input.

4. Captions aid with the decomposition and/or analysis of language.

5. Captions are sometimes viewed as crutches.

The first three relate to our research questions; the fourth and fifth emerged through an examination of our data even though they had not been part of our original research questions. Below we present a few select examples of learner responses by theme.

The first theme that emerged from the comments relates to the role of multiple modalities. The learners in the interview sessions noted that they were aware of their own needs for listening as well as visualizing the speech. For example, in Example 1, the learner relates his experience with captions in the second video to his first-time through, where only audio (video plus audio but no captioning) was available:

Example 1. *"It, um, I think it, they um, reinforced what I had experienced before. I can actually see the uh, the word in the proper context."* (Second-year Spanish learner who saw captions second.)

This was also noted by learners of languages with scripts very different from English, as in Example 2 with a second-year Russian learner and Example 3 with a second-year Chinese learner:

Example 2. *"Um, because you can see the words and hear the words at the same time."* (Second-year Russian learner who saw captions second.)

Example 3. *"Hearing it and seeing it. I don't learn very well if teachers give me a list of words and say 'learn it,' like I need to see what it is and hear it."* (Second-year Chinese learner who saw captions first.)

Related to the role of multiple modalities is the second theme, the reinforcing role of captions. Examples 4 and 5 (Russian and Spanish learners respectively) are illustrative:

Example 4. *"Well, you listen first and then, you get, I don't know, you get familiar with the words first and the sound and things like that, and then with the subtitles you can, you can you can kind of verify what you were thinking first."* (Second-year Russian learner who saw captions first.)

Example 5. *"It, um, I think it, they um, reinforced what I had experienced before. I can actually see the uh, the word in the proper context."* (Second-year Spanish learner who saw captions second.)

The third theme had to do with the way captions affect learners' attention to the input. This attention-drawing function of captions may be viewed as positive or negative by the learner. They may view captions as both beneficial and distracting (or attention depleting). This can be seen in Examples 6 through 8. Example 9 illustrates this learner's conflicting views on captions.

Example 6. *"…and when the subtitles are on, I don't really pay attention to the actual video. I'm paying more attention to the subtitles at the bottom."* (Second-year Spanish learner who saw captions second.)

Example 7. *"Um, I guess seeing it with the subtitles first, because then I know what to pay attention to, I know, um, you know what to expect the next time around without the subtitles, you can pay attention to certain things the next time."* (Second-year Chinese learner who saw captions first.)

Example 8. *"When I didn't have them, I paid more attention to the video and, um. You know, when I had the subtitles, when the second time, with the second video I was thinking 'ok, so, pay attention to words,' so that when I listen to it the second time, I, I can, I just hear it, I can pay more attention to what's going on and try to figure out what they mean. But it wasn't that easy either. It was harder to pay, for me I'm mostly going back between the subtitles and the images so, it was sort of hard to pay attention but …"* (Second-year Spanish learner who saw captions both times.)

Example 9. *"I think they were helpful, um, they at times can be distracting I guess, if you were listening to something again, but seeing it each time would be helpful."* (Second-year Spanish learner who saw captions first.)

The fourth theme that emerged from the interview data had to do with the decomposition and/or analysis of language. This is seen in Examples 10 and 11.

Example 10. *"Um, well, with, Russian, it's just hard to, to sometimes tell where they start one word and where they end another, and this, it's just nice to be able to see it, laid out for me."* (Second-year Russian learner who saw captions second.)

Example 11. *"So if I watch it first without it, then I can kind of take in the whole message of it, hear a little bit, and then when I get stumped I can really break it up."* (Second-year Spanish learner who saw captions first.)

Finally, the interview data revealed that captions are sometimes viewed by the learners as crutches. Comments related to this are presented in Examples 12 and 13.

Example 12. *"Yeah. I think that, you know, if you, I mean, for me the subtitles are kind of a crutch so, you know, you try to watch it the first time with the crutch, and understand it the best you can, and after you understood it a little bit, then you can watch it without."* (Second-year Russian learner who saw captions first.)

Example 13. *"Um. Yeah. It is helpful, just to double-check to make sure that what you are hearing is correct. But sometimes you use it like a crutch, you know, like only read and not listen."* (Fourth-year Spanish learner who saw captions second.)

DISCUSSION

This study set out to investigate foreign language learners' use of captions while watching videos in a foreign language. By presenting captioned and noncaptioned video to groups of Arabic, Chinese, Russian, and Spanish learners, we found that, in response to the first research question, captioned rather than noncaptioned videos aid novel vocabulary recognition. This occurred regardless of whether the vocabulary test words were presented to the learners in written or aural mode. Captioned videos also aid overall comprehension of the videos. In other words, the use of different modalities appears to facilitate vocabulary recognition and overall comprehension. The benefit of multiple input modalities is supported by previous research, such as Bird and Williams (2002), who found that a bimodal presentation (in their case, text and sound) resulted in better recognition memory. Essentially, it appears that more input is better, leading to increased depth of processing since learners utilize different input modes differently, and these input modes reinforce one another. Similarly, when considering the vast literature on learning styles in educational research (see Dörnyei, 2005), we recognize that individual learners may be able to process one mode of input better than another. As Dörnyei noted, learners interact differently with the environment and approach learning tasks differently. Thus, as noted by our participants, captioned video allows this to happen.

The second research question relates to the ordering effect of captions. We found that when a video is shown two times, once with captioning and once without, the order of viewing has an effect on the subsequent recognition of vocabulary presented in the aural mode: learners presented with captions in the first viewing are better able to aurally recognize novel vocabulary than learners presented with captions in the second viewing. We suggest that this is due to the important role of attention in learning a second language. This is supported by comments from our participants. Many of their comments indicated that the captions served the function of drawing learners' attention to the language in the video. The captions seemed to help isolate what the learners perceived to be important and helped them determine what to pay attention to in subsequent viewings.

With regard to attention, it is well documented that language learners are often faced with a string of sometimes incomprehensible input and need to focus attention on particular parts of language as aspects of the learning process. In fact, Schmidt (2001) claims that attending to particular parts of language "appears necessary for understanding nearly every aspect of second and foreign language learning" (p. 6). This claim is integral to Schmidt's (1990, 1993, 1994, 1995, 2001) *noticing hypothesis*: awareness (through attention) is necessary for noticing, which in turn is essential for learning. Schmidt and Frota (1986) suggested that "a second language learner will begin to acquire the target like form if and only if it is present in comprehended input and 'noticed' in the normal sense of the word, that is, consciously" (p. 311). The idea presented here is that learning requires a learner to be actively involved or attending to L2 forms in order for learning to take place. However, at times, the language input (in this case the video) may be so complex that it is necessary for learners to have some sort of aid (in this case captioning), as was found by Markham (1993).

In a similar vein, Gass (1997) argued that interaction often serves as a priming device, setting the stage for learning rather than being a forum for actual learning. The same may be the case for captioning. When captioning occurs first, it may draw learners' attention to something they do not know. This allows for further information-gathering during the second listening. This is easier for those who can easily read the script (Spanish, Russian). When captioning occurs second, the unknown word/phrase that a learner hears is salient precisely because it is unknown (see Gass, 1988). The second listening allows for confirmation. Reading an unknown script requires more prior knowledge, which in this case comes from hearing the unknown word. In other words, with scripts that are similar to the native language script, it is easier to be alerted to something unknown through seeing it in writing; with scripts that are different from the native language script, it is easier to be alerted to something unknown through hearing it spoken. The second video provides additional confirmatory/nonconfirmatory evidence of what was comprehended. Acquisition is not necessarily instantaneous; it takes time and often requires repeated input, especially when the input comes through multiple modalities.

The third research question concerned orthographic differences between participants' native and the target language. It may be that language input, presented simultaneously through multiple modalities (aurally and in writing), is taken in differently depending on the orthography of the language. There was a trend for learners of Russian and Spanish to do better on comprehension and vocabulary tests when the captioning was first, and for learners of Arabic and Chinese to do better with captioning second. However, Arabic and Chinese learners did not appear to obtain consistently better test scores depending on a single ordering of captions. We suggest 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. Thus, Russian and Spanish learners benefitted when the first exposure to the language included the written mode. On the other hand, when there is a great distance between the native and target language orthographies, the aural modality is preferable, that is, it is more difficult to avail oneself of the written modality and there is a reliance on listening because the written symbols are not well learned.

Finally, this study did not find that proficiency differences affect any benefits derived from captions ordering. For Spanish and Russian learners who were either in their second year or fourth year of study, seeing a video with captions the first rather than the second time was equally beneficial regardless of year of study. This may suggest that captioning, as a language learning tool to aid processing, may function similarly for all proficiency levels. Concerns about whether lower-level students can benefit from captions in the same way as upper-level learners (Guillory, 1998; Markham, 1993; Taylor, 2005) may be more about the appropriateness of the video's complexity level for the lower-level learners rather than the appropriateness of the captioning for lower-level learners. As in Taylor's (2005) study, we found that when captions are used, upper-level learners performed better than lower-level learners on comprehension, as one would expect, since both groups watched the same videos. In light of our study, we suggest that the lower-level learners in Taylor's study who reported that it was more difficult to attend to captions than

upper-level students were perhaps having a harder time with the content of the video as it may not have been as appropriately matched to the lower-level students' abilities. Thus, it appears that captions are beneficial for a range of proficiency levels,[12] as long as the videos are matched appropriately in terms of content and complexity (not too hard *and* not too easy) to the proficiency level of the language learners.

As mentioned earlier, we looked for patterns in our interview data. Three patterns related to our research questions, but two additional findings emerged from the comments of our participants. First, as seen in Examples 10 and 11, captions aided in the process of language analysis or decomposition. Word boundaries cannot always be determined in fast running speech. But in writing words can be made more discrete, allowing the learners to unpack the speech in a more meaningful way. Ellis (2003, p. 77) stressed that "learning to understand a language involves parsing the speech stream into chunks which reliably mark meaning." We believe that our data show that captions help learners see and be able to then parse structural patterns or chunks in the videos, which may assist them in remembering and learning from the patterns presented. The role of chunks has a long history in the SLA literature (see Conklin & Schmitt, 2008; Hakuta, 1974). A full discussion is beyond the scope of this paper, but in general, processing information in chunks reduces the burden on the learner to process individual bits and link form and meaning. Research on the processing of formulaic sequences (Conklin & Schmitt, 2008) suggests a processing advantage of formulaic sequences over matched nonformulaic sequences. The present study may help explain why captioning may lead to a greater depth of processing, as suggested in the literature (Bird & Williams, 2002; Borras & Lafayette, 1994; Danan, 2004; Garza, 1991). As noted before, captions may aid in chunking. For instance, Vanderplank (1993) suggested that captions not only indicate word boundaries for learners, but they also are unaffected by variations in accent and/or audio quality that can adversely affect aural comprehension, thus further facilitating aural comprehension. Note that the present study found that captions resulted in better vocabulary test scores in the aural mode, especially when videos were shown twice, once with captions and once without.

The second additional finding that emerged from interview comments is that captions can be a *crutch*. We take the "crutch" notion to be a positive one in that when learners do not have to focus on extracting meaning from the sounds they hear, they can focus on the form and link that form to meaning. Learning requires learners to actively attend to L2 forms in order for learning to take place. But, at times, the language input (in this case the video) may be so complex that it is necessary for learners to have additional help, in this case captioning, as was found by Markham (1993). In this sense, captions can be a sort of scaffold or tool to aid L2 learning, as described in Example 12, even though, as Example 13 suggests, captions may be overused at times, as mentioned by Pujola (2002).

CONCLUSION

This study has yielded a number of observations about the use of captions, confirming previous research that indicates that captions are beneficial because they result in greater depth of processing by focusing attention, reinforce the acquisition of vocabulary through multiple modalities, and allow learners to determine meaning through the unpacking of language chunks. We found that listening twice to a video, first with captions and then without, may reduce listener anxiety, activate selective and global listening strategies, and promote automaticity in processing. We encourage replications of this study to create a broader database that includes learners of related and unrelated languages with Latin and non-Latin writing systems and learners with a greater range of proficiency levels.

Future research should address a number of additional questions pertaining to the use of captions, for example:

- What precisely are learners focusing on when they look at captions?

- Do upper-level learners ignore captions more often than lower-level ones?

- What are the individual differences that contribute to learners' utilization of captions, such as use of learning strategies, modality preferences, and memory?

- Do additional viewings of a video with captions result in greater vocabulary and comprehension gains, or is there a ceiling effect?

- Can learners be trained in effective use of captions? (Taylor, 2005)

- What is the need for captions as perceived by the learners themselves? Allowing learners to toggle captions on and off can provide information about when captions might and might not be useful to them[13] (Grgurović & Hegelheimer, 2007).

With a greater emphasis on technology in language classrooms, the use of captioning will undoubtedly increase in importance and frequency. If this is to happen, appropriate research will need to increase in future years lest we introduce a pedagogical tool without fully understanding its implications.

NOTES

1. This is a revised version of a paper presented in Essen, Germany at the AILA World Congress, August, 2008. We hope that we have addressed all of the comments received from various sources. All errors that remain are our own. We are grateful to the Center for Language Education and Research (CLEAR) at Michigan State University for support through a Department of Education grant P229A060011. We are also grateful to Dennie Hoopingarner and Michael Kramizeh for assistance with the development of the videos used in this study.

2. We distinguish between captions and subtitles according to the definition provided by Markham and Peter (2003). "Subtitles refer to on-screen text in the native language of the viewers that accompany the second language soundtrack of the video material. Captions refer to on-screen text in a given language combined with a soundtrack in the same language" (p. 332) (see also Danan, 2004, pp. 67-68). During the interview, interviewers and learners often used the word *subtitle* to refer to what we refer to as captions.

3. Form-meaning mapping refers to the psycholinguistic process of connecting the meanings of new vocabulary or grammar to their spoken and written representations.

4. We have used a variety of terms to refer to proficiency levels (e.g., lower-level, upper-level, beginning-level). When referring to the work of others, we have used their original terminology.

5. Garza (1991) showed captioned videos to American students of Russian (captions in Cyrillic script) and ESL students (captions in Latin script). Students of Russian had higher gains on comprehension than ESL students when captions were provided, but this difference is attributed to experience in watching movies rather than to the different scripts.

6. Age and gender were not variables in this study. All students were undergraduates and therefore represented a homogenous population. We are not aware of suggesting that either age or gender would be relevant to the current discussion.

7. We were not able to obtain comparable proficiency information across the language groups. We used seat time as the only available measure of proficiency despite its obvious weaknesses (see also NOTE 12).

8. We selected professional quality videos (one was a *National Geographic* video and the others were professional videos made for children) that represented common interests. Each video had a storyline that could hold the viewer's interest. All videos contained unfamiliar vocabulary.

9. A native speaker of the target language did the original translation from English. It was then checked by another native speaker of the target language. All translators were fluent in English.

10. When working across languages, especially with vocabulary, it is not possible to have exactly comparable difficulty levels for the same vocabulary items (Ard & Homburg, 1983).

11. The background questionnaire consisted of questions relating to demographics (age, gender, L1, etc.), length of study/exposure to the target language, and study of other languages.

12. Very early learners were not included in this study, so the results may not be applicable to this group.

13. We are grateful to the anonymous *LLT* reviewer for suggesting we mention this area of future research.

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