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Double subtitles as an effective tool for vocabulary learning

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Abstract

The present study aimed to investigate if and how the mere minimal exposure to subtitled audio-visual input in an unknown language can enhance incidental vocabulary learning. Three experimental conditions were compared in which native Dutch participants with no prior knowledge of the target language (Russian) viewed an eight-minute Russian cartoon with: (a) standard (Dutch) subtitles or (b) double (Russian and Dutch) subtitles. A control group watched the cartoon: (c) without subtitles. All participants were tested on vocabulary gains and visual information processing after having watched the cartoon three times. Results revealed that vocabulary acquisition did occur after watching the cartoon. Interestingly, participants who were exposed to the double subtitles condition significantly outperformed those who watched the cartoon with standard subtitles on a written word recognition test. Moreover, participants who were exposed to the subtitle conditions were better at remembering the sequence of scenes from the cartoon they had seen. The results thus provide evidence for increased processing of the visual scene as well as incidental vocabulary learning after the exposure to subtitled audio-visual input with no pre-existing knowledge of the target language and, more specifically, evidence for the particularly beneficial effects of the double subtitles.

Keywords: natural approach; authentic input; incidental vocabulary learning; standard subtitles; double subtitles

1. Introduction

The evolution of technology has provided language learners with access to various authentic audio-visual language input such as in the news, films, cartoons, music videos, etc. An ample amount of studies focusing on second or foreign language (L2) learning demonstrates a growing interest among researchers in the use of authentic input for educational purposes. Given that authentic input is one of the key prerequisites for foreign language acquisition (Krashen, 1985), it makes television a powerful platform for language learning. Krashen (1985) states, however, that people can acquire a second language "only if they obtain comprehensible input" (p. 4). Clearly, in the context of foreign language acquisition the linguistic input can become problematic for the learner to process when (s)he does not understand the language in the soundtrack (Lavaur & Bairstow, 2011). In that case, comprehension of input can be achieved with the help of (native language) subtitles.

In addition to providing a translation (first language, or L1, subtitles) or transcription (L2 captions) of the foreign language (FL) input, subtitles may be a valuable instructional tool. They are, however, quite often viewed as a distraction that takes attention away from the language and slows down language skills development (Danan, 2004). Nevertheless, several studies report encouraging results on the use of subtitles in a foreign language classroom (e.g., d'Ydewalle & Van de Poel, 1999; Koolstra & Beentjes, 1999; Lertola, 2012; Neumann & Koskinen, 1992; Zanón, 2006). In line with the reasoning behind these studies, there are several reasons to believe that subtitles can be beneficial for foreign language acquisition. First, audio-visual input provides learners with a triple connection between input channels including visual image, original FL/L2 soundtrack and written text consisting of subtitles offering a translation in the L1 or captions providing a transcription in the FL/L2 (e.g., Danan, 1992; d'Ydewalle & Van de Poel, 1999; Perego, del Missier, Porta, & Mosconi, 2010; Talaván, 2007).[1] Second, subtitling has proven to have a beneficial effect on reducing the anxiety level of the learners when they are exposed to authentic materials (e.g., Čepon, 2011; Talaván, 2007) as well as on building students' confidence level in relation to understanding a foreign language (Danan, 1992, p. 497).

Subtitles, and especially L2 captions, are being used in foreign language teaching (Bisson, Van Heuven, Conklin, & Tunney, 2014), which makes it important to examine their potential problems as well as to investigate the most effective ways of using them at different proficiency levels. The current study focuses on incidental learning after minimal exposure to an unknown language

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[1] Following Vanderplank (2010), we will use the term *subtitles* to refer to translations of the speech stream and *captions* to refer to same language subtitles, that is, (shortened) transcriptions of the information in the speech stream.

(Russian) outside of a classroom context and with no instructions to focus on specific content. With this in mind, the present research aims to find out whether the exposure to subtitled audio-visual input has a positive effect on incidental vocabulary learning and, if so, which of two different subtitling formats would be most beneficial for complete beginners in a foreign language: standard subtitles (in L1 Dutch) or double subtitles (in FL Russian and L1 Dutch). Furthermore, the study aims to examine whether subtitles distract the viewer's attention from the visual scene or whether input from two modalities (visual image and written text) actually enhances comprehension and retention of the viewed material (Perego et al., 2010).

2. Literature review

In the literature review below, we will discuss: (1) the natural approach to foreign language acquisition, (2) the mechanisms of incidental vocabulary learning and conditions that give rise to it, and (3) the benefits and disadvantages of subtitled and/or captioned audio-visual input, subtitle processing and the use of subtitles and/or captions at a low proficiency level.

2.1. Natural approach to foreign language acquisition

The theoretical framework for the study is inspired by the natural approach theory developed by Krashen and Terrell in the early 1980s (Krashen, 1981; Krashen, 1985; Terrell, 1986). This approach aims to foster naturalistic foreign language acquisition, which can be compared to and contrasted with native language acquisition. According to this view, language acquisition is similar to the process children go through when acquiring their native language: children listen to their parents and other people, collect sentences and get better and better at producing their own sentences. Language learning, on the other hand, is described by Krashen as a conscious process that involves explicit instruction and error correction. Summarizing Krashen's ideas, Terrell (1986) states that fluency primarily depends on acquired knowledge while learned knowledge serves as a monitor that is used to make corrections in the process of speech production.

Many researchers have challenged Krashen's views on the grounds that unconscious language acquisition is not sufficient for the development of sound knowledge of the target language. Elgort (2011), for example, tested advanced L2 learners' ability to deliberately learn 48 English pseudo words from lists and cards. Her data provide evidence against Krashen's acquisition-learning dichotomy and suggest that explicit vocabulary learning alone can be an effective method for gaining L2 vocabulary. The author herself, however, also mentions

several limitations to the study. First, the findings cannot be generalized to early stages of proficiency in a foreign language since the participants of the study were advanced L2 learners. Second, the study did not focus on learning from larger meaningful contexts and only looked at the acquisition of individual words. Cobb and Horst (2004) add to Elgort's argument by pointing out to the fact that "the vast majority of English words are found mainly in written texts, while a relatively small handful are encountered in daily conversation and watching television" (p. 17), which makes these words inaccessible for learning through naturalistic acquisition. Furthermore, they argue that vocabulary acquisition through reading remains slow and uncertain even for those learners who read a lot.

All in all, conscious and unconscious processes in foreign language acquisition are one of the most controversial issues in applied linguistics. In discussing this issue, we agree with Gullberg, Roberts and Dimroth (2012) who state that "the debate is partly prompted by the observation that adults – unlike child learners – do not reproduce input very well" (p. 5). However, some of the recent studies (e.g., d'Ydewalle & Van de Poel, 1999; Gullberg et al., 2012; Neuman & Koskinen, 1992) that we will discuss in greater detail below have shown positive results when it comes to the adult's ability to pick up language incidentally from authentic input.

2.2. Incidental vocabulary learning

2.2.1. Mechanisms of incidental vocabulary learning

Many researchers have discussed the general problem of the all-embracing definition of incidental learning (e.g., Huckin & Coady, 1999; Rieder, 2003). Nevertheless, most specialists tend to agree with Ellis (1999) in that incidental learning occurs as a by-product of a task, that is, when the L2 is used as a tool to understand or produce meaning. Similarly, Bisson et al. (2014), in their study concerning the processing of subtitled films, refer to incidental learning as situations where learners are not explicitly asked to learn. In discussions on the definition of incidental learning, it is fairly consistently contrasted with the concept of intentional learning. Researchers have commented that in a real-world context, vocabulary learning cannot be defined as purely incidental or purely intentional, because it is often a combination of the two processes (e.g., Barcroft, 2004; Huckin & Coady, 1999). A fundamental research problem with incidental learning is that it is impossible to predict what the learner is actually doing during the task and whether they are aware of the upcoming tests or not (Bruton, García López, & Esquiliche Mesa, 2011). In the Pellicer-Sànchez and Schmitt (2010) study on incidental vocabulary learning from reading an authentic novel, none of the participants were informed about the upcoming vocabulary tests. The participant who

gained the highest scores, however, predicted the specifics of the study and paid more attention to the target words. So, even though the experiment was designed to investigate incidental vocabulary gains, intentional learning appeared to take place with at least one participant as was revealed in the interview later on.

Another research problem in the field of incidental vocabulary learning is that it is not possible to determine how often people need to be exposed to a word in order for it to be "lexically operational" (Dumay, Gaskell, & Feng, 2005, p. 339). In discussing vocabulary learning, it is important to understand what "knowing" a word actually means. Van Zeeland and Schmitt (2013), for example, distinguish three dimensions of vocabulary knowledge: form recognition, grammar recognition, and meaning recall. As will be explained in more detail in the methodology section, the present study has chosen to include both a written and an auditory vocabulary test aimed at form and meaning recognition. Recognition tasks, in contrast to recall tasks, provide learners with cues and are therefore a better option at the very beginning stages of language learning. It should be noted, however, that there is more to learning a word than learning its form-meaning connection (Webb, 2014, p. 3).

2.2.2. Conditions that give rise to incidental vocabulary learning

As noted by Laufer and Hulstijn (2001), "it is hard to find out which factors are responsible for vocabulary retention as researchers have no control over what people do when they decide to commit words to memory" (p. 11). However, the studies on incidental vocabulary learning offer important implications for understanding the conditions that give rise to it. Studies examining the role of proficiency have shown that a higher level of proficiency increases the potential for incidental vocabulary learning (Neuman & Koskinen, 1992; Montero Perez, Peters, Clarebout, & Desmet, 2014). The relevance of the purpose of reading was highlighted by a study conducted by Swanborn and de Glopper (2002), who examined the effect of three varying reading purposes on incidental word learning: reading for fun, to learn about the topic of the text, and for text comprehension. The results suggest that the free reading condition yields the lowest vocabulary gains while the probability of learning a word incidentally was the highest in the "learn about the topic" group. Among other factors is the type of text coverage. It seems plausible that "the combination of visual imagery and aural input may make it easier to learn words incidentally through watching television programs than through reading" (Webb & Rodgers, 2009, p. 341).The empirical evidence for the importance of imagery in incidental vocabulary acquisition can be found in the large-scale study byElley (1989) in which teachers in several schools in New Zealand read stories aloud to elementary school children. The results

of the study indicated that depiction of the word in illustrations is one of the features that best predicted whether a particular word would be learned.

2.3. Subtitled audio-visual input

Many studies have thus far been carried out in the field of incidental vocabulary learning, but the majority of them have focused on incidental learning from reading with advanced or intermediate learners of a foreign language (e.g., Daskalovska, 2014; Ferrell Tekmen & Daloglu, 2006; Horst, Cobb, & Meara, 1998; Pellicer-Sànchez & Schmitt, 2010; Pulido, 2004; Swanborn & de Glopper, 2002; Vidal, 2011). Furthermore, as noted by Bisson et al. (2014), little research has been carried out in other contexts where the exposure to the foreign language is provided through combinations of written, auditory and visual input.

2.3.1. Benefits of subtitled audio-visual input

The expectation that subtitled audio-visual input and audio-visual input in general contributes to incidental vocabulary learning is justified by a number of its benefits. Perhaps the most recognizable benefit of audio-visual input that is in line with the natural approach is that it creates a simulated natural context (Oetting, Rice, & Swank, 1995).Authentic materials allow the learner to be confronted with the target language as it is naturally used and, as Berardo (2006) writes, they will "enable learners to interact with the real language and content rather than the form" (p. 62). Obviously, one can argue that a real language that is not simplified and spoken at a normal speed can cause anxiety, high level of insecurity and frustration among students (Bacon & Finneman, 1990; Talaván, 2007). Subtitles may, however, provide both feedback and positive reinforcement, which may help learners to gain confidence in watching foreign television even without subtitles in the future (Vanderplank, 1988; Talaván, 2007). Subtitled video contextualizes the learning process as explicit information on the meaning of words is not given, but meanings of words can be inferred from the context (Koolstra & Beentjes, 1999). Moreover, the viewer may also learn in which situations these words may be used. Entertaining qualities of audio-visual materials ensure a high level of engagement among learners since viewers are generally motivated to understand what is happening on the screen. Koolstra and Beentjes (1999) state that learning from natural language occurs not because the viewer is trying to memorize, but because the viewer is trying to understand what is being said. Finally, the use of authentic audio-visual materials can also enhance positive attitudes towards and interest in the target culture (Bacon & Finneman, 1990; Erbaggio, Gopalakrishnan, Hobbs, & Liu, 2012; Nostrand, 1989).

Audio-visual input seems to provide a rich context for foreign language acquisition and evidence for the foregoing discussion comes from several studies. Neuman and Koskinen (1992), for example, compared differences in L2 incidental vocabulary learning by comparing four conditions: captioned television viewing, traditional television viewing without L2 captions, reading along and listening to the text, or reading the text only. The results indicated that students who watched television programs with captions made significantly larger vocabulary gains than those who watched television without captions and, more importantly, they outscored those who read the text. Similar evidence for the beneficial effects of captioning on written and auditory form recognition tests have been obtained by Sydorenko (2010) and Markham (1999) respectively.

Gullberg et al. (2012) focused on acquiring vocabulary "in the wild", that is, with no pre-existing knowledge of the target language (Mandarin Chinese), among Dutch participants after minimal exposure to the new language and is therefore very much related to the purposes of the present study. The participants were exposed to natural but controlled input in the form of a 7-minute weather report that consisted of 24 target words selected to construct the text. The findings of the study suggest that, even if the input is in a completely unknown language (i.e., Chinese) and the exposure to that language is minimal, adults are able to extract word form and meaning information.

An interesting study using eye-tracking methodology to investigate subtitle processing was conducted by Bisson and colleagues (2014), who compared the efficacy of intralingual L1 subtitles, interlingual FL captions, and reversed subtitles (in which the speech stream was provided in the L1 and the text in the FL) in relation to the acquisition of words in a completely unknown language (i.e., Dutch). They showed that, because of saliency and automatic reading behaviour (d'Ydewalle, Praet, Verfaillie, & Van Rensbergen, 1991), participants always focused on the subtitles, regardless of whether they were provided in FL or L1 and regardless of whether the spoken language was in FL or L1. Bisson et al. (2014) did not find any clear vocabulary gains as measured on an unexpected auditory word recognition test and suggest that more subtle measures might be needed in order to detect a gain in vocabulary. This might, however, also be related to the relatively low amount of input that participants get after watching a film only once. The frequency at which someone encounters a word is a crucial factor in the vocabulary acquisition process (Elley, 1989) and repeated exposure to a target word seems necessary for acquisition to occur.

Different subtitling conditions have also been compared by d'Ydewalle and Van de Poel (1999) who used both standard L1 subtitles and reversed subtitles (with L1 soundtrack and L2 subtitles). They found only limited effects on vocabulary gains and, as expected, showed that reversed subtitles only lead to

acquisition of the written form. An L1 translation of the soundtrack might be mainly beneficial for comprehension and a written transcription of the L2 soundtrack might mainly help to link the written form of the L2 words to the corresponding phonological form. It might thus well be that a combination of L1 subtitles and L2 captions is even more beneficial to both written and auditory vocabulary acquisition. Double or dual subtitles are normally not offered on DVD's but have occasionally been used for second language learning purposes (Raine, 2012). Double subtitles have not yet been frequently investigated in the context of second language development. To our knowledge, there has only been one study thus far, conducted by Raine (2012), that explored the effectiveness of double subtitles by comparing them to English (L2) captions, Japanese (L1) subtitles, and no subtitles. Raine tested 39 Japanese low-intermediate students of English and his results suggested no vocabulary gains in any of the four conditions. Perceived usefulness was also tested by means of a questionnaire and these data did reveal that participants within the interlingual group, that is, the group exposed to L1 subtitles, were the only ones to find the subtitles easy to read. The participants within the interlingual group were also unique in that they believed they could have learned new words from watching the video.

2.3.2. Disadvantages of subtitled audio-visual input

The literature already provides a considerable amount of empirical evidence for beneficial effects of subtitled television. At the same time, language acquisition through watching subtitled or captioned material can only occur if both the spoken foreign language input and the written text are processed up to a certain degree (Van Lommel, Laenen, & d'Ydewalle, 2006, p. 244). Some researchers have suggested this can be difficult as subtitles may only distract viewers from the audio and image channels. When spending time reading the subtitles, the television viewer might miss information from both the soundtrack and the visual scene. Some studies have indeed suggested this could be the case.

Sohl (1989), for example, used the dual-task method to investigate whether the soundtrack is processed while viewing a subtitled movie. The results of the experiment showed that reaction times to the second task (reaction to a flash light) were slower when the first task involved watching a movie with both soundtrack and subtitles as compared to watching a movie with either soundtrack or subtitles only (as cited in d'Ydewalle & Van de Poel, 1999, p. 228; Van Lommel et al., 2006, p. 244). Even though the participants were slower when processing both audio and subtitles, this result provides evidence that viewers actually attend to all input channels simultaneously. Another study that at least partly contradicts the viewers' exclusive orientation to subtitles was conducted by de Bot,

Jagt, Janssen, Kessels and Schils (1986), who investigated to what extent viewers focus on L1 subtitles, L2 speech or both. The subjects were exposed to short items of a news bulletin in which, at various points, speech and subtitles contained conflicting information. After each news item the subjects were asked to answer multiple choice questions, some concerning information where L1 subtitles did not correspond with L2 speech. The authors concluded that different types of TV viewers all to a greater or lesser extent make use of the spoken language in the soundtrack. More specifically, as could be expected, they showed that beginning L2 learners are more L1 subtitle-oriented than advanced L2 learners, who appear to use information in the L2 soundtrack relatively more often.

Of course, not only may subtitles distract attention from the soundtrack, but they might also divert the viewers' attention from viewing and processing the visual scene. As noted by Koolstra, Peeters and Spinhof (2002), "when the attention is focused on the subtitle, information provided in the picture might be missed" (p. 331). Contrary to these expectations, an eye movement registration experiment conducted by Gielen (1988) found that viewers employ a "viewing strategy" when watching subtitled television: the eye is focused on the area just above the subtitles which allows monitoring the most important events in the video channel and reading the subtitles almost simultaneously (as cited in Koolstra, Peeters, & Spinhof, 2002, p. 331). These findings have more recently been supported by a study on the cognitive effectiveness of subtitle processing by Perego et al. (2010). Their results indicated that good understanding of film content with a good level of performance in word and scene recognition tasks does not induce a trade-off between image and text processing, that is, a focus on the text does not come at the expense of image processing and vice versa.

Taken together, the aforementioned studies indicate the possibility of simultaneously processing video, audio and text and, consequently, suggesting that incidental foreign language acquisition in such a context might also occur.

3. The study

3.1. Research questions

So far, there have been a number of studies (e.g., d'Ydewalle & Van de Poel, 1999; Koolstra & Beentjes, 1999; Lertola, 2012; Neumann & Koskinen, 1992; Talaván, 2006) that have reported a rather positive impact of subtitles and/or captions on students' foreign language competence. However, discussions about the potential of subtitling as an instructional tool for foreign language teaching and learning often take as their starting point stages where the learners have already acquired some knowledge in that language. At the same time, as Elgort (2011)

pointed out referring to the cognitive literature on L2 vocabulary acquisition, "there may be important differences in the organization of the bilingual lexicon, access to representations of L2 words, and even the nature of vocabulary acquisition processes for beginner and advanced L2 users" (p. 398). Therefore, there is reason to believe that different proficiency levels bring the need for different types of subtitles. Furthermore, most research to date has focused on whether subtitling is beneficial for vocabulary learning, but, since this has already been shown repeatedly, a more interesting question would be to examine which type of subtitling is most beneficial for gaining vocabulary. Unfortunately, studies that have included multiple types of subtitling have yielded inconclusive results (e.g., Bisson et al., 2014; Raine, 2012) and the potential benefits of double subtitles (i.e., including both a translation and a transcription of the soundtrack) have not yet been explored in enough detail.

The current study investigates learning a new language at the absolute earliest stage, which means that the participants in the study were complete beginners and had no prior knowledge of the language they were exposed to during the experiment. This brings us to consider the factors that should be taken into account when it comes to the use of subtitles at this stage. Clearly, in the case of complete beginners in a foreign language, the learners need to "rely on some form of input in their native language to grasp the meaning of a message" (Danan, 1992, p. 501). As mentioned earlier, the input must be comprehensible for language acquisition to occur (e.g., Krashen, 1985; Pulido, 2004; Schmidt, 1990). Consequently, it is logical to assume that standard L1 subtitles are more suitable at the early stage of this process, because they enable the low-level students to engage in easier retrieval of lexical information (Talaván, 2007). Another problem that all beginning learners face is word segmentation. Identifying words in fluent speech poses a serious difficulty for the complete beginners in a foreign language. As Vidal (2011) claimed, the phonetic sensitivity of FL learners is based on the contrasts present in their mother tongue and often cannot be successfully applied to L2 speech. In these cases, foreign language subtitles may help learners to distinguish words in the stream of speech (Almeida & Costa, 2014).

Therefore, as the authors see it, double subtitles (a combination of mother tongue and foreign subtitles) might be extremely beneficial as they help beginners to solve two problems simultaneously: mother tongue subtitles facilitate foreign language comprehension, while additional foreign subtitles help the learners to visualize what they hear and identify words in the context of fluent speech.

The first research question addressed in the present study therefore attempts to examine the potentially beneficial effects of double subtitles as compared to standard L1 subtitles on incidental vocabulary learning in the absence of pre-existing knowledge of the target language and with no instructions to focus

on specific content. We hypothesized that a combination of mother tongue and foreign subtitles would not only provide complete beginners with comprehensible input, but also help them identify words in the context of fluent speech and visually familiarize the learners with the target language. Therefore, we expected the participants who were exposed to audio-visual input with double subtitles to outperform the participants in the standard subtitles group on subsequent audio and written word recognition tests.

Double subtitles would, however, take more time to read and process than L1 subtitles. Subtitles are sometimes thought to constitute a distraction that takes the learner's attention away from image processing and this might especially be true for double subtitles as the time spent reading double subtitles cannot be spend on viewing the visual scene. An additional research question thus focuses on whether there is a trade-off between image and subtitle processing, that is, whether viewers process and remember less of the visual scene when processing (double) subtitles. Even though there are a number of studies that have contradicted this view (e.g., Gielen, 1988; Perego et al., 2010), no one has examined the trade-off hypothesis in relation to double subtitles. Based on previous research by Perego et al. (2010), we would not hypothesize to find a trade-off effect in the L1 subtitles group as compared to a control group, but we might expect people exposed to double subtitles to suffer from a trade-off between image and text processing, as they have to spend a relatively long time reading subtitles.

3.2. Method

3.2.1. Participants

A total of 43 students with no prior knowledge of Russian (which was one of the criteria for participation) were recruited to take part in the experiment. The participants were BA students of the University of Groningen enrolled in one of the following programs: English Language and Culture, Dutch Language and Culture, European Languages and Cultures (Spanish, German, Italian), Linguistics, Communication and Information Studies, Psychology.

Each student was randomly assigned to one of the three experimental conditions. The first group (N =16) watched a Russian cartoon (see materials section for more details) with standard subtitles providing a translation in the L1 (Dutch); the second group (N = 16) watched the cartoon with double subtitles providing a translation in the L1 (Dutch) and a transcription in the FL (Russian), and the control group (N = 11) that consisted of international non-Dutch and non-Russian speaking students watched the cartoon without subtitles. Since there were not enough Dutch speaking participants available and the participants' L1

was not considered to be a crucial factor in the non-subtitled condition, we assigned all the non-Dutch speaking participants to the control group.

3.2.2. Materials

The selection of materials for the experiment was based on the language proficiency of the participants. Taking into account the absence of pre-existing knowledge of the target language, choosing a relatively easy authentic video in that language was of the highest priority. Animated cartoons contain a number of features that facilitate target language comprehension at low-proficiency levels. Some of the facilitating features distinguished by Jylhä-Laide (1994) are the following: (1) they present a strong picture-word interconnection, (2) the sentences in the dialogues are usually simple, (3) repetition is used frequently, and (4) the rate of speech is often relatively low in cartoons (p. 94). When choosing a cartoon, care was taken to ensure that there was balance between action and dialogues and that the plot was interesting enough to keep the participants' attention. The dialogues also needed to be rich in simple catchy phrases built on basic vocabulary.

Taking these points into consideration, the decision was made in favour of the humorous cartoon *Bobik visits Barbos* (Russian: *Бобик в гостях у Барбоса*) dating back to the year 1977. This video stimulus was used to create three viewing conditions: one with standard subtitles in Dutch, the second with double subtitles in Russian and Dutch, and the third one without subtitles. Double subtitles were presented in two lines: the first line was in Russian, the second line was in Dutch. Given that the Russian language uses Cyrillic alphabet, the Russian text was transcribed with Latin letters so that the Dutch-speaking students could read it. Examples of standard L1 (one-line) subtitles and double Dutch-Russian (two-lines) subtitles are shown in Figure 1 and Figure 2 respectively.

Figure 1 A video frame from the cartoon with standard (Dutch) subtitles

Figure 2 A video frame from the cartoon with double (Russian and Dutch) subtitles

3.2.3. Measurements

3.2.3.1. Vocabulary gain

17 audio fragments and 20 vocabulary items were created as vocabulary learning targets for the study used in the audio and written word recognition tests respectively (see Appendix A and Appendix B).

For the audio recognition test, 17 audio fragments were cut from the cartoon soundtrack. The length of the fragments varied from 1 to 2 seconds. Each fragment was presented with the correct Dutch translation and two other Dutch words or phrases as answer options. The participants were asked to listen to each audio fragment two times in a row and choose the correct response as presented to them on paper. The participants could take as much time as they needed to decide on the answer since the transition to the next fragment was manual. This part of the experiment was carried out with the help of the *E-Prime* program (Schneider, Eschman & Zuccolotto, 2002).

For the written word recognition test, the list of vocabulary items were presented on paper either in isolation or in short phrases with the correct Dutch translation and two incorrect options. The three answer options for each audio fragment and vocabulary item were taken from the cartoon's script translated into Dutch and were matched to be visually similar in length to make the correct response less obvious and avoid the possibility of guessing the right answer, as in the following example:

shto ti panimaesh v zhizni (don't you know anything about life):

- en jouw opa vindt dat goed *(and your grandfather is ok with that)*
- weet je dan niks van het leven *(don't you know anything about life)*
- wat is dat in hemelsnaam *(what on earth is that)*

3.2.3.2. Image processing

A scene ordering test was conducted to assess the potential level of distraction from the visual scene of the cartoon in the three different conditions. 45 video frames were captured from the cartoon, printed out, and presented to the participants on paper cards in random order (see Appendix C). The participants were asked to arrange the video frames in the right order according to the sequence of events they had seen in the cartoon. The ordering test was assessed by the number of corrections needed to rearrange all the video frames in the right order in the shortest way possible. The number of corrections was established manually for each participant.

3.2.4. Data collection procedure

During the entire experimental session, the participants viewed an 8-minute cartoon in Russian three times and completed three tests: a scene ordering test, an audio recognition test and a written word recognition test. The participants were not informed about the vocabulary aspect of the experiment or about the testing procedure after the videos to avoid intentional memorization. The experiment took about 1-1.5 hours depending on how fast the participants were at completing the tests. The participants had unlimited time to complete each test.

The first stage was to watch the cartoon one time without any specific instructions on the purpose of watching. Immediately after having watched the cartoon, the participants were asked to complete the scene ordering test. The scene ordering test was carried out after the first watching in order to avoid unconscious and incidental memorization of the plot after having watched the cartoon three times since the purpose of this part of the experiment was to assess the degree to which the participants were distracted from the visual scene processing in the three conditions. After completing the scene ordering test, the participants watched the cartoon two more times in a row. The multiple number of viewings was justified by the mechanism of incidental learning discussed in the literature review and the factor of frequency as one of the conditions for such learning to occur. As mentioned earlier, the frequency of exposure to a word in order for it to be lexically operational has yet to be determined (Dumay, Gaskell & Feng, 2005, p. 339). Taking into consideration the fact that the participants were exposed to an unknown language and considering the length of the video, we decided that three viewings would be enough for incidental learning to occur. After having watched the cartoon a total of three times, the participants proceeded with the audio recognition test. The final part of the experiment consisted of the written word recognition test. This latter part of the experiment was designed for the subtitled conditions only.

3.2.5. Data analysis

Data were analyzed in two steps to answer research questions one and two. The first set of analyses was designed to determine which of the two subtitling formats is most beneficial for incidental vocabulary learning with no prior knowledge of the target language: standard L1 or double L1 and FL subtitles. To conduct the first set of analyses, we examined two variables: scores on the audio recognition test and scores on the written word recognition test. We predicted that exposure to double subtitles would have a more beneficial effect on incidental vocabulary gains than standard subtitles in both tests. A Kruskal-Wallis *H* test and an independent-samples *t*-test were used to examine vocabulary recognition differences between the three groups in the audio recognition test (with the no subtitles group being a control group) and the two subtitle groups in the written word recognition tests.

In the second set of analyses, we investigated if there is a trade-off between the image and subtitles processing or whether the subtitles actually enhance retention of the viewed material. To conduct this set of analyses, we examined the following two variables: the number of corrections in the scene ordering test and total gain scores for each participant in the audio and written word recognition tests. First, a one-way ANOVA was used to examine differences among groups in the ordering test by comparing the mean scores. On the basis of research by Gielen (1988) and Perego et al. (2010), we hypothesized that there would be no significant difference between the L1 subtitle and no-subtitle conditions. Double subtitles, however, require more focus from the viewer and might therefore lead to less processing of the visual scene. An additional correlation analysis was performed to investigate whether the scores in the scene ordering test were related to overall vocabulary gain scores in the audio and written word recognition tests in the two subtitle conditions.

4. Results

4.1. Efficacy of standard and double subtitles

Our first set of analyses aimed to answer research question one, that is, to examine the potential differences in vocabulary gains between the two different subtitle conditions: standard L1 subtitles and double L1-FL subtitles.

4.1.1. Audio recognition test

As can also be seen in Figure 3, the standard (*M* = 10.88; *SD* = 2.44) and double subtitles groups (*M* = 10.69; *SD* = 2.62) scored higher on the audio recognition test than the group who watched the movie without subtitles (*M* = 8.82; *SD* = 1.94).
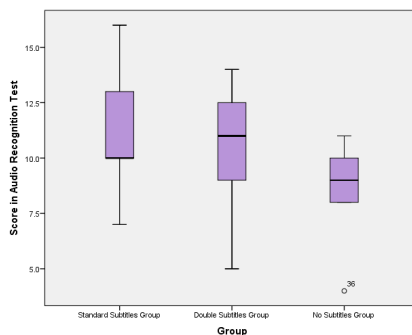
Figure 3 Boxplots showing the dispersion of the scores on the audio recognition test for the standard subtitles group (on the left), the double subtitles group (in the middle) and the no subtitles group (on the right)

Since the data obtained from the no subtitle condition did not meet the normality and equality of variance requirements ($W = .849$; $p< 0.05$), a Kruskal-Wallis H test was used to evaluate whether the mean rank for the three groups differed significantly from one another. The results revealed a trend towards a difference between the three groups, $\chi 2$ (2, N = 43) = 5.33, $p = .069$. This trend was mainly caused by the lower scores obtained in the no subtitles condition. An additional independent-samples t-test used to compare the difference in the mean scores between the subtitle conditions revealed no significant difference between the standard and double subtitles groups, $t(30) = 0.2$, $p = 0.836$.

4.1.2. Written word recognition test

As can be seen in Figure 4, the double subtitles group scored higher on the written word recognition test ($M = 14.31$; $SD = 2.35$) than the standard subtitles group ($M = 11.25$; $SD = 2.11$).
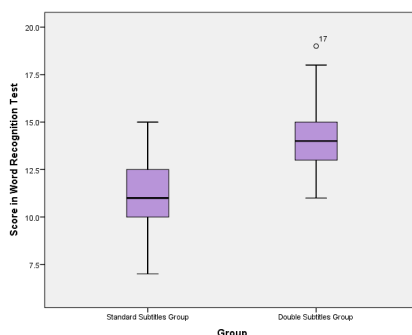

Figure 4 Boxplots showing the dispersion of the scores on the written word recognition test for the standard subtitles group (on the left) and the double subtitles group (on the right)

An independent-samples *t*-test confirmed that, on average, the double subtitles group significantly outperformed the standard subtitles group in the written word recognition test ($t(30)$ = -3.8; p = 0.001).

4.2. Distraction from image processing

4.2.1. Scene ordering test

Our second set of analyses was designed to investigate whether there is a trade-off between the image and subtitles processing especially in the double subtitles condition due to more focus on the textual information presented in two lines at the bottom of the screen (as compared to one line in the standard subtitles group). The no subtitles group needed more corrections (M = 12.55; SD = 4.46) than the standard and double subtitles groups (M = 9.31; SD = 3.81and M = 9.75; SD = 2.32, respectively). The results of a one-way ANOVA confirmed this effect of viewing condition by showing a trend towards a main effect, $F(2,40)$ = 3.054; p = 0.058.

Post-hoc comparisons using the Gabriel test indicated no significant differences between the standard and double subtitles group (p = .979) or between the double subtitles and no subtitles group (p = .137). There was a trend, however, towards significantly more corrections needed in the no subtitles group as compared to the standard subtitles group (p = .069).

4.2.2. Correlation analysis between image processing and total vocabulary gains

A Pearson *r* correlation analysis was performed toinvestigate whether image processing measured by the number of corrections in the scene ordering testis related to the total vocabulary gain scores in the audio and written word recognition tests in the two subtitle conditions. The results of the analysis are plotted on Figure 5.
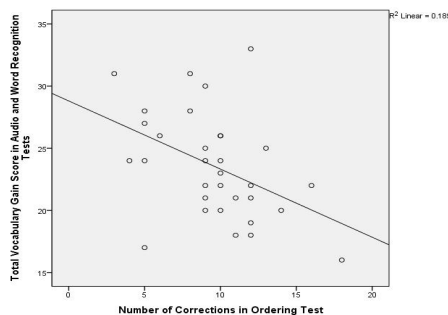

Figure 5 Scatterplot showing the number of corrections in the scene ordering test on the x-axis and total vocabulary gain score in audio and written word recognition tests in both subtitle conditions on the y-axis. Each dot represents a student

The scatterplot clearly reveals that when the total vocabulary gain score decreases, the number of corrections increases. This was confirmed by the statistical analysis revealing a moderately strong significant *negative* relationship between the processing of visual images and total vocabulary gain in the subtitle conditions ($r = -0.43$; $p = 0.01$; two-tailed). The higher the number of corrections needed, the lower the total gain score in the vocabulary tests.

5. Discussion

The present study is one of the first to examine the potential benefits of double subtitles, that is, a combination of both a written L1 translation and a FL transcription provided at the bottom the screen of a cartoon for incidental vocabulary acquisition of a completely unknown language (Russian). The main aim of the present experiment was to examine: (1) which type of subtitling (standard L1 versus double L1-FL) would be most beneficial for incidental vocabulary acquisition of an unknown language, and (2) whether the increase in dual processing of scene and subtitle information especially in the double subtitles condition would lead to a trade-off, that is, less processing of the visual scene due to more focus on the subtitles. In order to answer these questions, Dutch students were either repeatedly exposed to a Russian cartoon containing L1 subtitles or L1-FL double subtitles, and their vocabulary gain as well as retention of the visual information was tested afterwards and compared across the two groups as well as to a control group consisting of international students who watched the cartoon without subtitles.

5.1. Efficacy of standard and double subtitles

The first set of analyses focused on the efficacy of the two types of subtitles (standard and double) in the context of no prior knowledge of the target language. We hypothesized that double subtitles would have more beneficial effects on incidental vocabulary gains as compared to standard subtitles since they would not only provide complete beginners with comprehensible input, but also help them to identify words in the context of fluent speech and visually familiarize the learners with the target language. Therefore, we expected the double subtitles group to outperform the other two groups in both the audio and the written word recognition tests.

We hypothesized that especially FL subtitles should facilitate recognition of word boundaries in the spoken language for complete beginners in a foreign language. Contrary to expectations, no significant difference was found between the two subtitle conditions and participants' scores in the audio recognition test. The

absence of a significant difference between the two subtitle groups, however, does suggest that the two-line subtitles in the double subtitles condition did not negatively affect audio processing when compared to the standard subtitles condition with one-line subtitles. Although the subtitles groups performed better on the audio recognition task than the no subtitles group, the overall comparison of the three groups only revealed a trend and failed to reach statistical significance.

It should be noted, however, that the participants in both subtitle conditions achieved an average score of approximately 11 words out of a possible score of 17 words in the audio recognition test. These results are remarkable given the participants' limited exposure to the video stimulus and no pre-existing knowledge of the target language. The present study thus shows that minimal exposure to an unknown language can lead to incidental vocabulary acquisition as reflected in the ability to segment and subsequently recognize FL words and their meaning in a speech stream. Furthermore, the present study suggests that learners are able to do this regardless of whether they are provided with only L1 subtitles or double L1-FL subtitles. Future research should look into this issue in more detail by including more participants and maybe employ measures of saliency. It might well be that learners acquire words that are salient in the input because they occur often or because the auditory (e.g., intonation or stress) and/or visual input (e.g., the use of gestures by the speaker) add saliency to these words which cause the viewer to notice and hence process them. Of course, the present study only looked at immediate effects and it would be interesting to examine retention of the recognized words and phrases, and factors influencing this, after a period of non-exposure to the language.

Whereas only a trend towards a difference was found for auditory word recognition, the double subtitles group did significantly outperform the standard subtitles group on the written word recognition task. The learners who were exposed to standard L1 subtitles gained on average about 11 words and phrases out of 20 tested. The group exposed to the double subtitles (i.e., both Dutch and Russian) on average learned approximately 14 words out of 20. These results thus confirm our hypotheses and reveal that a combination of mother tongue and foreign language subtitles on the screen may help to identify words and phrases in the context of fluent speech and, in turn, enhance incidental acquisition of an unknown language. The fact that a combination of L1 translation of the soundtrack and a FL transcription are more beneficial to written word and phrase recognition than L1 subtitles suggests a potential benefit of using FL/L2 captions for vocabulary acquisition. Previous studies have reported similar benefits of L2 captions for vocabulary acquisition (e.g., Sydorenko, 2010), but many studies yielded inconclusive results and found no differences between subtitling conditions and vocabulary gain (e.g., Bisson et al., 2014). This might be related

to differences in proficiency level among the learners, but there might well be effects of linguistic similarity as well as familiarity with subtitles that have led to null effects and differences between the studies. Bisson et al. (2014), for example, tested native English speakers watching Dutch television. Even though they had no knowledge of Dutch whatsoever, Dutch and English do belong to the same Germanic branch of the Indo-European language family and are linguistically similar in many ways. This is definitely not the case for Dutch and Russian, the languages used in the present study. Furthermore, Bisson et al.'s (2014) subjects were not familiar with reading subtitles as most of the television they watch is provided in their native language (English). The research field might benefit from studies directly comparing the efficacy of subtitling conditions across different populations to investigate effects of linguistic similarity and familiarity with subtitles.

As the differences in scores in the present study between the two subtitle conditions were small (but significant) and the variance in individual results was quite large, one may question the external validity of the experiment. Some factors that could influence the results should be taken into account. A possible explanation for the variance in individual results can be found in the participants' involvement. Taking into consideration the fact that the participants were not actually enrolled in the Russian language course and did not choose to learn it of their own accord, some of them might not have been motivated enough. The potential difference in involvement may have contributed to individual differences in overall success in vocabulary gains. Furthermore, our participants most likely differed in linguistic experience, background, awareness and sensitivity as some of them were studying a foreign language (English, Dutch, Spanish, Spanish, German, or Italian) while others were doing a BA in Linguistics or Communication and Information Studies. Differences in individual results can also be related to the research problem with incidental learning indicated by Bruton et al. (2011). As mentioned earlier, it is impossible to tell what exactly the participants were doing during the viewing part of the experiment. Even though they were not informed about the upcoming tests and the vocabulary aspect of the experiment, some participants still might have paid special attention to some words and phrases and some to none at all.

Overall, the present results confirm that subtitles enhance incidental vocabulary acquisition (e.g., Lertola, 2012; Neumann & Koskinen, 1992; Zanón, 2006) in that both standard and double subtitles may increase a viewer's recognition of FL words and or phrases heard in the speech stream. Our results additionally reveal that, when comparing subtitle conditions, double subtitles may be particularly beneficial for incidental acquisition of written FL forms and thus seem to be an undervalued learning tool that can be particularly useful to enhance the recognition of written words and phrases in an unknown language.

5.2. Distraction from image processing

With respect to the second research question, regarding potential distractions from the image processing caused by spending time reading the subtitles, which supposedly takes even longer for double as compared to standard subtitles, the results are in line with our hypotheses and the research results obtained by Gielen (1988) and Perego et al. (2010). The present study found a trend towards significantly better image processing scores, as revealed by the ability to arrange the video frames captured from the viewed material in the correct order, for the standard and double subtitles groups as compared to the group who was exposed to the audio-visual input without subtitles. Subtitles are sometimes thought to result in distraction that overwhelms learners' attentional capacity providing them with different types of information through different channels (Danan, 2004). Contrary to these concerns, our findings clearly indicate that students in the subtitle conditions viewed and processed all the scenes even better than the group who watched the cartoon without subtitles. A possible explanation for this might be the lack of engagement among the participants in the no subtitle condition since they were exposed to totally incomprehensible input. Therefore, even in the absence of a significant effect of condition, the results may point towards the fact that comprehension of audio-visual input influences the learner's engagement and attention to what is going on on the screen. Future research might test such an assumption by combining the experiments of the present research with measures of engagement and attention. The use of eye-tracking may definitely be helpful in these cases to establish where learners focus on while watching video material with a foreign language soundtrack.

An interrelated and interesting result was found in the analysis of the relationship between the performance on the scene ordering test and total vocabulary gain scores in the subtitle conditions. A significant moderately strong *negative* relationship between these two variables revealed that the lower retention of the visual information, the lower the total gain score in the audio and the written word recognition tests. This result suggests that those who performed well in the experimental tests by acquiring a relatively large number of words also better processed and recalled the audio-visual input from the cartoon. This finding might seem counterintuitive as it suggests both increased processing of the scene and increased processing of the subtitles. Related to the findings mentioned above, this correlation between image and text recall can be accounted for by the importance of engagement and motivation in incidental vocabulary learning. These findings are in line with the idea of the cognitive effectiveness of subtitles processing proposed by Perego et al. (2010): subtitled television leads to good comprehension and processing of the viewed material

without causing a trade-off between image and text processing. The present study adds to these results by showing that the participants, who showed higher levels of performance in the scene ordering test also showed higher vocabulary gains. This indicates that, in addition to comprehension, vocabulary learning can take place without causing a trade-off effect between image and subtitles processing, especially in the case of double subtitles.

6. Conclusion

To investigate the effects of the mere minimal exposure to subtitled audio-visual input on incidental vocabulary learning, to see which of the two subtitle formats is more beneficial for complete beginners in the target language and to examine whether there is a trade-off between image processing and subtitle processing in the double subtitles condition as compared to the standard and the no subtitles conditions, 43 students of the University of Groningen with no prior knowledge of the target language watched an eight-minute cartoon in Russian in three conditions: with standard L1 subtitles in Dutch, with double L1-FL subtitles in Dutch and Russian and without subtitles. They were subsequently tested on vocabulary gains in an auditory and written word recognition test and on image processing in a scene ordering test. The double subtitles group showed significantly higher vocabulary gains on the written word recognition test as compared to the standard subtitles group. Only a trend towards a significant difference between the groups was found in recognition of spoken Russian phrases in the audio recognition test with both subtitles groups performing slightly better than the no subtitles group. These combined results indicate that there was no negative effect of the two-line double subtitles as compared to the one-line standard subtitles on the audio processing and, moreover, that double subtitles even appear to be particularly useful for incidental vocabulary learning of written forms at the low-proficiency level, as reflected by the significant vocabulary gains on the written word recognition test. Additionally, no effects of a trade-off between image and subtitles processing were found. On the contrary, the participants in the two subtitle conditions performed even better with regard to the retention of the visual information from the viewed material than those in the no subtitles condition. Moreover, a significant negative relationship between image processing and total vocabulary gains revealed that the lower their image processing recall as reflected in the scene ordering test, the lower total vocabulary gains in the two vocabulary tests. These results show that simultaneous processing of a soundtrack in an unknown language, visual information and subtitles in the L1 or in both the L1 and the FL can be cognitively effective.

Notwithstanding the positive results, there are some limitations to this study that should be acknowledged. First, the results provide clear evidence of incidental vocabulary acquisition having occurred in both subtitle conditions. The question remains, however, whether the accuracy of scores for the subtitle conditions was significantly above chance. Learning was measured by checking whether the learner can recognize the meaning of the target word among several given options which involves the possibility of guessing. In addition, even though the no subtitles group, which was exposed to completely incomprehensible input, obtained the expected lower scores in the audio recognition test, the Kruskal-Wallis *H* test only revealed a trend towards the difference between the three groups. Yet, the result in the double subtitles group with an average score of 14 words out of a possible score of 20 words in the written word recognition test is, in our opinion, quite remarkable after having minimal exposure to an unknown language and does not point towards guessing. Another possible limitation is that the word knowledge measures involved passive recognition skills only. None of the tests required active recall of vocabulary. Besides, conclusions regarding the learning effects in both subtitle conditions are mitigated by the fact that a vocabulary retention test was not carried out. The experiments have only examined short-term effects, with minimal delay between exposure to the cartoon and testing. As Dumay, Gaskell and Feng (2005) pointed out, direct measures of vocabulary learning only indicate the traces left by the exposure to the target input, not the fact that a new lexical item has been actually learnt.

The findings of the current study are meant to be used to reveal possible trends worth examining in further research. In particular, several questions remain to be answered. First, the study did not investigate the impact of repeated exposure to the foreign language, that is, whether the number of exposures to the subtitled video influences the results. Furthermore, the current study was limited to the form recognition tests only. Further research could also aim to gain insights into how many exposures are required for different types of vocabulary acquisition, from recognition of form to meaning recall, as discussed in Bisson et al. (2014). The second suggestion for further research concerns the role of instruction. The participants were deliberately not informed about the purpose of watching and the upcoming tests since the focus of the current study was on incidental learning. An important question raised by Gullberg et al. (2012) in the discussion of their study results mentioned earlier is whether the participants would show higher vocabulary gains if their attention was drawn to some specific aspects of the input in instructions making the learning more explicit. As mentioned by Huckin and Coady (1999), "incidental learning is not entirely 'incidental', as the learner must pay at least some attention to individual words" (p. 190). The results of the study by Swanborn and de Glopper (2002) on

the importance of purpose in incidental learning raise a similar question. Thus, it is reasonable to expect that the participants in the current study, who were in a relatively free viewing condition, would be less successful as compared to viewers in a more explicit learning condition.

Obviously, the participants' performance on experimental tests is different from the actual implicit language acquisition in the traditional sense of the word. At the very least, the findings of this study confirm that subtitled audio-visual input is a valuable instructional tool that can trigger incidental vocabulary learning by the mere minimal exposure to subtitled audio-visual input, that double subtitles have greater beneficial effects as compared to standard subtitles, at least for beginning learners and for the recognition of written FL forms, and that vocabulary learning can take place without causing a trade-off effect between image processing and subtitles processing even with the two-lined subtitles in two different languages.

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APPENDIX A

Audio recognition test answer sheet

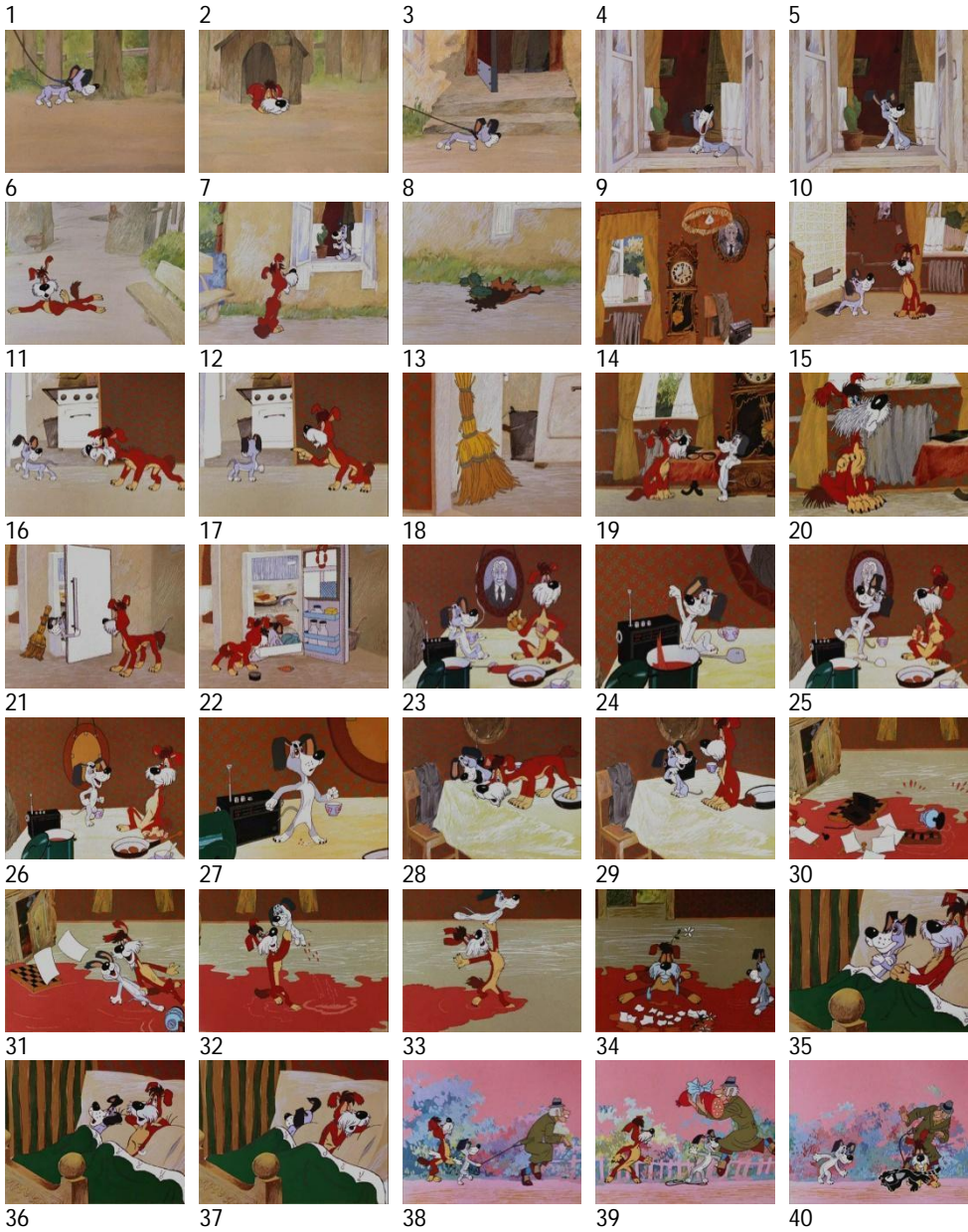| #	a	b	c	
1	Ik moet op het huis passen.	Dat heb je zelf net gehoord.	Dat is een heel handig ding, zie je.	
2	En wat wil je nog meer?	Hoe moet ik je dat nou uitleggen?	Heb je nog nooit een klok gezien?	
3	Ja, ik mag niet klagen!	Geen probleem!	Ik heb nog meer!	
4	Zal niemand me eruit schoppen?	Wat is dat in hemelsnaam?	Ben je nooit door zo'n ding geslagen?	
5	Wil je kaas?	Waar ren je heen?	Wat is er?	
6	Waarom kom je niet bij mij langs?	Heb je nog nooit een klok gezien?	Hoe moet ik je dat nou uitleggen?	
7	Hij is niet belangrijk!	Spring door het raam!	Ik heb nog meer!	
8	En als ik wil, kan ik chillen op het bed!	Alles in de koelkast is ook van mij!	Eigenlijk, is alles hier van mij!	
9	Waarom zit je thuis?	Waar is dat voor?	Maar waar slaapt opa?	
10	Ik kan koteletjes eten en kissel drinken wanneer ik wil.	Dit is geen kennel, het is een appartement.	Dat is een heel handig ding, zie je.	
11	Het is een appartement.	Opa komt 's avonds pas.	Ik moet op het huis passen.	
12	Ik zou het meteen opeten!	Meer kaas en meer koteletjes!	Het zou er niet lang in blijven bij mij.	
13	En jouw opa vindt dat goed?	Waar is dat voor?	Maar waar slaapt opa?	
14	Ja, ik mag niet klagen.	Dat is een heel handig ding.	Je kan gaan en staan waar je wilt.	
15	Wil je kaas?	Welke opa?	Of een kotelet?	
16	Ik sla hem met een bezem.	Dat heb je zelf net gehoord.	Dat is een heel handig ding, zie je.	
17	Of een kotelet?	Welke opa?	Wat is er?	

APPENDIX B

Written word recognition test answer sheet

#	Russian word/phrase	a		b		c	
1	chudak	uiteraard		luister		gekkerd	
2	dve komnati	twee kamers		die lopen		geen probleem	
3	nu i shto	nou en		dat daar		goed zo	
4	vannaja	een badkamer		een koelkast		een klok	
5	net	hij		nee		nou	
6	tebe harasho zhivetsa	de tafel is van mij		je leven is zo goed		spring door het raam	
7	sprashivaesh	gekkerd		zonde		uiteraard	
8	a eta shto	en wat is dit		of een kotelet		wil je kaas	
9	u tebja vse est	je hebt alles		ik heb nog meer		ik ren gewoon	
10	stol	een appartement		een tafel		een kennel	
11	eta pravilna	dat daar		goed zo		kom op	
12	zhalka	gekkerd		luister		zonde	
13	hvatit na pervii raz	ik moet op het huis passen		hij is niet bel-angrijk		nu is het genoeg voor de eerste keer	
14	haladilnik	een keuken		een tafel		een koelkast	
15	shto ti panimaesh v zhizni	en jouw opa vindt dat goed		weet je dan niks van het leven		wat is dat in hem-elsnaam	
16	kvartira	een appartement		een keuken		een badkamer	
17	davaj	kom op		dat daar		goed zo	
18	ja ne zhaluyus	ik mag niet kla-gen		ik ren gewoon		je leven is zo goed	
19	ti chevo	wil je kaas		wat is dit		wat is er	
20	slushai	zonde		uiteraard		luister	

APPENDIX C

Video frames for scene ordering test

| 1 | 2 | 3 | 4 | 5 |

| 6 | 7 | 8 | 9 | 10 |

| 11 | 12 | 13 | 14 | 15 |

| 16 | 17 | 18 | 19 | 20 |

| 21 | 22 | 23 | 24 | 25 |

| 26 | 27 | 28 | 29 | 30 |

| 31 | 32 | 33 | 34 | 35 |

| 36 | 37 | 38 | 39 | 40 |

41 42 43 44 45