Noticing and intake of formulaic sequences in L2 subtitles: an eye-tracking study on the effects of genre and input enhancement

by

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Abstract

The present study explores the effects of input enhancement and genre on the noticing and intake of formulaic sequences in the context of captioned videos. It involves 31 Catalan-Spanish English learners. Highlighted groups outperformed non-highlighted ones at the posttest, showing that input enhancement leads to the increase in intake. The non-fiction groups showed higher degree of noticing, suggesting that participants tend to focus on the textual part more for this genre. It is further inferred that genre and highlighting can have an impact on participants behavior in terms of noticing and potentially, intake. The results are interpreted in terms of the Cognitive Load Theory and the Noticing Hypothesis.

Introduction

The advent of massive fiction and non-fiction availability over the Internet has had an enormous impact on people entertainment watching habits. Because of the widespread use of subtitles in both fiction and non-fiction TV and internet products, there has been a great interest by researchers to understand how exposure to subtitled videos may contribute to second language acquisition. The potential of combined imagery, and

auditory and written input for language learning has raised the interest of many researchers worldwide. In this context, the goals of this MA thesis are to explore the impact of genre and input enhancement on the noticing (measured by eye-tracking) and intake (knowledge tests) of formulaic sequences in L2 subtitled videos in order to determine the most beneficial way of their use in SLA context. The thesis is structured in the following way: first we present a short review of the theoretical framework guiding our research followed by the identification of the gap in previous research, then the methodology of the study is described, which is followed by the presentation of the obtained results and their interpretation within the discussed theories. The final part of the thesis includes limitations and suggestions for future research.

Literature review

Multimedia learning

Instructional design can greatly influence the outcome of language learning. Thus, designing adequate classroom materials and activities is a key issue for SLA teachers and researchers.

Mayer has advanced with the Multimedia Principle, which states that people learn better from the combination of words and pictures than from words alone (Mayer, 2009). The suggested rationale for the phenomenon is that there are two separate information processing systems for visual and verbal material, and using both systems simultaneously, learners are able to take the full advantage of their processing capacity.

This idea of the two systems reinforcing each other is based on Paivio's Dual Coding Theory, which argues that verbal and imagery information is processed through different channels and stored in separate but referentially connected representations in the human mind. Thus, if input contains the same item presented both in imagery and verbal forms it will lead to creating two representations instead of one and, as a result, to better recall (Paivio, 1990).

However, Mayer emphasizes that mere combination of visual and verbal components cannot guarantee that learning will take place and research on designing efficient multimedia instruction is needed.

In the same line of research, Sweller (1994) proposed the Cognitive Load Theory which claims that in order to be efficient, instructions should be designed in accordance with the cognitive architecture of the human brain and its main components: long term memory and working memory. In his view, the learning process involves the following stages: being exposed to novel information, retrieving relevant items from that information and storing them in working memory, and then (potentially) integrating those items into long-term memory. While long term memory has a considerable volume, working memory, involved in novel information processing, is of limited capacity (Miller, 1956). Thus, according to Sweller, the main objective of instruction is to help the learner to take full advantage of his working memory during novelty information processing without overloading it.

The aforementioned ideas were further developed for the field of SLA by Plass and Jones (Plass & Jones, 2009). Based on the interactionist perspective of second language acquisition, which assumes comprehensible input, interaction and comprehensible output as its main components, they came up with the following definition of second language acquisition with multimedia: "the use of words and pictures designed to support the comprehensible input that the learner is exposed to and interact with, and to elicit and negotiate comprehensible output" (Plass & Jones, 2009, p.469). Thus, multimedia is considered as a reinforcement and the key role is assigned to input.

In sum, multimedia instruction has been claimed to enhance second language acquisition provided that certain conditions are met, i.e. the instruction design takes into consideration working memory limitations and the learner is exposed to comprehensible input of due quality. An increasing body of research has started to focus on subtitled videos in an attempt to design valid multimedia instruction meeting these conditions, as will be seen in the following section.

Subtitles and captions

Subtitled videos are of considerable interest for the field of SLA, as they provide authentic and engaging input (Neuman & Koskinen, 1992; Koolstra & Beentjies, 1999).

The first attempt to explore the possible benefits of subtitled videos for language learners was carried out by Price in 1983. Since then, various aspects of this tool have been investigated in an attempt to determine the most advantageous way of its application. Researchers so far have focused on learners characteristics such as age or proficiency (Danan 2004; Muñoz, 2017), the distance between L1 and L2 (Winke et al. 2013; D'Ydewalle & Van de Poel, 1999), subtitles characteristics such as the general effect of subtitles presence (e.g. Garza, 1991; Huang & Eskey, 1999; Yuksel & Tanriverdi, 2009); comparing the effect of L1 and L2 subtitles (e.g. Markham, Peter & McCarthy, 2001; Montero Pérez et al., 2013); different language fields and skills such as vocabulary acquisition (Bird & Williams, 2002; Chai & Erlam, 2008; etc.); listening comprehension (Garza, 1991; Guichon & McLoran, 2008); grammar (Van Lommel et al, 2006), literacy: Kothari, Pandey & Chudgar, 2004), among others. (For an in depth review, see Vanderplank, 2010). In this paper, and following the convention of the field, the L1 subtitles hereafter will be referred to as subtitles and those in L2 will be called captions.

Previous findings have shown the overall advantage of subtitled videos over non-subtitled ones across different language dimensions in SLA, with the most impressive results in the areas of vocabulary acquisition and listening comprehension (e.g., Vanderplank, 1993; Bird & Williams, 2002). Furthermore, captions have been proved to be generally more beneficial for language learners than subtitles (Montero Pérez et al, 2013; Matielo et al, 2015). However, some studies suggested limitations of this method for lower-level learners and different age groups (Danan, 2004; Taylor, 2005; Vanderplank, 2010; Muñoz, 2017). According to Montero Pérez, this limitation can be overcome by carefully matching video materials to learners' proficiency (Montero Pérez et al, 2013).

The results obtained by the studies mentioned so far are typically interpreted in terms of the dual-coding theory. It has been suggested that captions help to establish the connection between the two input modalities, which leads to deeper processing and enhances learning. Some affective variables are taken into account by researchers as well, e.g. captions are claimed to reduce learners anxiety and provide motivation (Winke et al, 2010).

Genre and subtitles

In the studies presented above the only element of subtitled videos that has received considerable attention in the research is the subtitle itself, and namely its language. While this primary focus on a merely linguistic feature is understandable, there is some evidence that other video characteristics could be of importance for learning outcome as well.

For instance, Neuman and Koskinen (1992) investigated incidental vocabulary learning in bilingual speakers of minority languages from Asian or Hispanic background. 129 children from the 6th and 7th grade were assigned to one of the four groups: captioned

TV, non-captioned TV, reading along and listening to the text, textbook only (control group). In general, the captioned TV group consistently outperformed the other three groups at all word knowledge tests. However, the difference between the two TV groups (captioned and non-captioned ones) was not always significant. To account for this finding, the authors suggest that "the visual representation of words in video form is an important contributor to students' increased word knowledge" (Neuman & Koskinen, 1992, p.102). A multiple regression analysis was run to further explore the contribution of word-related (e.g., number of occurrences, difficulty of concept) and picture-related (the provided contextual support) factors in the overall vocabulary gains. The results showed the significance of both factors, with lower percentage of correct answers on the vocabulary test corresponding to the lower levels of contextual support provided by the video for a given item. Thus it is shown that picture-related factors should be taken into account while analyzing the effect of captioned videos on language learning.

The importance of video materials and their intrinsic characteristics has been touched upon by Garza as well (Garza, 1991). In his study he followed an elaborated selection procedure for the test videos involving a number of criteria, such as situational appropriateness of the language, its grammatical and lexical complexity, interest value and a high audio-video correlation (the degree to which audio text is contextualized in the video material, providing "visual glossary" for difficult words). Besides, the video segments are described in terms of genre and genre classification based on functional speech act situations is provided: dramatic feature film (dialogic speech, focus on register, emotional tone and previous happenings), light comedy feature film (dialogic speech, focus on irony and humour), news/documentary feature (monologic speech, focus on narrative details and reported facts), animated feature (children's register and voice characterizations), music video (lyric speech, rhyme and rhythm). Garza explains

the highest increase in scores for music videos by the intrinsic features of the genre, thus partially including the genre variable into analysis.

While these studies briefly comment on the role of intrinsic properties of captioned videos in learning outcome, these properties have never been explored in due detail and in a systematic manner. The concept of genre, included into analysis by Garza, seems to be in power to account for a great portion of variation in video characteristics. In the same line of thought, Douglas Kellners (1974) defined genres as "a coded set of formulas and conventions which indicate a culturally accepted way or organizing material into distinct patterns." The present study will adopt this definition for its purposes.

The lack of research into genres is confirmed by Vandeplank (Vanderplank, 2016), who states that for some reason the variable of genre can often be found in the limitations section of the studies, however, none of the researchers chose to include it in the analysis as a primary factor.

Formulaic sequences

In this section we will address some other unexplored issues in the research on captioned videos. As suggested earlier, this type of instruction could be a useful tool for promoting vocabulary acquisition. However, some language fields are typically out of the investigation focus. For instance, while vocabulary acquisition received high attention in the context of captions, formulaic language as its specific area has not been sufficiently investigated within the framework. To our knowledge, the only attempts to bring formulaic language into the picture are limited to Chai and Erlam's (2008) study involving phrases, and Frumuselu et al. (2015), who investigated idioms. However, the authors of the latter study were not quite clear on their focus, as it was described through very vague terms, i. e. "informal language" and "colloquial language". Thus,

the potential of captioned videos in promoting the acquisition of formulaic language remains virtually unexplored.

Some difficulties in investigating the phenomenon in question can lie in its diverse nature, with different researchers focusing on its different aspects and with a variety of terms used to describe the same phenomenon. For the purposes of the present study, Wray's (2000) definition will be used, as it is quite comprehensive and summarizes its key characteristics. He introduces a term "formulaic sequence" (FS), which, according to him, corresponds to:

"a sequence, continuous or discontinuous, of words or other meaning elements, which is, or appears to be, prefabricated: that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation or analysis by the language grammar." (Wray, 2000, p.1)

A number of studies have emphasized the importance of formulaic language for perceived overall proficiency, thus confirming the relevance of its investigation (e.g., Pawley & Syder, 1983; Boers et al, 2006). Wray notices that a number of taxonomies has been put forward in an attempt to classify formulaic sequences. In the present study we will adhere to Erman and Warren's (2000) classification, distinguishing four types of formulaic sequences: lexical (e.g., "I can't see a thing"), grammatical (e.g., "a great deal of", "used to"), reducibles (e.g., "let's", "I'm") and pragmatic (e.g., "thank you", "good evening", "you know"). Pragmatic formulaic sequences have been chosen as a primary focus of this study due to their high dependence on the context, thus it is assumed that context differences across the genre might have a noticeable impact on their acquisition.

Noticing and Intake

From all the points discussed in the previous sections it can be inferred that language learners can potentially enrich their knowledge of formulaic sequences by watching captioned videos. However, providing learners with authentic input of this kind does not necessarily guarantee that acquisition will take place. D'Ydewalle and van de Poel (1999) argue that for learning to happen the presented information (audio or captions) has to be processed. The claim is supported by the Noticing Hypothesis, formulated by Richard Schmidt in 1990 for grammar and later adopted for other aspects of language: second language learners must notice grammar features of the input in order to acquire them (Schmidt, 1990). A more detailed account of input processing and its role in acquisition can be found in the interactionist model of SLA suggested by Gass (Gass, 1997). The model includes five stages with raw input as a starting point and comprehensible output as a final objective. According to Gass, for the learner to move towards this objective, the input has to be apperceived (noticed), comprehended and assimilated in the form of intake – comprehended input stored for the further processing.

While intake of a linguistic item does not necessarily result in its integration into the learner's interlanguage, it is clear that noticing and intake are essential components of language processing, determining whether linguistic elements present in the input will be selected for acquisition or not.

Intake in Gass's interpretation is limited to comprehended input, which would greatly constrain the analysis of the present study with its primary focus on captioned videos. Watching captioned videos imposes a great cognitive load on learners in terms of selecting linguistic items for further analysis. Thus, limited exposure (which is the case for the study) may not result in a really deep processing, though the detection of certain items in the input can be expected.

Therefore, to account for the very first stages of language acquisition, a broader definition proposed by Reinders will be adopted:

"Intake is a subset of the detected input (comprehended or not), held in short term memory, from which connections with long term memory are potentially created or strengthened." (Reinders, 2012, p.28)

In turn, noticing will be defined as conscious attention allocation to the elements of input the language learner is exposed to, and will be measured by an eye-tracker.

A number of studies suggested using eye-tracking technology as a measure of noticing (Smith, 2012; Godfroid et al, 2013). The rationale is the assumption that when our eyes are fixated on a certain region, the region is being processed. In the literature, eye movements are usually measured in terms of saccades (quick eye movements from one region to another) and fixations (stops).

The eye-tracking technology has been used to address various aspects in SLA: auditory word recognition (Spivey & Marian, 1999), subtitles processing (Bisson et al, 2011; Muñoz, 2017), language processing during reading (Carrol & Conklin, 2015; Siyanova-Chanturia et al, 2011). For a comprehensive review, see Conklin & Pellicer-Sánchez, (2016).

Input enhancement

The limitations of working memory, only briefly mentioned above, play a central role in the context of captioned videos processing. Learners have to allocate their attention wisely to take the most advantage of the three types of presented information: image, text and audio. Thus, certain aspects of the video that are not crucial for understanding tend to be ignored. It can be expected to be the case for pragmatic formulaic sequences, chosen for the analysis in the present study, as their primary function is to modify the message rather than to transmit it. That would suggest, according to the Noticing Hypothesis, that pragmatic formulaic sequences are less likely to be focused on in the captioned videos, and therefore, acquired, despite the potentially rich context and processing advantages suggested by the dual-coding theory.

Previous studies suggest that this issue can be addressed in terms of input enhancement. The idea of making certain input elements more salient in order to increase the likelihood that they will be noticed by language learners was first suggested by Sharwood-Smith (1991). In the research on formulaic language, Bishop (2004) hypothesizes that the rationale for the difficulties that language learners encounter in acquiring formulaic sequences is that unknown formulaic sequences are less likely to be noticed than unknown words. Therefore, not being aware of the gap in their knowledge, learners are not allocating cognitive resources to bridge it. The obtained results proved his hypothesis, as the control group focused more on unknown words than on unknown formulaic sequences, though they were synonymous in meaning. To cope with this problem, Bishop resorted to input enhancement in the form of highlighting, discovering that highlighted unknown formulaic sequences are noticed significantly more frequently than non-highlighted unknown words, resulting in higher scores on the reading comprehension task as well.

The findings are further supported by Choi (2017), who found that participants exposed to highlighted collocations spent more time on their processing and consequently performed better at the recall test, than the control group.

Thus, it can be hypothesized that input enhancement through highlighting can help to overcome the processing disadvantage for pragmatic formulaic sequences in captioned videos.

Present study

The analysis of the literature on the topic has shown the lack of the research on processing and acquisition of formulaic sequences in the context of captioned videos. Besides, genre as a specific video characteristic and input enhancement as a tool for directing learners attention to the relevant language items in the subtitle, have never been brought into the direct focus of investigation before. To fill the identified gap and to contribute to the developing of valid multimedia instruction, the present study seeks to answer the following research questions:

- 1. Does genre affect the noticing (as measured by eye-tracking) and intake (as measured by gains from pre-test to post-test) of formulaic sequences in captioned videos?
- 2. Does input enhancement of formulaic sequences in captions lead to any changes in noticing and intake?
- 3. Is there an interaction between genres and highlighting factors?

Question 1. asks about whether noticing (which we operationalize in terms of the number and duration of fixations and visits, as well as the number of skipped subtitles) and intake (measured as gains in formulaic sequences knowledge from pre-test to post-test) will be affected by the genre to which L2 learners are exposed. While we have no directional hypotheses to draw on from previous studies, we can predict differences given the considerable differences between the two genres employed in the study and that are described in the methodology section of the present study.

Question 2. The previous studies suggest that input enhancement can lead to better noticing and, as a result, intake. We would like to see if the same effect could be observed in the context of subtitles. Question 3. We would like to explore the possible interaction between the two factors to see whether one of them can have an enhanced effect in the presence of another.

Methodology

Participants

Data was collected from 43 participants. Some of the participants were excluded from the analysis due to one of the following reasons: poor quality of the eye-tracking data (6 people), ceiling effect at the pre-test (5 people), outlying position according to the proficiency test scores (1 person). Thus the resulting sample used for the analysis included 31 Catalan-Spanish learners of English, 8 male and 23 female. The mean age was 29.4 (range 18-53), with the mean proficiency score 5136. 15 participants were first- and second-year Philology students from the University of Barcelona (3 males). 16 participants were English learners from Escuela Oficial de Idiomas in Cornellà de Llobregat (5 males). Information about the project was spread through the teachers and A2/B1 were indicated as the target proficiency levels. The levels were decided on with the consultation of two certified teachers and native English speakers. The rationale was to look for language learners unfamiliar with the target FS but with a sufficient proficiency level to benefit from the treatment (for the in-depth discussion on the proficiency factor in captioned videos processing, see Muñoz, 2017). The UB students were rewarded for the participation with 10% of the credit, and for the EOI students the experimental session was presented as an extracurricular workshop. Participants were self-selected which resulted in a highly heterogeneous sample. For this reason subjects were assigned to one of the 4 experimental groups according to their age and

proficiency level to ensure that the groups are comparable and to minimize the interference of these variables with the results. The description of participants per condition can be found in Tables 1 and 2.

Table 1. Participants characteristics across the groups (age).

	N	Mean age	Range	Age group1	Age group2	Age group3	
				(18-30)	(30-45)	(45-55)	
Condition 1 (sitcom+highlighted)	9	29	18-51	4	2	2	
Condition 2 (sitcom+ non-highlighted)	8	33	18-53	4	1	3	
Condition 3 (non- fiction+ highlighted)	7	27.7	18-48	4	2	1	
Condition 4 (non- fiction+ non- highlighted)	7	28.14	18-50	5	2	1	

Table 2. Participants characteristics across the groups (proficiency).

	N	Mean proficiency score	Range	Proficiency level 1	Proficiency level 2	Proficiency level 3
Condition 1 (sitcom+ highlighted)	9	5414	3760-6430	1	6	2
Condition 2 (sitcom+ non-highlighted)	8	5037	3988-6750	1	6	1
Condition 3 (non- fiction+ highlighted)	7	5223	3160-6878	1	3	3
Condition 4 (non- fiction+ non- highlighted)	7	4736	3143-6149	3	3	1

Experimental design

The study followed the pretest-treatment-posttest structure, with pre- and posttests being the same. For the treatment, participants were assigned to one of the 4 experimental groups:

Group 1: Non-fiction (TED Talks) + non-highlighted	Group 2: Fiction ("Friends") + non- highlighted
N=7	N=8
Group 3: Non-fiction (TED Talks) + highlighted	Group 4: Fiction ("Friends") + highlighted
N=7	N=9

No control group was used in the study as it was assumed from previous research that language learners can benefit from L2 subtitles and the current study was more focused on the effect of particular properties of subtitled videos rather than that of the presence of subtitles in general.

The pre- and post-tests were administered to measure any changes in participants' knowledge of the target sequences due to the treatment.

The treatment was presented in the form of an eye-tracking experiment, designed by means of Tobii studio software. It included 10 clips and was divided into 2 parts (6 videos + 4 videos) to avoid fatigue effect among the participants. Each clip contained one target sequence, hence there were 2 clips per each of the 5 sequences. The same 5 target formulaic sequences were present in the videos for all the four groups. There was an introduction before each video, contextualizing the clip and explaining what happened before. After each video there was a comprehension question with 3 optional answers. The questions were included to reproduce the typical classroom activity of video comprehension and to motivate the participants to be attentive throughout the

experiment. Two videos containing the same TS followed each other. Thus an attempt was made to make the limited exposure as advantageous for the participants as possible. The order of the videos was not randomized due to the technical difficulties and a limited sample. However, it was the same for all the groups, thus it should not affect the group comparison.

Instruments and materials

Target formulaic sequences (TS)

The present study focused on the following five pragmatic formulaic sequences:

- Let's face it.
- Don't get me wrong.
- Are you kidding?
- Give me a break.
- What's the big deal?

The choice of the sequences was determined by a number of criteria: all of the words within the sequences should be familiar to English learners of the target proficiency level, however, the overall meaning should be unknown; they should consist of at least three words in order to obtain reliable eye-tracking data and they could be found in a natural context in the videos of both genres.

Genres

Two genres have been selected for the purposes of the present study: a fiction genre, represented by American sitcom "Friends" and a non-fiction genre, represented by a TED conference (TED talks). The rationale behind the choice was their representative character in terms of intrinsic genre properties as well as an easy access via Internet and

a popular nature. Besides, their position at the opposite ends of the fiction/non-fiction

continuum can be expected to yield a more vivid comparison. Video characteristics

specific of a particular genre are of much interest for the study, therefore, an attempt to

classify those has been made:

TED talks

Subtitle characteristics: longer subtitle presence on the screen, subtitles presentation on

the screen – one line, smaller font, background colour: black; subtitle style: verbatim.

Image characteristics: non-engaging content, little amount of action; high reliance on

verbal information.

Language characteristics: generally more complex language.

Contextual characteristics: lower number of contextual clues provided for the

understanding of the language items meaning.

Friends

Subtitle characteristics: bigger font, organization on the screen: two lines, in the form of

a dialogue; subtitle style: edited.

Image characteristics: engaging content, high percentage of action.

Language characteristics: high frequency vocabulary, informal register.

Contextual characteristics: higher number of contextual clues provided for the

understanding of the language items meaning.

Videos

The study involved 20 clips, 10 from American TV series "Friends" and 10 from TED

conference. The episodes and talks were chosen according to the following criteria:

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clear and natural context for the TS use, moderate reliance on background knowledge (mainly cultural for Friends and academic for TED conference) or familiarity of the topic, absence of high level vocabulary crucial for understanding, and entertaining content. The original TED videos were downloaded from the official website of TED conference and the "Friends" ones - from the educational website for English learners fenglish.ru (the materials could be accessed freely for educational purposes). The original videos were cut into clips in the way described below.

The mean length of the clips was 115.9 sec for "Friends" with the range 104-125, and 115.8 sec for TED conference (range 99-123). The length of the clips was considered optimal to ensure sufficient contextualization of the target formulaic sequences without overloading the participants. When possible, the clips were cut from the original videos loosely at the scene boundaries to facilitate general comprehension of the situation. In other cases, an effort was made to perform the cut in a way which would not interfere with the overall understanding of the content.

The target sequences appeared approximately in the middle of the clip, giving participants enough time to adjust to the specific characteristics of the video and stabilize their eye movements without any concentration loss that might occur at the end of the clip. The timing of target sequence appearance was controlled across the videos. The mean difference between the exact middle of the clip and the time of TS occurrence amounts to 6.6 sec for "Friends" (range 0-16.5) and to 7.3 sec for TED talks (range 4-13.5). All differences in clip length and the time of TS appearance were determined by some context characteristics or the length of original videos, and were carefully matched across the genre for the same TS. For example, if there was a shorter clip for a particular TS with the expression appearing 15 seconds after the middle of the clip, the corresponding video in TED talks has the same characteristics.

All the clips were presented with English audio and English (L2) subtitles. For TED talks, the original embedded subtitles from the official website of the conference were used. For "Friends", the subtitles available for download were of low quality, therefore new subtitles were created using Aegisub Advanced Subtitle Editor 3.2.2. The style and timing of the new subtitles were matching as close as possible those of the "Friends" episodes available on the Internet. For the condition of enhanced input, the target FS were highlighted with orange colour using the same software. For highlighting, default style settings were applied.

There were considerable differences in the subtitles characteristics between the two genres, e.g. in subtitles font, size, time on the screen and organization (one line or two). However, the decision was made to keep the differences as they reflect intrinsic properties of the genre and enhance the ecological validity of the study. Language teachers and learners are most likely to use the unmanipulated authentic materials that can be found online, thus it was thought that the results of the study would be more relevant in explaining real learning experience.

Tests

Proficiency test

V_YesNo v1.0 test was applied to measure participants proficiency in English. It is a basic vocabulary size test based on the Eurocentres Vocabulary Size Test (Meara & Jones, 1990). Participants are presented with a list of 200 words, appearing on the computer screen one at a time. They have to indicate if they know the meaning of the word by clicking on one of the two buttons, "yes" for the words they know and "next" for the unfamiliar ones. It is emphasized during the instructions that they should give honest answers and click "yes" only being completely sure in their knowledge. The test includes 100 real English words and 100 imaginary ones. The real words are a stratified

sample from the vocabulary of 10.000 words. The imaginary words are included to correct for guessing. The YesNo test has proved to be a valid tool in measuring participants proficiency, as its scores fairly correlate with other language skills (Meara & Miralpeix, 2015). Besides, a quick administration and a simple structure were considered highly advantageous for the present study as they allowed to balance the cognitive load of the experimental session that already included a quite demanding eye-tracking part. The test was scored automatically by the app, with possible scores ranging from 0 to 10.000 (scores under 2000 considered unreliable). The manual available on the website was consulted for scores interpretation.

Testing vocabulary knowledge and intake

To measure possible intake, an adaptation of Vocabulary Knowledge Scale (VKS; Wesche & Paribakht, 1996) was used as a pre- and post-test. The test comprised 15 items: 5 target sequences, 5 non-target sequences of the same difficulty level (distractors) and 5 non-target sequences of the lower difficulty level (distractors). None of the distractors was present in the clips shown during the treatment. The items of lower difficulty were familiar to the participants. These items were included to encourage them and to avoid possible negative perception of the test. The expressions belonging to the same difficulty level as the target ones were meant to distract the participants attention from the real focus of investigation. Participants were suggested to estimate their knowledge of each of the sequences using the following 5-point scale:

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means: ______(Please, write a synonym or translation/explanation).

4. I know this expression it means:	expression it means:
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5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences)

(If you do this section, please also do Section 4)

For the full version of the test, see Appendix 2.

As Wesche and Paribakht (1996, p. 33) claim, the VKS was designed "to capture initial stages or levels in word learning", which coincides with the purpose of the present study that is aimed at measuring intake as the first stage of acquisition. Besides, the test makes it possible to measure slight changes in participants knowledge that can be expected after limited exposure during the experiment.

The test as well as the scoring system were adapted to the purposes of the present study. The possible scores ranged from 0 (the expression is not familiar at all) to 4 (the expression can be used in a context with semantic and pragmatic appropriateness.), with other scores being 1 (the expression is familiar but the meaning is unknown), 2 (the correct translation or explanation is provided), 3 (the expression is used in the context with semantic but not pragmatic appropriateness.)

Procedure

The pre- and posttest was piloted with 6 B1 English learners from a language school in Vilassar de Mar (Catalan-Spanish natives, age 16). The entire experiment was piloted with one Catalan-Spanish student from the UB (18-year-old, B1 level of English) and two researchers qualified in Applied Linguistics. All the materials received positive feedback on the content and structure and their adequacy for the target proficiency level was ensured. The eye-tracking experiment was perceived as too long and was therefore cut in two parts.

Participants were contacted via email to set the time for individual experimental sessions. The pretest was sent to them by email as well, one day before the session in an

attempt to minimize the priming effect. The pre-test was thus self-paced, and the subjects were instructed to give honest answers and not to consult any dictionaries. The completed tests were sent back to the researcher on the same day or brought to the session in a printed form. Four participants failed to complete the pretest before the session and were allowed to do it at the beginning of the session.

For the UB students, the sessions were carried out at the university premises and the subjects from EOI were recorded in one of the school's classrooms. In all cases the room was quiet and participants could focus. Each session lasted about an hour and started with measuring participants proficiency with V_YesNo v1.0 test. The test was administered and scored online on the researcher's computer through the http://www.lognostics.co.uk website. The test was not timed and on average took 15 minutes to complete. Based on the proficiency score, participants were assigned to one of the four experimental groups.

Then the experiment was presented in a 1280 x 1024 resolution on a 17" TFT monitor of a Tobii T120 integrated eye-tracker (Tobii Publ AB, Stockholm, Sweden). Eye-tracking sampling rate was 120Hz (for full information on this type of an eye-tracker, see Muñoz, 2017). Before the recording, each participant's position was adjusted to keep a 60 cm distance to the screen and a 9-point calibration was performed. The participants were kindly asked not to move during the recording. The experiment consisted of two parts with a one-minute break in between to allow the subjects to change the position and release the tension of immobility. The two parts were recorded separately and the same calibration procedure was performed before the second part. Immediately after the eye-tracking recording the participants were asked to complete the post test. The session was finished with a short background questionnaire and a

semi-structured interview with the stimulated recall elements (for the lack of space, those will not be analyzed within the present paper.).

All the materials and instructions were presented in English, with a possibility of a Spanish translation provided, if needed.

Measurements

The following eye-tracking measures were used to investigate participants eye behaviour during the experiment and to make inferences on their noticing of the target sequences.

<u>Fixation count</u>: how many times participants fixated on the target expressions.

<u>Total fixation duration:</u> how long (in total) participants fixated at the target expressions.

<u>Visit Count:</u> how many times participants moved their eyes to the AOI from some other area.

<u>Total visit duration:</u> how long (in total) participants were looking at the target expressions, when they moved their eyes to the AOI from some other area.

<u>Skipped subtitle:</u> how many times the AOI was ignored by participant altogether, i.e. the number of zero fixations.

To compute the metrics for the selected measures, areas of interest (AOI) were created for each target expression, covering a region slightly larger than the expression itself, as some shifts in eye movement recording can occur (Muñoz, 2017).

Statistical tests

To explore the effects of genre and input enhancement on noticing, as measured by an eye-tracker, a Mann-Whitney U test has been run for all the variables.

To determine the effect of genre and input enhancement on intake, a paired samples ttest has been used between pre- and posttest scores for each of the experimental groups as well as for the following comparisons: highlighted groups vs. non-highlighted groups and TED talks group vs. Friends group.

Possible relationships between intake and noticing, operationalized as gains from pre- to posttest and fixation count, total fixation duration, visit count, total visit duration and the number of skipped subtitles were examined by means of one-tailed Spearman's correlations. The same test was used to look at the possible intervening variables (age and proficiency).

Results

For convenience, the results will be reported in three sections: eye-tracking data, data from the pre- and posttest, interactions (research question 3) and exploration of possibly intervening variables. First the descriptive data will be reported and this is followed by comparisons between genres (research question 1) and input enhancement conditions (research question 2).

Effects of genre and input enhancement on noticing

Descreptive statistics for the eye-tracking measures can be found in the Table 3.

Table 3. Descriptive statistics for the eye-tracking measures

	N	Mean	Std.	Median	Minimum	Maximum
			deviation			
Skipped	31	1.03	1.33	1	0	6
Subtiltle						
Deflection	31	5.65	3.33	5	0	12
Fixation	31	35.97	13.68	35	5	74
Count						
Total	31	6.85	2.99	6.44	1.09	15.89
Fixation						
Duration						
Visit Count	31	14.61	3.98	14	4	21
Total Visit	31	8.25	3.79	7.17	1,12	18.1
Duration						

The analysis of the data collected by the eye-tracker yielded the following results.

Mann-Whitney U tests have revealed significant differences between the Friends and TED talks group in total visit duration (Mdn=6.14 vs. Mdn=8.82, respectively; U=187, z=2.7, p=.006), total fixation duration (Mdn=5.52 vs. Mdn=7.42, respectively; U=171, z=2.064, p=.039), visit count (Mdn=13 vs. Mdn=17, respectively; U=173.5, z=2.177, p=.029) and fixation count (Mdn=30 vs. Mdn=38.5, respectively; U= 203, z= 3.34, p=.001). However, no significant differences between the two genre groups could be observed for the number of skipped subtitles (Mdn=1 for Friends, Mdn=1 for TED talks; U=82, z=-1.3, p=.182) In other words, L2 learners looked at the target expressions significantly more times and for longer each time they looked in the case of the non-fiction genre (TED talks) than when watching the sitcom (Friends), though the number of target expressions they did not focus on didn't differ between the genre.

There were significant differences between highlighted and non-highlighted groups in the number of skipped subtitles (Mdn=0 vs. Mdn=1, respectively; U=63.5, z=-2.4, p=.017) and visit counts (Mdn=15 vs. Mdn=13, respectively; U=171.5, z=2.04, p=.041). The highlighted and non-highlighted groups behaved in the same way in terms of fixation count (Mdn=36 vs. Mdn=31, respectively; U=159, z=1.6, p=.12), fixation duration (Mdn=6.6 vs. Mdn=5.2, respectively; U=156, z=1.4, p=.15) and total visit duration (Mdn=7.2 vs. Mdn=7.2, respectively; U=140, z=.8, p=.43). This suggests some kind of impact for input enhancement, which led participants to deviate from the text less often.

Effects of genre and input enhancement on intake

Descriptive statistics for the participants scores from pre- and posttest can be found in Table 4. The scores are provided for each of the experimental groups.

Table 4. Descriptive statistics for the pre- and posttest scores.

			Pre-test					Post-test			
Genre/condition		N	Mean	Std. deviation	Min	Max	Mean	Std. deviation	Min	Max	
Friends	Non-higlighted	8	8	3.7	2	14	8.63	2.8	3	12	
	Highlighted	9	9.89	5.3	2	16	11.78	5.6	3	20	
TED talks	Non-highlighted	7	7.29	3.3	3	11	7.86	3.2	3	12	
	Highlighted	7	9.71	3.4	6	15	12.14	3.7	7	17	

There was a significant improvement between the pre- and posttests for the highlighted groups (t(15)=4.5, p<.01). For the non-highlighted groups, the gains between pre- and posttest were not significant (t(14)=1.8, p=.09). Both genre groups performed significantly better at the post test (t(16)=3.3, p<.01 for Friends, t(13)=2.8, p=.02 for TED talks). It is worth noticing that people in the highlighted, non-fiction group actually showed the largest improvement. So in terms of gains, and as opposed to eye-tracking measures, input enhancement seemed to play a higher role than genre.

Interactions and intervening variables

There were no significant correlations between intake, as measured by the gains from pre- to posttest, and noticing, as measured by total fixation duration, fixation count, total visit duration, the number of skipped subtitles. This suggests that any gains in the knowledge of the expressions (intake) may not be related to how much they looked at them (noticing).

No interaction has been found between genres and highlighting for the gains from preto posttest, as the differences between the highlighted and non-highlighted groups were consistent across the genre.

There is an interaction between genre and highlighting for visit count and the number of skipped subtitles, as these variables differ significantly between highlighted and non-highlighted conditions for Friends (visit count: Mdn=11.5 (non-highlighted) vs.

Mdn=15 (highlighted); U=67, z=3, p<.01; skipped subtitles: M=2.38, SD=1.9 (non-highlighted) vs. M=0.56, SD=0.72 (highlighted); U=12.5, z=-2.3, p=.02), but not for TED talks (visit count: Mdn=17 (non-highlighted) vs. Mdn=17 (highlighted), U=26.5, z=.26, p=.29; skipped subtitles: M=0.71, SD=.48 (non-highlighted) vs. M=0.43, SD=.53 (highlighted); U=17.5, z=-1.04, p=.29). However, no interactions can be observed for the other eye-tracking measures.

A for potential intervening variables, no significant correlations have been found between participants proficiency and any of the eye-tracking measures. There was a moderate positive correlation between participants age and total visit duration, which was statistically significant ($r_s = .40$, p < 0.05)

Discussion

The present study has sought to contribute to the research on the potential of multimedia instruction for second language acquisition. Captioned videos as an instruction type have been chosen for the analysis due to the fact that they have proved to be a valid tool for promoting learning across various language fields. However, by drawing on the cognitive theories of information processing, it has been suggested that learning outcomes can vary according to certain characteristics of the video. Thus genre and input enhancement have been investigated in an attempt to determine the different ways in which captioned videos may contribute to language learning. Formulaic sequences have been selected as the primary focus of the study due to their importance for the overall L2 proficiency and the fact that their acquisition in the context of captioned videos can be greatly influenced by intrinsic video characteristics.

The obtained results will be further interpreted below in terms of the Noticing Hypothesis and the Cognitive Load Theory. The effect of the two main variables will be discussed separately in the corresponding sections and then an explanation of the overall picture will be advanced.

Effect of genre

The lack of research on the topic did not allow us to put forward any directional hypothesis on the effect of different genres. However, following Garza (1991) and Neuman & Koskinen (1992), it was suggested that intrinsic properties of the videos, associated with the two analyzed genres and described in detail in the methodology section, would differ in their effect on noticing and intake of the target formulaic sequences. This prediction was partially confirmed by the findings, as there were significant differences in participants eye behavior according to the type of video that they were watching, TED talks or Friends. The analysis of the eye-tracking data showed that the number of fixations on the target expressions was higher for the TED talks, as well as the number of visits and total duration of fixations and visits correspondingly. That means that participants looked at the target sequences considerably more often and for longer time in TED talks than in Friends.

This can be explained by a number of intrinsic properties of the TED talks genre, such as high reliance on the verbal component instead of the image, which makes reading subtitles a more relevant activity than looking at the picture, absence of engaging content to follow in the image area (all you can see is just a person talking), or the generally longer presence of each subtitle on the screen. Thus, a possible interpretation is that the viewer is not facing the need to divide his or her attention between the different aspects of the video and can focus on one of them, namely the subtitle.

Only one measure does not support the overall interpretation. There were no differences between the genres in the number of the subtitles skipped during watching, i.e. in our case, in the number of times when the target expressions were not fixated on by the viewer even once. The finding indirectly suggests that if participants for some reason

chose to look at the target expression, they looked at it longer with more fixations involved. A possible interpretation of the finding could be provided through the connection between the number of skipped subtitles and the viewing strategies applied by L2 learners. If the learner tends to focus more on the image, due to one of the beliefs expressed during the interviews (e.g., "I think I need to try to listen more"), than his or her behaviour is not affected by the genre and he will tend to skip the whole subtitle, and not just the AOI in question, giving us the observed results. However, if the learner normally relies on the subtitles in a video comprehension task, he would do it more in the case of TED talks than in Friends for the reasons explained above. This interpretation should be treated with caution, as the information on the eye-tracking measures for the whole subtitle was not analyzed within the study.

Thus it can be inferred that watching a non-fiction genre such as TED talks can lead to a better noticing and potentially deeper processing of the information. In this case, according to the Noticing Hypothesis, we would expect to see an increase in intake for the non-fiction group as well. However, the results from the pre-and posttests do not confirm the hypothesis, as both genre groups improved their performance from pre- to post test. This suggests that any gains in the knowledge of the expressions (intake) may not be related to how much they looked at them (noticing), which apparently contradicts the Noticing Hypothesis. This controversial finding can be accounted for by the nature of the multimedia instruction, combining several information types. Our experiment was designed to measure noticing for just one of them, and namely verbal information in text form (subtitles). However, noticing of other types of information (audio and image) was left unexplored. It can be inferred that in this case their contribution may have been of more importance for the resulting intake.

Effects of input enhancement

Watching captioned videos imposes a great cognitive load on learners in terms of selecting linguistic items for further analysis. Learners have to allocate their attention wisely to take the most advantage of the three types of presented information: image, text and audio. Thus, certain aspects of the video that are not crucial for understanding tend to be ignored. It can be expected to be the case for pragmatic formulaic sequences, chosen for the analysis in the present study, as their primary function is to modify the message rather than to transmitting it. That would suggest, according to the Noticing Hypothesis, that pragmatic formulaic sequences are less likely to be focused on in the captioned videos, and therefore, acquired, despite their potentially rich context.

It was hypothesized that input enhancement in the form of highlighting with a colour will help L2 learners to deal with the problem of attention allocation in the situation imposing high cognitive load and will direct their focus to the target expressions. As a result, highlighting was expected to lead to better noticing and, potentially, intake. This was confirmed for the intake, as the highlighted groups outperformed the non-highlighted once at the post test. However, the hypothesis was only partially confirmed for noticing, as the significant difference between the highlighted and non-highlighted groups could be observed only for the number of skipped subtitles and the number of visits. It could be inferred that highlighting helped to direct participants attention to the target expressions and they were more likely to come back to the AOI in question than those from the non-highlighted group.

It is interesting to note, that the only interaction between input enhancement and genre was found for the same measures. There was a significant difference in those measures between the highlighted and non-highlighted groups for the Friends videos. It can be interpreted as an indicator that participants tend to pay more attention to the image in

the case of Friends, with highlighting significantly shifting their focus towards subtitles, while they tend to be more attentive to the subtitles in Ted talks in general, which explains the absence of any significant differences for this genre.

When it comes to intake, no correlations have been found between this variable and noticing, confirming the hypothesis that processing the information through other channels can have additional effect on the outcome of language learning through captioned videos. Therefore, some other aspects of captioned videos should be investigated in more detail.

As far as intervening variables are concerned, no significant correlations have been found between participants proficiency and any of the eye-tracking measures. There was a moderate positive correlation between participants age and total visit duration, which was statistically significant, however, as the correlation found was only for one of the five measures used, it was considered insignificant for the present analysis and probably resulting from the specific nature of the sample.

Thus, despite the highly heterogeneous character of the sample, it can be claimed that the variables of age and proficiency did not intervene with the results.

Limitations and further research

Any broad generalizations from the findings of the present study should be drawn with caution due to a number of limitations stemming partially from its exploratory nature. First of all, the sample size was quite small and despite all the effort to ensure the comparability of the experimental groups, the highly heterogeneous character of the sample might have had some impact on the results. The testing system could be improved as well, as self-reported data used for measuring intake could not be considered highly reliable and it could be argued that the scoring scale was not sensitive enough. The possible priming effect due to a short interval between the pretest and the

treatment should also be taken into account. Further research is needed on the specific genre characteristics, their interaction and possible effect on language learning. Besides, the investigation of noticing and intake in other systems of information processing (e.g. audio) would shed more light on the nature of language acquisition through multimedia.

Conclusion

In the present study, an attempt has been made to bring into focus some unexplored aspects of captioned videos as a means of multimedia instruction. To this end, the role of genre and input enhancement have been investigated. The findings suggest that intrinsic characteristics of captioned videos defined by genre can have an impact on participants behavior in terms of noticing and potentially, intake. Input enhancement in the form of highlighting has been shown as a useful tool for directing learners attention towards the target items, and it has been suggested that this tool could be slightly more relevant for the fiction genre. However, a more detailed research is needed to explore these variables in a greater depth.

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Appendix

Appendix 1. Test for vocabulary and intake:

Instructions

You are going to see <u>15 expressions in English</u>. Please tell us how well you know them. You will have 5 variants of answer:

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means ...
- **4.** I know this expression it means ...
- 5. I can use this expression in a context ...

If you choose variant 5, please also write the translation for variant 4! Here is the example for an expression <u>How are you?</u>

- For answers 1 and 2 just put an "x" if you choose them:
- 1. I have never seen this expression before (I don't remember). X
- For answers 3 and 4 give a translation/explanation (in Catalan, Spanish or English):
- 4. I know this expression it means

¿cómo estás?

- For answer 5 use the expression in the situation:
- 5. I can use this expression in a context:
- Hi! How are you?

- Hi, I am fine, thank you.

If you choose answer 5, please also do answer 4!

Test.

See you later. 1 1. I have never seen this expression before (I don't remember). 2. I have seen this expression before, but I don't know what it means. 3. I have seen this expression before, and I think it means (Please, write a synonym or translation/explanation). 4. I know this expression it means (Please, write a synonym or translation/explanation). 5. I can use this expression in a context: (Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4) 2 Let's face it. 1. I have never seen this expression before (I don't remember). 2. I have seen this expression before, but I don't know what it means. 3. I have seen this expression before, and I think it means (Please, write a synonym or translation/explanation). 4. I know this expression it means (Please, write a synonym or translation/explanation). 5. I can use this expression in a context: (Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4)

3 Good for you.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences)
(If you do this section, please also do Section 4)

4 Give me a break.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

5 Have a nice day.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4)

6 You don't say.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

7 What's the big deal?

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4)

8 Take care.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

9 Are you kidding?

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4)

10 Watch out!

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

11 Talk to you soon.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4)

What's the matter?

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

Don't get me wrong.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4)

14 You know what I mean?

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

15 Nice to meet you.

- 1. I have never seen this expression before (I don't remember).
- 2. I have seen this expression before, but I don't know what it means.
- 3. I have seen this expression before, and I think it means

(Please, write a synonym or translation/explanation).

4. I know this expression it means

(Please, write a synonym or translation/explanation).

5. I can use this expression in a context:

(Please, write a short dialogue: 2 sentences) (If you do this section, please also do Section 4)

Thank you!