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An alternative to language learner dependence on L2 caption-reading input for comprehension of sitcoms in a multimedia learning environment

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Abstract

Most second/foreign language (L2) learners have difficulty understanding listening input because of its implicit and ephemeral nature, and they typically have better reading comprehension than listening comprehension skills. This study examines the effects of using an interactive advance-organizer activity on the DVD video comprehension of L2 learners to provide an alternative to the scenario of L2 learners experiencing sensory overload in a multimedia learning environment that presents pictures, printed words and speech words. A total of 95 intermediate university-level L2 learners with an average TOEIC (Test of English for International Communication) score of 565 were placed in four conditions for an English-language DVD viewing task, including an advance-organizer group, a captions group, a captions plus advance-organizer group, and a control group. The study concludes that using advance organizers as an instructional strategy facilitated participant listening comprehension and reduced participant dependence on L2 caption-reading input by 50% for initial comprehension. Participants also held a positive attitude towards an interactive advance-organizer activity. The details concerning the role of L2 captions in multimedia listening are also discussed. The findings provide insight into teaching listening to L2 learners who learn most of their L2 in a more reading-dependent classroom setting and typically have enhanced L2 literacy skills.

Keywords

interactive advance-organizer activity, L2 listening instruction, multimedia in L2 listening, teaching/learning strategies.

Introduction

Listening is one of the most crucial skills for second/foreign language (L2) learners to develop because of its beneficial effect on developing other skills. Vandergrift

(2007, p. 191) indicated that L2 listening remains 'the least understood and least researched skill' although listening comprehension is at the core of L2 learning. Advancing technology has facilitated authentic multimedia language-learning materials to become increasingly common in L2 classrooms. The DVD option, which offers both multilingual captions and multilingual soundtracks to allow for various combinations of oral and written language, has become particularly useful in the classroom setting to enhance L2 learner

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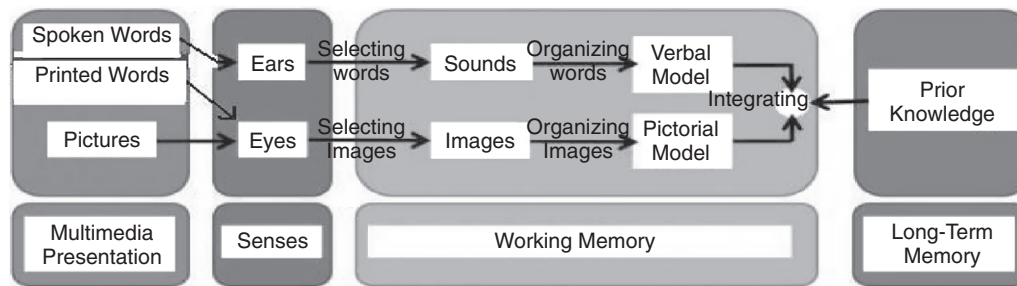


Figure 1 Cognitive Theory of Multimedia Learning Showing Narrated Animation with Redundant Printed Text – Words and Pictures Both Enter the Visual Information-Processing Channel

comprehension. Although multimedia environments allow language learners to work with audio, visuals and text, they have limited capacity to process visually and auditorily presented material (Kalyuga, Chandler, & Sweller, 1999, 2000; Mayer, 2001; Taylor, 2005). The cognitive theory of multimedia learning by Mayer (2001) showed that presenting pictures and words visually as animation and on-screen text places an additional load on the learner visual information-processing channel. This increased cognitive load reduces the amount of processing that learners can apply to the pictures because pictures and on-screen text compete for limited cognitive resources in the visual channel (Figure 1). Adding on-screen text to a narrated animation detracts from multimedia learning and results in poorer learning and understanding, a finding referred to as the ‘redundancy effect’ by Mayer and other researchers. Thus, the value of caption-reading input afforded by DVD technology should be considered in light of how the human mind works. Only multimedia messages designed and presented based on how humans process information are likely to result in meaningful learning.

Authentic materials reflect unadapted, natural interaction among native speakers and are unaltered in speech-delivery speed or syntactic complexity to suit the proficiency level or needs of language learners. Therefore, they are likely to cause comprehension difficulties for most L2 learners who typically have better L2 literacy skills, particularly in the absence of on-screen text or captions. To provide an alternative to the redundancy effect, by which on-screen text contains the same words as narration, an interactive advance-organizer activity is used to activate the prior knowledge of language learners to integrate with visual

and auditory information presented in a multimedia environment to arrive at a full interpretation of the listening material (Figure 1). The term ‘advance organizer’ is defined as a teaching activity that provides L2 learners with prior knowledge and helps them organize their thoughts and ideas to prepare for a listening task. Advance organizers provide ‘known’ information on DVD material for L2 learners to help them comprehend DVD material through listening rather than through reading the printed text. The known information provided in the advance organizer also reduces the cognitive load in the visual channel by making learners less dependent on reading L2 captions to understand their DVD viewing. This hypothesis needs to be tested against a learning situation in which language learners view the same DVD segment with redundant L2 captions, but without any relevant known information on it. Enhanced understanding of the listening process will help inform pedagogical decisions in this area, and help L2 teachers in a multimedia classroom setting teach listening in a more effective manner.

Literature review

A brief overview of the L2 literature supports the role of captions in L2 comprehension success, regardless of where language learning occurs. Garza (1991) found that the data collected from 70 university-level ESL (English as a second language) students learning English and 40 native-English speakers learning Russian for five or six semesters strongly support a positive correlation between the presence of captions and increased comprehension of the video material. Several other researchers have studied the relationship between captioned video (also television and movie

clips) and L2 learner vocabulary development, listening comprehension, and the amount of meaning negotiation (Arslanyilmaz & Pedersen, 2010; Guichon & McLornan, 2008; Guillory, 1998; Hayati & Mohmedi, 2011; Huang & Eskey, 2000; Markham, 2003; Starbek, Starcic Erjavect, & Peklaj, 2010; Stewart & Pertusa, 2004; Winke, Gass, & Sydorenko, 2010; Yuksel & Tanriverdi, 2009). The results of these studies have shown that aural input with captions/printed text helped L2 learners improve general comprehension, incidental vocabulary learning and communicative competence. Compared to most studies conducted in traditional classroom settings, Chang, Tseng, and Tseng (2011) investigated the effect of captions on listening comprehension among learners with different English proficiencies in a ubiquitous learning environment. The students observed animals in a zoo using a personal digital assistant, an audio guide, and a global positioning system, and they learned through spoken messages only or through text and spoken messages. The results indicated that students provided with dual-channel information outperformed their peers on the listening comprehension test and held a significantly higher positive attitude in the ubiquitous learning environment.

Although L2 captions aid in immediate comprehension, Robin (2007) stated that the longitudinal effects on listening-comprehension improvement remain unknown. Diao, Chandler, and Sweller (2007) found that learners provided with captions can become too dependent on such reading input by receiving information passively, which results in surface learning and lowers learner listening-comprehension performance. Other studies have also challenged captioned video use in the classroom by indicating that students simply ignore the soundtrack and primarily concentrate on reading captions, which in turn leads to non-significant improvement in listening comprehension (Borras & Lafayette, 1994; Caimi, 2006; Latifi, Mobalegh, & Mohammadi, 2011). Another concern is that the visual channel of language learners can become overloaded when pictures and words are both presented visually as animation and as on-screen text (or captions) because they have limited capacity to process visually (and auditorily) presented material (Kalyuga *et al.*, 1999, 2000; Mayer, 2001; Taylor, 2005; Yoshino & Kano, 2000). Mayer contended that the most efficient method to present verbal material is through the verbal channel as spoken text only rather

than as on-screen text 'because in this way it does not compete with pictures for cognitive resources in the visual channel' (p. 153).

A phenomenon commonly observed in L2 learners who are in a more reading-dependent classroom setting is that they typically have better reading comprehension than listening comprehension skills. The absence of on-screen text normally creates difficulties in comprehending authentic English-language DVD material. However, research evidence abundantly supports the usefulness of providing background knowledge or information in the form of an advance organizer in facilitating the L2 listening-comprehension process. Vandergrift (2007) showed that advance-organizer use helps build or activate listeners' prior knowledge and 'develop a conceptual framework for inferencing (top-down processing)' (p. 198). The facilitative role of prior knowledge in comprehension is also manifested in Mayer's cognitive theory of multimedia learning in which prior knowledge, including linguistic knowledge and content knowledge, is integrated with the two sensory modalities in working memory to arrive at a full interpretation of the information supplied by a multimedia presentation. A systematic review of L2 research that used advance organizers to activate prior knowledge in the listening-comprehension process shows that advance-organizer design assumes various forms. These assumed forms include a summary of major scenes with or without accompanying pictures, an introduction to the main characters in a film, key vocabulary presentation, a short film preview followed by brainstorming and a class discussion, picture illustrations, cultural background cues and a question preview (Chung, 1999, 2002; Chung & Huang, 1998; Herron, 1994; Herron, York, Cole, & Linden, 1998; Li, 2009, 2012; Teichert, 1996; Wilberschied & Berman, 2004). Li (2012) confirmed the advantages of using advance organizers for improving listener DVD video comprehension. L2 listeners with access to video information through an advance organizer performed at a significantly higher level on the listening test than did their peers. Li suggests that advance organizers providing relevant and accurate information of DVD video content and involving a higher level of cognitive processing might have a stronger effect on the comprehension and retention of aural input.

The literature documents the facilitative role of the advance-organizer approach to activating prior

knowledge before any listening task. However, no advance-organizer study has considered the opportunity for learner control of and interaction with the advance-organizer presentation. In multimedia learning, certain learners take more time to mentally integrate visual and verbal representations, whereas others devote less cognitive capacity to processing them in working memory. The increased availability of multimedia and digital technologies allows the development of other effective advance organizers for learner control of and interaction with the presentation, making the advance-organizer activity more informative and meaningful to L2 learners. Previous studies offer scant information on the effects of advance organizers on language-learner use of L2 captions for video comprehension. Does the availability of advance organizers make learners less dependent on reading L2 captions for initial comprehension in a multimedia environment? The reasons language learners refer to L2 captions when viewing a target-language video remain unknown. These concerns elicit ongoing research into listening comprehension to help inform pedagogical decisions in this area and to provide L2 teachers with an alternative approach in the L2 classroom setting for effective listening instruction. To fill the research gap, the following four questions are addressed:

- How well do intermediate English as a foreign language (EFL) students provided with advance organizers and/or L2 captions comprehend English-language DVD soundtrack material, compared with students viewing a video without any help?
- To what extent does the use of advance organizers affect the percentage of time intermediate EFL students refer to L2 captions? Does the use of advance organizers make them less dependent on L2 captions for initial comprehension?
- What are student attitudes towards the use of advance organizers in a multimedia listening activity?
- Why do students refer to L2 captions while viewing a target-language video, and what difficulties, if any, are caused by using L2 captions?

Method

Participants

A convenience sample of 97 EFL juniors (26 men and 71 women) enrolled in two sections of the required

course, Language and Communication, at a national university of science and technology in the spring semester of 2012 was used. The Test of English for International Communication (TOEIC), consisting of a listening section and a reading section, was administered to the participants as an English proficiency test 1 week prior to the main data-collection effort. Each section was scaled on a score range of 5–495, and the total scaled score was derived by adding the two scaled scores together with a range of 10–990. An analysis of their TOEIC scores showed that they ranged from 450 to 895 with a mean score of 565, placing them in an approximately intermediate level of English proficiency in relation to a full score of 990. A further look at their performance on the two sections of the test shows that the development of their listening skill (with an average score of 240) lagged significantly behind their reading skill (with an average score of 325). In the demographic background section on the TOEIC test, no student self-reported as a native English speaker or having studied in an English-speaking country. All of the students were native Chinese speakers and reported having studied English for approximately 12 years on average. The results of the standardized English proficiency test were useful for research purposes because the length of English study might not correlate with learners' levels of English proficiency. The participants were randomly assigned to four groups: an advance-organizer group (AO), a captions group (CA), a captions plus advance-organizer group (CAO), and a control group without advance organizers or captions. On the test day, one student in the CA group and one in the control group were late. Data collected from them were incomplete, and thus discarded. Only data collected from the remaining 95 students were used for further analysis.

Instrumentation and materials

The instruments and materials used in the study consisted of a DVD episode, a self-developed interactive organizer-aided activity, a multiple-choice listening test, a posttest questionnaire and an unstructured retrospective interview.

An authentic DVD episode of 'Everybody Loves Raymond', one of the most popular situation comedies broadcasted on U.S. television, was used in the study. Each episode in the series is approximately 20 min

long and depicts a funny anecdote in a typical American middle-class family. In addition to adhering to authenticity, the particular difficulties of participants were accounted for. One DVD episode was purposely selected, in which the cultural practices were similar to the participants' own cultural perspectives, to avoid an increase in the difficulty level of the DVD content. In the selected DVD episode entitled 'Frank Paints the House', Frank offers to paint Ray and Debra's house, but refuses to paint it the colour they prefer. Frank's need to be the boss of every situation finally angers Ray, who fires his father. Ray's mother, Marie, conveys information of Frank's past to Ray, who reconciles with his father by allowing him to finish painting the house his way.

One of the rationales for developing the advance organizer was to enable students to associate pictorial information with linguistic information in order to activate their two cognitive systems simultaneously for

meaningful learning. Findings from previous studies (Li, 2009, 2012; Wilberschied & Berman, 2004) also suggested that using authentic pictures taken directly from video effectively provides accurate clues to the video content and facilitates the learning process. The advance organizer in this study included ten episodic photos important to the main idea of the DVD episode and ten one-to-two line English captions corresponding to the photos. The photos and lines were displayed on the left and right sides of the computer screen for students to view. Each page contained five episodic photos and five lines (Figure 2). The participants in the AO and CAO groups were instructed to drag one line from the right and place it next to a possible episodic photo. If the photo and the line did not match, an icon showing a sad face popped up on the screen to prompt them to try again. After completing the first page, learners clicked on 'GO ON TO THE NEXT PAGE' to proceed to the second page. When all of the photos and

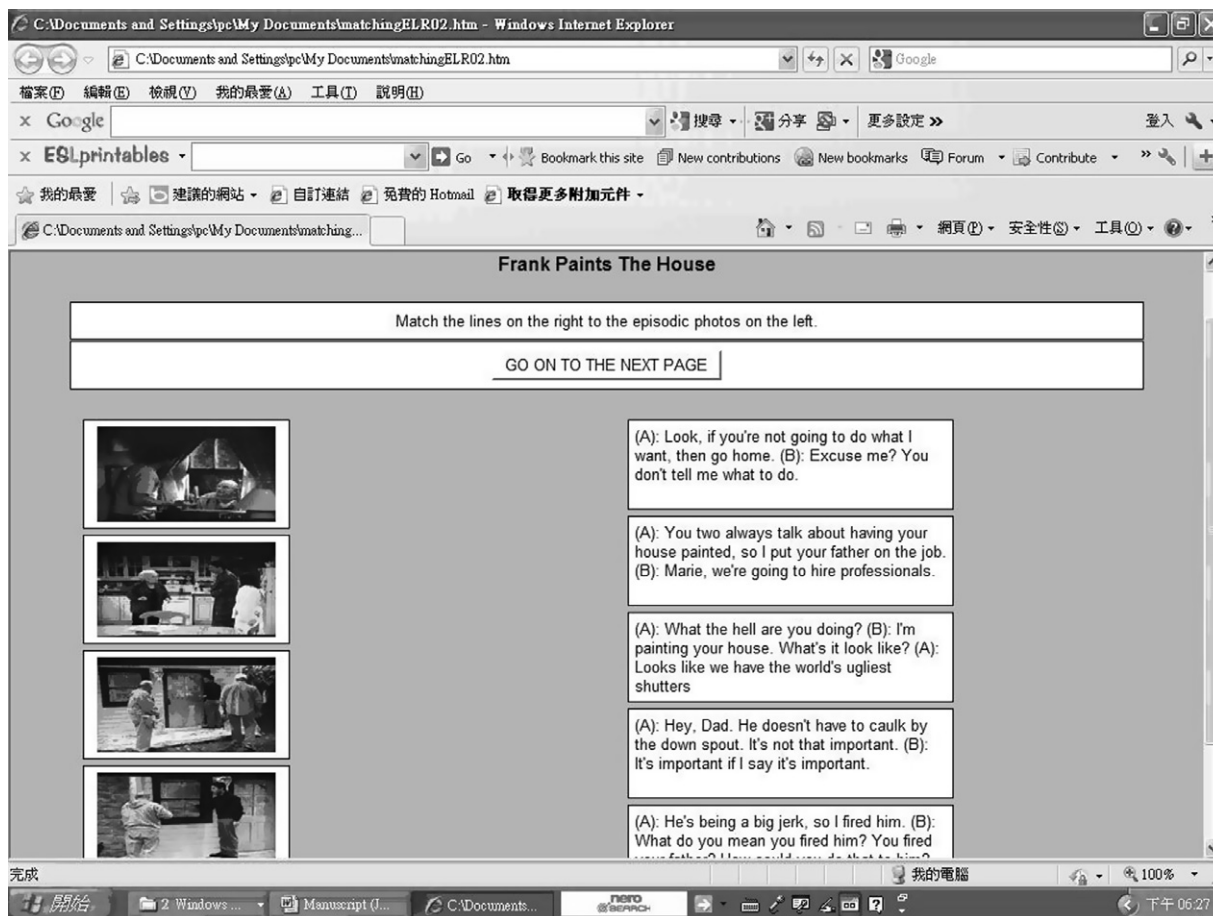


Figure 2 A Screenshot of the Interactive Advance-Organizer Activity

lines were matched, the computer automatically displayed the ten well-matched pairs of photos and captions in chronological order based on the film plot. A recorded message of each English line was also played while learners listened through their headsets and viewed the corresponding episodic photo. They could choose to play the ten well-matched pairs of photos and captions as many times as they wanted by clicking the 'REPLAY' button on the computer screen. This interactive matching activity ended once they clicked on the 'X' to close it. A positive feature of this design is that information included in the advance organizer appears to function as a 'TV Guide' and it is typical of some people to read a short synopsis in the newspaper about an upcoming program before they view it. Herron (1994) claimed that the synopsis-reading framework motivates people to watch the program, and it also provides them with prior knowledge (content knowledge and linguistic knowledge) that can be integrated into the upcoming events in the program for better comprehension.

A multiple-choice listening comprehension test was used to assess the participant listening performance on the DVD episode. Because the selected DVD episode was approximately 20 min in length, 20 multiple-choice listening comprehension questions were developed. These were carefully created to ensure adequate coverage of the DVD content and to not give an advantage to the AO group or the CAO group because any explicit information provided in the advance-organizer activity was not included on the multiple-choice listening test. Because the participants were all from the same first language (L1) background, the test items were written in Mandarin to ensure that their L2 reading ability did not interfere with their listening test scores. Three ESL/EFL experienced teachers were invited to view the target DVD passage and to rate the construct validity of the multiple-choice listening test in appropriateness to the DVD content. They rated each test item using a 5-point Likert scale with a range from 5 points (*highly appropriate*) to 1 point (*highly inappropriate*). Any test item that was rated below 3 points by at least two raters was eliminated. Based on the rater-evaluation results, two test items were deleted to ensure the validity of the multiple-choice listening test. The final version of the listening test was composed of 18 multiple-choice listening-comprehension questions, each with four possible responses.

A posttest questionnaire consisting of 5 Likert-type items was developed to address participant attitudes towards using the advance organizer in their listening-comprehension process to assist in interpreting the statistical findings and to arrive at a more comprehensive analysis.

The DVD episode and the multiple-choice listening test were pilot tested with a small group of university-level L2 students ($n = 14$) whose proficiency level was approximate to the intended audience to determine their suitability for the audience. The participants viewed the episode without any advance organizers or captions. The pilot-test findings showed that the difficulty level of the DVD episode and the multiple-choice listening test were suitable for the target audience because after participants received a relatively challenging DVD viewing format (English soundtrack without the advance organizers or L2 captions), they selected 51% of correct multiple-choice alternatives at the lower end of the test-performance range. An item analysis was conducted to alter any test items that were not performed at an acceptable level prior to the main experimental treatment. The validation process of the multiple-choice listening test replicates the study by Markham (2003).

Procedures

This study was conducted using a between-subjects design during regularly scheduled class periods in a computer laboratory. The participants were given a meal coupon as an incentive to participate in the study. They signed a consent form acknowledging that their participation in the study was voluntary, and they were assured that their test performance did not affect their course grades. Participants were randomly assigned to one of four groups. Each laboratory computer was labelled with a number and was equipped with the screen-recording software Camtasia Studio (version 7.1.1) developed by TechSmith to record participant test moves. Participants were seated at the assigned computers and were given short instructions on how to start the test. Participants in the AO group and the CAO group were provided with an additional tutorial that explained how to work with the interactive advance-organizer activity before viewing the target DVD material. All participants used headsets to listen while the target DVD material played, and they,

except for those in the AO group and the control group, were allowed to turn on/off the option for closed L2 captions anytime when viewing the video. They were unaware that their test moves were being recorded. The researcher circulated in the laboratory as a monitor to ensure that each participant had no trouble completing the listening activity and to ensure that the precise procedure was followed. Once the participants in each group completed the DVD viewing activity, they immediately proceeded to complete the multiple-choice listening test. In addition to the listening test, participants in the CAO group and the AO group were required to complete an additional posttest questionnaire on the effect of advance organizers. Four participants (two in the CA group and two in the CAO group) were randomly selected to participate in the retrospective interview conducted in their native language to gather details on their use of L2 captions during DVD viewing.

Data analysis

To address the first research question on the effect of advance organizers and/or L2 captions on DVD video comprehension, each correctly answered multiple-choice question was given a 1-point score with a full score of 18 on the listening test. The group means were compared using single-factor analysis of variance (ANOVA) to determine any significant differences among groups, followed by a *post hoc* analysis to determine which group(s) differed with the significant main effect.

To address the second research question on the time of participant use of L2 captions, the recordings of participant test moves in the CA group and the CAO group were analysed to quantify the amount of time each participant referred to L2 captions while the video played. When a participant turned on the option for L2 captions, the researcher started the timer. When the participant turned off the option for L2 captions, the timer was stopped. This procedure continued until the researcher finished examining the participant's behaviour during the listening activity. The researcher and an outside judge examined and calculated the total time that each participant used L2 captions in this manner, achieving an inter-rater reliability level of 0.92 for calculating the amount of time. The amount of time that the CA group and the CAO group referred to the L2

captions was separately divided by the total video length to convert the amount to a percentage. The mean percentage of time of the CA group was computed and compared with that of the CAO group, and an independent-samples *t*-test was conducted to determine whether a difference existed in the average percentage of time between the two groups.

For the third and fourth research questions, two types of analyses were conducted. To address the third research question, descriptive statistics were calculated and compared for each questionnaire item. To address the reasons participants used L2 captions and the difficulties they found in doing so, retrospective interview responses were analysed to identify the reasons and difficulties. A brief summary highlighting major findings was translated into English.

Results

Listening comprehension test

Table 1 lists the results of the listening comprehension test divided by the treatment condition. Participants who had access to target-language captions and the advance organizer (i.e., the CAO group, $M = 15.42$, $SD = 1.56$) scored the highest, followed by the CA group ($M = 15.26$, $SD = 1.10$) and the AO group ($M = 14.96$, $SD = 1.24$); the control group ($M = 6.83$, $SD = 1.89$) scored the lowest. The ANOVA procedures on the effect of L2 captions and/or the advance organizer on L2 learners' DVD video comprehension yielded significant results [$F(3, 91) = 173.55$, $p < .001$, $\eta^2 = 0.85$] across the four conditions, as shown in Table 2. *Post hoc* analyses, also shown in Table 1, indicate that the control group performed at a considerably lower level than did their peers in the other three groups

Table 1. Means, Standard Deviations and Comparison Results of Treatment Groups on the Multiple-Choice Listening Test

Treatment group	<i>n</i>	<i>M</i>	<i>SD</i>
AO	25	14.96 _a	1.24
CA	23	15.26 _a	1.10
CAO	24	15.42 _a	1.56
Control	23	6.83 _b	1.89

Note. Means in the same row that do not share subscripts differ at $p < .001$ in the Tukey's honestly significant difference (HSD) comparison. AO = advance-organizer group; CA = captions group; CAO = captions plus advance-organizer group.

Source	SS	df	MS	F	η^2
Between groups	1227.43	3	409.14	173.55***	0.85
Within groups	214.53	91	2.36		
Total	1441.96	94			

Table 2. Summary of One-Way ANOVA for Multiple-Choice Listening Test

Note. ANOVA = analysis of variance.
*** $p < .001$.

on the listening test; however, the differences among the three experimental groups failed to reach a significant level. The multiple-choice listening test clearly reflects that the advance organizer and/or L2 captions led to increased DVD video comprehension of L2 learners.

Time of L2 caption use

The findings for the second research question on the mean percentage of time the participants used L2 captions for the DVD viewing task indicated that participants in the CA group ($M = 80.26$, $SD = 7.39$) referred to L2 captions at a dramatically higher rate for the DVD viewing task than did their peers in the CAO group ($M = 29.21$, $SD = 10.41$). This difference was statistically significant, $t(45) = 19.33$, $p < .001$, and it represented a large sized effect, $r = 0.93$. Table 3 presents a summary of the results.

The results presented in Tables 1–3 show that the advance organizer helps activate L2 learner prior

knowledge in a DVD viewing context to increase listening comprehension compared with the control group, and the facilitative role the advance organizer plays also makes learners less dependent on L2 captions without hindering their overall comprehension of authentic video materials.

Attitudes towards using the advance organizer

The posttest questionnaire consisted of five items on a 5-point Likert scale (1 – *strongly disagree*, 2 – *disagree*, 3 – *no opinion*, 4 – *agree*, 5 – *strongly agree*) measuring attitudes towards using the advance organizer by the AO group and the CAO group. Means above the centre point of 3 are considered positive attitudes, whereas means below 3 indicate negative attitudes. The internal consistency reliability coefficient of this 5-item questionnaire was *Cronbach's* $\alpha = 0.824$, indicating that the five items reliably measured the same construct. The means of the five items ranged from 3.41 to 4.51 on the 5-point scale, as shown in Table 4 and Appendix I.

Treatment group	n	M (%)	SD	t	r
CA	23	80.26	7.39	19.33***	0.93
CAO	24	29.21	10.41		

Table 3. Comparison of the Mean Time Percentage by Treatment Conditions

Note. CA = captions group; CAO = captions plus advance-organizer group.
*** $p < .001$.

Table 4. Results of the Posttest Questionnaire on Attitudes Toward Using Advance Organizers by AO and CAO Groups ($n = 49$)

Survey item	M	SD
1. Comprehending a DVD episode without relevant prior knowledge is difficult.	3.73	0.84
2. I liked the interactive organizer-aided listening activity that also allowed for learner control of the presentation.	4.51	0.62
3. Using the advance organizer helped me activate my prior knowledge, by which I could visualize an overall context for the DVD material.	3.41	0.73
4. Using the advance organizer made me feel confident and comfortable during the DVD viewing task.	3.61	0.79
5. I believe the advance-organizer treatment condition is useful for and effective in improving my DVD video comprehension.	3.84	0.63

Note. AO = advance-organizer group; CAO = captions plus advance-organizer group.

Table 5. A Summary of the Retrospective Interview

Comments and source

1. Using L2 captions helped make the DVD content much more comprehensible to me because my reading comprehension skill is far beyond my listening comprehension skill, but I had difficulty focusing on the DVD content. I felt overwhelmed by the deluge of combined information from the sound, image, and text. . . . (CA group)
2. Without caption availability, I would be unable to understand most known words in the stream of fast-connected speech. Reading L2 captions helped me closely follow what the speakers were saying in the target language and made me feel less anxious. However, I found that pictures, narration, and printed text were too much for me. I could not fully focus on what the characters were doing in the film. . . . (CA group)
3. I referred to L2 captions when I needed relevant details to the film plot for further comprehension. I also referred to L2 captions for the meaning of certain unknown words that were used or mentioned frequently by the speakers in the film. I believe the previewing activity helped me better comprehend the DVD material and boosted my listening confidence. I never thought that I could follow most of the film plot without the considerable use of L2 captions. . . . (CAO group)
4. I used to depend on captions for comprehension when I viewed an English-language movie on DVD, but today I changed my viewing behavior. I attended to L2 captions only when I wanted to associate certain unfamiliar spoken words I heard in the video with their written form. I feel that the limited use of L2 captions allowed me to focus on the visual image while I was watching the film. At the same time, I could listen attentively to the soundtrack. . . . (CAO group)

Reasons and difficulties for using L2 captions

Table 5 presents a summary of the literal translation of participant comments regarding their use of L2 captions and the difficulties they encountered.

Discussion

Despite the non-significant difference in video-comprehension performance across the three experimental groups, they all performed at a substantially higher level than the control group. The findings indicate that the advance organizer facilitates DVD video comprehension of intermediate-level L2 learners, as found in the AO and CAO groups. This outcome corresponds with that of previous research on the positive role of the advance organizer (Chung, 1999, 2002; Chung & Huang, 1998; Herron *et al.*, 1998; Li, 2009, 2012; Teichert, 1996; Wilberschied & Berman, 2004) in facilitating comprehension success. Advance organizers provide L2 learners with clues of upcoming aural input and help them activate their prior knowledge, which can thus be integrated into their working memory in the listening process to result in meaningful learning and increased comprehension performance. A further analysis of the data presented in Table 4 shows that the study participants also responded favourably to the advance-organizer role in L2 listening comprehension, indicating the beneficial and facilitative effect of advance organizers on their DVD video comprehen-

sion. The mean of item 2 (*I liked the interactive organizer-aided listening activity that also allowed for learner control of the presentation*) was the highest at 4.51. Thus, the finding suggests that the advance-organizer design that allows for learner control of and interaction with the presentation should be an important criterion to consider in developing an effective advance-organizer activity.

Using advance organizers as an instructional strategy also affects how language learners use L2 captions. Participants working with the advance organizer and captions (i.e., the CAO group) showed a bottom-up approach for using L2 captions, reflected in comment 3 and comment 4 of Table 5. Information in the interactive organizer-aided activity provided the CAO group with a holistic picture of the target-listening material by asking them to arrange a series of pictures in order (i.e., a top-down activity) prior to the DVD viewing task. When referring to captions during the viewing task, they tended to focus on understanding relevant details of the film plot and recognizing unfamiliar vocabulary rather than 'reading' the text for the main idea. This finding might explain why the average percentage of time the CAO group used captions was much lower, compared with the CA group, providing support for the effectiveness of advance organizers in making the CAO group less dependent on the printed text, which in turn reduced sensory load caused by combined audio, video and text. The CAO group participants used combined top-down and bottom-up processes to become more effective and

less dependent listeners in the classroom setting. However, the CA group participants, unlike the AO group or the CAO group, had no access to a previewing introductory stage to provide known information on the DVD material. Therefore, they had to rely on their imperfect linguistic knowledge and the caption-reading input to better comprehend the DVD material. Thus, the average percentage of time the CA group used captions, shown in Table 3, was significantly higher than that of the CAO group, implying the benefit of the caption-reading input as a possible factor in enhancing 'immediate' comprehension.

The interview data, collected from L2 learners who had learned most of their English in a heavily reading-dependent classroom setting, provided reasons and difficulties on their use of L2 captions in the aural DVD input. Comments from the four participants, shown in Table 5, indicate that caption reading helps increase 'accessibility of the salient language through authentic video materials' by empowering them 'to assign meaning to previously unintelligible aural entities' (Garza, 1991, p. 246), to bridge the gap between their skill development in reading and listening comprehension. This finding is also consistent with the Stewart and Pertusa's (2004) study that listeners using L2 captions report a greater 'connection' between the written text and the soundtrack. However, students in the CA group who used L2 captions in the absence of an advance organizer spent most of their viewing time (approximately 80%) on the printed text and experienced sensory overload. They found the captions useful but distracting, and had trouble attending to all three channels of sound, video and text, as reported in comment 1 and comment 2; however, students in the CAO group who spent less than one-third of the viewing time (approximately 29%) on L2 captions did not report such a problem. This outcome suggests that the redundancy effect proposed by Kalyuga *et al.* (1999, 2000), Mayer (2001), and Taylor (2005) might be harmful, particularly in a situation in which language learners must focus on all three information channels (sound, video and audio) for most of their viewing time. This concern supports previous study findings (Borras & Lafayette, 1994; Caimi, 2006; Latifi *et al.*, 2011; Robin, 2007) that long-term improvement of listening-comprehension skills of L2 learners, not their immediate listening-comprehension performance, remains questionable using L2 captions because stu-

dents in the CA group simply read the captions for comprehension and ignored the listening input, as depicted in comment 1 and comment 2.

The research findings imply that using L2 captions deserves careful consideration. When pictorial information is also presented visually in a DVD viewing task, the use of on-screen text that is identical to the narration for a great amount of time is considered harmful to multimedia learning because of redundancy effects. However, the redundancy effect should not be used to justify never-presenting captions/printed text. When immediate comprehension or recognition of particularly challenging target-language items presented in a multimedia environment is the learning task for a group of L2 learners who are literate in the target language, the effectiveness of L2 caption use is not surprising, as documented in the literature and shown in this study. However, using an advance organizer in the L2 classroom setting prior to viewing a target video should be an alternative instructional strategy for improving long-term listening comprehension.

Study limitations

The study results must be interpreted according to the following limitations. First, the study participants who viewed an authentic DVD video for comprehension were rated as intermediate-proficiency L2 learners (with a mean TOEIC score of 565). The findings should not be generalized to beginner-level or advanced learners who study most of their English in a more heavily reading-dependent classroom setting. Second, the generalizability of the findings in the study is also restricted by the nature of advance-organizer design and participant pool. The study used a convenience sample in which females outnumbered their male counterparts. Would the interactive photographic advance organizer be more helpful to men than to women? Are there any negative effects on learning due to learners' false inferences drawn from the organizer-aided intervention? Future studies, as suggested by one anonymous reviewer, could investigate the two issues in listening comprehension when learners are provided with such an interactive photographic advance-organizer activity prior to a listening task. Third, the study used a single listening measure to assess participant DVD video comprehension. Despite participant improved listening comprehension as a result of the use

of advance organizers, the multiple-choice format inherently could have provided participants with an opportunity for random guessing. To avoid such a concern, future studies could use multiple measures, such as a multiple-choice listening test and a written protocol, to yield a more reliable basis for evaluation of participant listening comprehension. Fourth, the content and language usage in each DVD episode selected from an authentic TV series varies in difficulty level to a certain extent. The data collected from only one DVD viewing in a short classroom setting might reduce the generalizability of findings to other episodes in the same series or to other multimedia materials selected from contemporary authentic sources. Using a standardized English proficiency pretest and posttest (e.g., the TOEIC) to serve as an indicator of L2 learners' long-term progress in listening comprehension, combined with the use of effective advance organizers to enhance foreign-language learning in a long-term instructional setting, would strengthen the dependability and validity of the results.

Pedagogical implications

Because of the crucial role of listening competence in second language acquisition and communication, any strategies or techniques to help L2 learners better comprehend the listening materials selected from contemporary authentic sources deserve careful consideration.

Language teachers teaching listening in a more reading-dependent L2 classroom setting can employ an organizer-aided activity prior to a listening task to help L2 learners activate prior knowledge and develop a conceptual framework for top-down processing. The length of this previewing-introductory stage to provide known information varies depending on the amount of previous information language learners possess on a topic. Using a pre-listening organizer-aided activity, L2 learners are encouraged to use their previously acquired listening skills and topical knowledge to follow what they hear in the target language for initial comprehension. This enables them to attend to both visual image and spoken text simultaneously without inducing sensory overload. After the first viewing, language learners who are literate in the target language can be exposed to L2 captions to use their already-developed skills in reading comprehension for a greater connection between the written text and the soundtrack. This

bottom-up processing compensates for their understanding of relevant details to the topic and of particularly challenging target-language items in the stream of fast-connected speech, including lexicon, phrases and expressions. Although the second viewing presents pictures, printed words and spoken words, language learners should focus on verbal information, not on pictures, because pictorial information presented during the first viewing should have been stored in their working memory and must be integrated with verbal information to arrive at a comprehensive interpretation of information from the multimedia presentation.

The ultimate goal of language learning for L2 learners, as found in the study by Chung and Huang (2009), is to develop their communicative competence in achieving actual use of the target language to respond appropriately to genuine communicative needs in realistic L2 situations. To this end, the development of L2 listening competence plays a crucial role, and successful listening depends on operating both processes (top-down and bottom-up processes) simultaneously.

Conclusion

The findings of this empirical research support the use of advance organizers to facilitate university-level L2 learners' DVD video comprehension and provide an alternative approach to teaching effective listening in a classroom setting where most L2 learners typically possess better reading comprehension than listening comprehension skills. Because of the increasing importance of new technologies in L2 classroom settings, the ongoing inquiry concerning the use and efficacy of technology in listening instruction should continue to be an important avenue for further research.

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Appendix I

Participant ratings of each item on the posttest survey ($n = 49$)

Item	No. of 'strongly agree' ratings (%)	'Agree' (%)	'No opinion' (%)	'Disagree' (%)	'Strongly disagree' (%)
1	9 (18.4)	21 (42.9)	16 (32.7)	3 (6.1)	0
2	28 (57.1)	18 (36.7)	3 (6.1)	0	0
3	1 (2)	23 (46.9)	21 (42.9)	3 (6.1)	1 (2)
4	4 (8.2)	27 (55.1)	13 (26.5)	5 (10.2)	0
5	4 (8.2)	35 (71.4)	8 (16.3)	2 (4.1)	0

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