

The potential benefits of subtitles for enhancing language acquisition and literacy in children

An integrative review of experimental research

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While a considerable body of experimental work has been conducted since the beginning of the 1980s to study whether subtitles enhance the acquisition of other languages in adults, research of this type investigating subtitles as a tool for enhancing children's language learning and literacy has received less attention. This study provides an integrative review of existing studies in this area and finds extensive evidence that subtitled AV content can indeed aid the acquisition of other languages in children and adolescents, and that it can moreover enhance the literacy skills of children learning to read in their L1 or the official language of the country in which they live and receive schooling. Recommendations for future research are also made, and it is highlighted that further research using eye tracking to measure children's gaze behaviour could shed new light on their attention to and processing of subtitled AV content.

Keywords: subtitles, language acquisition, literacy, cognitive processing, children

1. Introduction

Since the beginning of the 1980s, a considerable body of experimental work has tested whether viewing audiovisual (AV) content with subtitles aids the acquisition of other languages in adults. Much of the existing research on this question has focused on testing the use of intralingual subtitles¹ for intentional, or explicit learning of the target language in adults, particularly university students. The findings of the principal studies in this area provide ample evidence that viewing AV content in the L2² with intralingual subtitles significantly improves students' reading and listening comprehension and increases the recognition and retention of words, phrases and phonological information, compared to viewing the content without subtitles (see, for example: Price 1983; Vanderplank 1988; Markham 1989 and 1999; Garza 1991; Guillory 1998; Bird & Williams 2002; Winke, Gass & Sydorenko 2010; Montero, Peters & Desmet 2013). There is also substantial and growing evidence that interlingual subtitles³ aid intentional second language (L2) learning (see, for example: Markham & Peter 2003; Bianchi & Ciabattini 2008; Ghia 2011; Caimi 2011; Mora & Cerviño 2019) and incidental

¹ Subtitles which are in the same language as the spoken language on the soundtrack of the AV material. Also referred to in the literature as same language subtitles (SLS), bimodal subtitles, or captions. When they have been produced for the purpose of accessibility to the AV product, they are referred to either as captions or as SDH. SDH differ from intralingual subtitles produced specifically for the purpose of learning other languages or improving viewers' literacy skills, as they contain not only a segmented transcription of the spoken language, but also include paralinguistic information, such as short descriptions of sound effects or music.

² Second language. A second language (L2) is a language acquired after one's mother tongue, and can be used to refer to a third or fourth language, etc.

³ Subtitles that provide an interlingual translation of the source language of the AV content. Their usual function is to facilitate comprehension of the source language of the AV content for a target audience who understands the language used in the subtitles. In this study, interlingual subtitles refers to the standard interlingual subtitles modality (L2 audio, L1 subtitles).

language acquisition in adults who are not receiving formal instruction in the L2 and have little knowledge of the language (Pavakanun & d'Ydewalle 1992; D'Ydewalle & Pavakanun 1995).

As for the question of whether subtitles can also serve as a tool for enhancing children's language learning and for the development of reading skills, it appears that a substantial amount of such research has been produced over the past 30 years within a range of fields, namely: AVT, cognitive psychology, deaf studies, educational psychology, foreign and second language education research, psycholinguistics, communications research, and reading and literacy research. However, no comprehensive reviews of research on this subject, considering both interlingual and intralingual subtitles for children and examining the potential of subtitled AV content to both aid the acquisition of other languages and to enhance the development of children's reading skills in their first language (L1), seem to have been undertaken to date. Thus, this article aims to contribute to filling this gap by conducting an integrative review of the existing experimental research in this area to answer the following research questions:

1. In the existing experimental research in this area, have subtitles been shown to boost children's acquisition of other languages?
2. According to the experimental studies conducted so far, do subtitles enhance children's literacy skills in their L1 or in the official language of the country in which they live and receive schooling?⁴

2. Theoretical framework

2.1 Incidental language acquisition vs intentional language learning

Incidental language acquisition occurs without the acquirer being aware of it, and according to Krashen (1982, 10) is similar to the process by which children acquire their first language. Incidental language acquisition is unintentional, as it involves the "learning of vocabulary as the by-product of any activity not explicitly geared to vocabulary learning" (Hulstijn 2001, 271). As for intentional language learning, as Caimi (2006, 91) explains, learning is closely linked to memory, since

The term *learning* is often used to refer to processes involved in the initial acquisition or encoding of information, whereas the term *memory* refers to later storage and retrieval of information. However, this distinction may be merged in the *learning/memory process* considered by psychologists as a means of incorporating all facets of encoding, storage and retrieval.

Intentional, or explicit learning/memory involves the "conscious recollection of prior experiences, as assessed by traditional tests of recall or recognition" (Schacter 1992, 244), as learners deduce the meanings represented by the lexicon and the grammar of the language by "consciously recalling and comparing words or sentences that they have encountered" (Bird & Williams 2002, 511).

2.2 Automatic subtitle processing and dual coding theory

It may be that watching subtitled AV content enhances children's acquisition of other languages and literacy skills as subtitle reading seems to be an automatic process. Experimental studies using eye tracking have found subtitle processing in adults to be automatic to a certain extent (D'Ydewalle et al 1991; D'Ydewalle & De Bruycker 2007). Moreover, viewers have been found both to process L2 verbal auditory information while watching AV content with interlingual subtitles (De Bot et al 1986; Sohl 1989 cited in D'Ydewalle & Pavakanun 1997, 146–147) and to process and integrate effectively the multiple sources of information in subtitled AV content (Perego et al 2010). As for younger viewers, D'Ydewalle & Van Rensbergen (1989) and D'Ydewalle & De Bruycker (2007) found the gaze behaviour of children aged 9–12 years while watching subtitles to be similar to that of adults, leading them to

⁴ This study focuses exclusively on research on viewing subtitled AV content, not on learners creating their own subtitles.

conclude that reading subtitles is an automatic process for adults and older children. However, D'Ydewalle & Van Rensbergen (1989) observed that the gaze behaviour of children aged 7–8 years was more inconsistent. Thus, it seems likely that children do not process subtitles automatically until they have reached the stage at which they become independent readers. Nevertheless, this does not mean that it may not be beneficial for younger viewers to watch subtitled AV content. Moreover, since it is thought that sufficient practice can render some processing tasks automatic (Eysenck & Keane 2010, 193), it is probable that reading subtitles is less demanding and more of an automatic process for children who view them regularly.

Another theory which supports the idea that viewing subtitles aids language learning and literacy is dual coding theory, which posits that the processing of verbal information is strengthened when it is presented together with non-verbal visual referents (objects or events), as these “dually coded items [...] are linked by referential connections” (Danan 1992, 498). Moreover, Danan (2004, 72) explains that processing AV content with interlingual subtitles, a more complex form of input consisting of images and two verbal systems⁵, can be understood in line with Paivio's (1986) bilingual dual coding theory:

...these three independent systems are interconnected through triple associations between image, sound in one language, and text in another, which may lead to better processing and recall because of the additive effects of both image and translation. Once translation has linked the two verbal systems, viewers have established more paths for retrieval and may benefit from visual traces as well as from two distinct sets of verbal traces.

3. Methods and materials

The integrative literature review method was adopted for the purposes of this study as it “reviews, critiques, and synthesizes representative literature” to generate new knowledge on a topic (Torraco 2016, 404). The integrative review process involved the following stages: problem identification, literature search, data evaluation, data analysis, presentation, and conclusion (Cooper 1998; Whitemore & Knafl 2005). The problem identification stage entailed formulating the research questions set out in section 1. During the literature search stage, in February 2021 a systematic literature search was conducted in the academic databases JSTOR, PubMed, Scopus, PsychINFO and Google Scholar, using the following key terms: subtitles, language acquisition, language learning, literacy, learning to read, children, adolescents. The search strategy was adapted for each of the databases using the Boolean operators AND and OR, and the fields TITLE and ALL. An additional search strategy was to analyse the reference lists of retrieved publications.

The search generated 325 results, 128 of which were duplicates and 15 were unpublished master's dissertations, which left 182 publications. During the data evaluation stage, publications were excluded according to the following criteria: 81 were excluded because they addressed other aspects of research on subtitles, such as the process of subtitling rather than the reception of subtitled AV materials or the reception of subtitles which had been enhanced or adapted in different ways. Other excluded studies in this category included reviews of research on subtitles and language acquisition/literacy and corpus studies. 39 studies were excluded because they were conducted with adult participants, and nine were on other topics related to AV materials. Three publications were excluded as they had been written in languages that could not be read by the researcher, and two were not peer-reviewed academic publications. Ten studies were excluded as they focused on other aspects of language acquisition or literacy, and 18 examined other topics. The 20 remaining experimental studies conducted with children as participants were selected for the data analysis stage and are presented in Tables 1–3.

According to Whitemore & Knafl (2005, 550), during the data analysis stage of an integrative review “data from primary sources are ordered, coded, categorized, and summarized into a unified and integrated conclusion about the research problem”. The 20 selected studies were grouped into three categories of research:

⁵ Applications of dual coding theory to the processing of subtitled AV content tend to neglect to consider the processing of the non-verbal auditory input; i.e., the background music and sound effects.

1. Subtitles as a tool for the incidental acquisition and intentional learning of other languages in children (9 studies);
2. Intralingual subtitles and children's literacy skills (10 studies);
3. Interlingual subtitles and children's L1 literacy skills (1 study).

The publications were read in full and relevant information was extracted in accordance with the following codes: author name(s), year of publication, number of participants, whether the study was short-term or long-term, the L1, instruments and findings. For the studies in category 1 above, the codes main variable (incidental language acquisition or/and intentional language learning) and subtitle/soundtrack conditions were also included, and for category 2, information on reading level was also coded. The data were extracted in an iterative process and are summarised in the following section.

4. Data analysis and presentation

4.1 Subtitles as a tool for the incidental acquisition and intentional learning of other languages in children

A summary of the nine publications in this category is presented in Table 1, which shows that these studies were published between 1996 and 2020 and that most focused on incidental language acquisition, with only two having tested intentional language learning. The majority of the studies, particularly over the first ten years, were performed with participants whose L1 is Dutch, and only two of the studies seem to have been conducted with participants under the age of 11 years. While the research conducted in the earlier years of this period tested participants after short-term exposure to the subtitled AV materials, the more recent studies were conducted over a longer time period. Most of the studies have compared interlingual and intralingual subtitles, and the earlier research has also tested reversed subtitles⁶. Almost all of the studies test participants on aspects of vocabulary acquisition, some test for comprehension, while a few have included grammar tests and other instruments to test aspects of language acquisition such as syntax, morphology, and idiomatic expressions.

INSERT TABLE 1 ABOUT HERE

As can be observed in Table 1, almost all of these studies have shown that viewing subtitled AV content can enhance the acquisition of other languages in children. Table 1 shows that the first studies of this type appear to be those performed in the mid to late 1990s by researchers at the University of Leuven in Belgium or in the Netherlands, with Dutch-speaking children and adolescents. In the first study D'Ydewalle & Pavakanun (1996) found that the groups who watched the cartoon with interlingual subtitles performed much better in the vocabulary and comprehension tests than the other groups. In their next experiment, (D'Ydewalle & Pavakanun 1997) considerable language acquisition was observed across languages in the participants who watched the clip with interlingual subtitles, with stronger improvements observed in vocabulary acquisition and more limited gains in grammar acquisition. Moreover, D'Ydewalle & Van De Poel (1999) concluded that their study "shows real but limited foreign-language acquisition by children watching a subtitled movie" (1999, 242). In contrast to the studies reviewed above, which tested different combinations of standard interlingual, intralingual and reversed subtitles, Koolstra & Beentjes (1999) tested only three, more realistic conditions: a clip of a documentary in English with Dutch subtitles, the same clip without subtitles, and a control clip in Dutch. The researchers found that the children who viewed the interlingual

⁶ In AV content with reversed subtitles, the spoken language on the soundtrack is in the viewers' L1 and the subtitles are in an L2.

subtitles attained significantly higher scores in vocabulary and auditory word recognition tests than the other groups.

One limitation of the studies mentioned so far is that they only measure short-term language acquisition, as mentioned above; i.e., the participants in these experiments watched a short clip and completed performance tests immediately afterwards. Given that the findings of these studies provide substantial evidence that children and adolescents acquire L2 vocabulary after watching a 10–15 minute clip with interlingual subtitles, it seems reasonable to assume that regular exposure to AV content with interlingual subtitles would have a cumulative beneficial effect in terms of language acquisition. With the aim of shedding light on this question, Kuppens (2010) investigated whether long-term exposure to AV content in English, including subtitled television, increases incidental language acquisition in Flemish children. The findings revealed that the children who reported watching programmes in English with Dutch subtitles frequently obtained significantly higher scores on the tests. As shown in Table 1, Bravo (2008) also examined children’s language acquisition in the longer term, in a study which employed a larger number of objective performance measures than Kuppens’ study (2010), which included self-reported data. In Bravo’s study (2008), 77 Portuguese schoolchildren watched an episode of a television series in English once a week for 10 weeks. One half of the group watched the series with intralingual subtitles and the other watched it with subtitles in Portuguese. During the 10 weeks and three months after the end of the study, the children were tested on content comprehension, English vocabulary retention and understanding and retention of idiomatic expressions. It was observed that, from week four onwards, the children who watched the series with intralingual subtitles obtained lower performance scores than those viewing the interlingual subtitles, leading the author to infer that they had more difficulty in understanding the content with the intralingual subtitles in general.

The two most recent studies conducted over a longer term (Vulchanova et al 2015; Pujadas & Muñoz 2020) found that interlingual subtitles aid comprehension. However, while the studies examined so far provide substantial evidence that interlingual subtitles enhance comprehension and vocabulary acquisition, the findings *vis-à-vis* the acquisition of L2 grammatical rules have revealed much more limited effects thus far. No significant effects in terms of grammar acquisition were observed in D’Ydewalle & Van De Poel (1999) and Van Lommel, Laenen & d’Ydewalle (2006) and, although D’Ydewalle & Pavakanun (1997) reported modest gains in terms of grammar acquisition, their participants were older adolescents.

4.2 Subtitles as a tool for enhancing children’s literacy skills

A summary of the ten studies in this category is presented in Table 2, which shows that these studies were published over a period of almost 30 years, between 1986 and 2014. A large majority of the studies tested AV materials and subtitles in English, and most were conducted over a longer time period. Children of a range of ages have taken part in this body of research, and many of the studies were performed with children who are below-average readers, minority language speakers, or from disadvantaged backgrounds. Almost all of the studies employ vocabulary tests, measuring aspects such as word recognition and retention, and several test literal and inferential comprehension skills. A few have also included reading and writing tests, measures of engagement and of recall of conceptual information.

INSERT TABLE 2 ABOUT HERE

As is shown in Table 2, all but one of these studies have found that intralingual subtitles improve children’s literacy skills, in particular children who are economically disadvantaged, non-readers or below-average readers, or minority language speakers. Several of these studies moreover observed that the positive effects of intralingual subtitles are cumulative. Viewing television programmes with intralingual subtitles has been found to improve comprehension skills and increase incidental

vocabulary recognition and acquisition in children who are below-average readers, both within a formal teaching environment (Koskinen et al 1986; Goldman & Goldman; 1988) and as a result of regular viewings in the home (Koskinen et al 1997 cited in Linebarger, Piotrowski & Greenwood 2010, 151). Neuman & Koskinen (1992) conducted their study with bilingual children who were minority language speakers, who moreover had been “identified by a community needs assessment as being an ‘at risk’ target population” (1992, 96) and in terms of their educational development as being 2–3 years behind the standard for their grade at school. The researchers reported that children who viewed educational programmes with intralingual subtitles for 12 weeks outscored those who had viewed the programmes without subtitles or had read printed adaptations of the text in the subtitles in all of the tests, which measured different degrees and kinds of scientific word knowledge and recall of conceptual scientific information.

In more recent experimental research which tested a more comprehensive range of reading skills in economically disadvantaged children aged 7–9 years, almost half of whom were minority language speakers, and a large majority of whom were one to two years below the standard for reading at their grade, Linebarger, Piotrowski & Greenwood (2010) observed that those who had viewed videos with intralingual subtitles recognised and understood the meaning of more words from the videos and more high frequency words in general than those who watched the videos without subtitles. The group who viewed the subtitles also obtained significantly higher scores in the inference comprehension test, and were better able to decode and blend phonemes. Moreover, Davey & Parkhill (2012) observed significant gains in comprehension and vocabulary scores for students who had watched movies with intralingual subtitles over a six-week period as part of their AVAILLL literacy programme.⁷ Davey & Parkhill concluded that combining reading subtitles with targeted literacy activities “has the potential to lift achievement in traditional reading and writing tasks”, (61) especially for students with low achievement in literacy.

Kothari et al (2002) proposed that adding intralingual subtitles to popular film song videos broadcast on television would provide millions of people in India with a motivating, entertaining way for them to practise their reading skills. Their experiment was conducted with disadvantaged school children aged 8–10 years old over three months. The researchers reported that children who viewed film songs in Hindi with intralingual subtitles showed more improved decoding skills when reading words from the subtitles than those who watched the videos without subtitles and the control group. In a subsequent, much larger-scale study (Kothari & Bandyopadhyay 2014), 7,409 adults and children who were either non-readers or who read with considerable difficulty at the beginning of the study were selected at random from five Hindi states. Kothari and colleagues convinced the public broadcaster Doordarshan to add intralingual subtitles to the songs in its popular weekly music series *Rangoli*, and the aim of this research was to determine whether viewing the subtitled programme regularly over a period of almost five years would improve viewers’ literacy skills. Thus, participants completed literacy tests which included decoding and writing exercises and questions about their reading abilities and habits at the beginning of the research, one year later, and almost five years after the study began. The researchers reported that the subtitles significantly improved the literacy skills of regular *Rangoli* viewers, and that children showed even greater improvement than adults.

Table 2 shows that there is also evidence indicating that intralingual subtitles improve literacy skills in average readers and groups of children with mixed reading abilities. While the results of the study by Minucci & Cárnio (2010) were inconclusive, Linebarger (2001) reported that average readers aged 7–9 who viewed AV clips with intralingual subtitles obtained higher scores in word recognition and retention than those who watched the clips without subtitles. Moreover, the groups who viewed the subtitles were able to transfer the knowledge gained to an exercise with a text unrelated to the clip, and even remembered words 15 days later. The author concluded that the subtitles appeared to focus the children’s attention on the main elements of the stories contained in the clips. Parkhill, Johnson & Bates (2011) also found that, when used within a literacy programme in school, films with intralingual subtitles can increase vocabulary acquisition, and improve literal and inferential comprehension skills, reading fluency, and engagement with reading in children of all abilities. These positive effects on literacy were found to be cumulative over a period of six months.

⁷ AVAILLL stands for Audio Visual Achievement in Literacy, Language and Learning, and is a literacy programme which uses movies in English with intralingual subtitles as materials for reading practice, and to engage students in reading (2012, 61).

INSERT TABLE 3 ABOUT HERE

While several studies have provided evidence that intralingual subtitles can improve children's reading skills in their L1 or in the official language of the country in which they live and receive schooling, only one study was found which examined whether interlingual subtitles can also similarly enhance children's literacy skills, and is summarised in Table 3. Koolstra, van der Voort & van der Kamp (1997) found that interlingual subtitles can boost children's decoding skills. They conducted a three-year panel study with 1,050 Dutch children aged 8–10 years, who reported the frequency with which they watched content in other languages on television with interlingual subtitles and completed a decoding skills test every year. The researchers found a statistically significant longitudinal path from watching television programmes with interlingual subtitles to decoding skills, and concluded that reading interlingual subtitles aids the development of children's decoding skills, since it provides them with opportunities to practise word recognition.

5. Discussion

In the Introduction two research questions were posed, which shall now be discussed in light of the findings of this study:

1. *In the existing experimental research in this area, have subtitles been shown to boost children's acquisition of other languages?*

The research analysed in section 4.1 convincingly shows that watching subtitled films and television programmes can enhance the acquisition of other languages in children in middle childhood and adolescents. The findings are strengthened by the large sample sizes included and the fact that several studies have been conducted over a period of 24 years, with all but one reporting positive results. The strongest evidence that has emerged is that watching subtitled AV content can improve children's comprehension and acquisition of vocabulary in other languages. However, as mentioned in section 4.1, the results regarding the acquisition of L2 grammatical rules are much less conclusive. As can be observed in Table 1, only a few of the existing studies tested grammar acquisition, and no significant effects in terms of grammar acquisition were found in D'Ydewalle & Van De Poel (1999) and Van Lommel, Laenen & d'Ydewalle (2006). D'Ydewalle & Pavakanun (1997) observed modest gains in terms of grammar acquisition, but it should be noted that the participants in this study were older adolescents.

To compare these results with those of the existing research conducted with adults, while some studies have also observed no significant effects for grammar acquisition (Pavakanun & D'Ydewalle 1992; D'Ydewalle & Pavakanun 1995), Ghia (2011) reported significant improvements in several aspects of syntactic competence. Moreover, it should be noted that while the participants in the former two studies completed the grammar tests immediately after watching a short subtitled clip, Ghia's research (2011) was conducted over a longer time span, with participants viewing 15 subtitled films over three months. Thus, while it could be the case that, as Van Lommel, Laenen & d'Ydewalle (2006) suggest, grammatical rules are too complex for children to acquire incidentally by viewing AV content, given the compelling evidence for vocabulary acquisition from exposure to subtitled AV content, further longitudinal research may reveal that regular viewings of films and television programmes with interlingual subtitles can in fact aid children's acquisition of the grammatical rules of another language.

Moreover, the findings presented in section 4.1 indicate that standard interlingual subtitles are the most beneficial form of subtitles for younger viewers, while intralingual L2 subtitles or reversed subtitles may be useful for older or more advanced learners. Almost all of the studies reported positive

results for interlingual subtitles, while Bravo (2008) reported that the young adolescents in her research experienced greater difficulty in understanding the content with the intralingual L2 subtitles and Vulchanova et al (2015) concluded that intralingual subtitles can aid L2 comprehension in very advanced learners.

As for reversed subtitles, while these have been found to be effective for vocabulary acquisition in adults (Danan 1992; Pavakanun & d'Ydewalle 1992; D'Ydewalle & Pavakanun 1995) and in the research conducted with older adolescents discussed above (D'Ydewalle & Pavakanun 1996; 1997), the findings of D'Ydewalle & Van De Poel (1999) indicate that AV content with standard interlingual subtitles is more beneficial for younger children. For children of primary school age, reading subtitles in a language that they do not know well is likely to be a difficult task, since they are still mastering their reading skills in their L1, and the majority of younger children only learn other languages at school at an elementary level. Moreover, it is debatable whether many children would feel motivated to read subtitles in a language which they do not know well while engaged in viewing a programme or film in their own language. Furthermore, as Ghia points out, watching films and television programmes with the original soundtrack and standard interlingual subtitles provides "a less artificial learning situation" (2011, 99) and gives children "the opportunity to access L2 spoken language and (semi) authentic input" (ibid). While reversed subtitles are unlikely to be viewed outside of formal language learning environments, nowadays audiences of all ages have at their disposal a wealth of films, television series and videos in other languages which can be viewed with interlingual subtitles on a variety of platforms and devices at any time. Thus, it constitutes a plentiful, easily accessible resource for learning other languages and for exposure to other cultures.

2. *According to the experimental studies conducted so far, do subtitles enhance children's literacy skills in their L1 or in the official language of the country in which they live and receive schooling?*

The studies presented in Table 2 provide considerable evidence that watching AV content with intralingual subtitles can improve the literacy skills of children learning to read in their L1 or the official language of the country where they live and attend school. As was the case for the research on the acquisition of other languages, the findings are strengthened by the large sample sizes and the fact that several studies have been conducted over a period of almost 30 years, with all but one reporting positive results. The strongest findings show that viewing L1 intralingual subtitles can improve children's recognition, comprehension, and retention of vocabulary, and their decoding skills. Moreover, L1 intralingual subtitles have been found to improve children's literal and inference comprehension skills, their reading fluency, and their recall of conceptual information from the subtitled AV content. Furthermore, in several studies children have reported that they find this reading method to be highly motivating (Koskinen, Wilson & Jensema 1985; Goldman & Goldman 1988; Koskinen et al 1991 cited in Koskinen et al 1993; Kothari et al 2002). It seems that when children who are learning to read are provided with opportunities to watch AV content with intralingual subtitles, they engage with the text presented on the screen, as they perceive watching television as an easy and entertaining activity. This, in turn, may well spark children's interest in other reading opportunities, and the boost to their literacy skills provided by watching AV content with intralingual subtitles can then support their processing of other text types.

However, it is less clear whether interlingual subtitles can similarly enhance children's literacy skills. Only one study was found which examined this possibility: Koolstra, van der Voort & van der Kamp (1997), summarised in Table 3. The researchers concluded that reading interlingual subtitles aids the development of children's decoding skills, as it gives them opportunities to practise word recognition. However, AV content with interlingual subtitles does not present the same verbal information in two modes (i.e., auditory and visual) in the way that intralingual subtitles do, which give children the opportunity to visualise the words they hear and may facilitate their comprehension of AV content with intralingual subtitles by increasing "the number of cognitive paths that can be followed to retrieve the information" (Linebarger, Piotrowski & Greenwood 2010, 149). In contrast, children are obliged to read interlingual subtitles to understand AV content in a language that they do not understand well. On the other hand, children may process subtitles automatically to some extent, as discussed in section 2.2. Furthermore, given the considerable evidence of the benefits of intralingual subtitles, it seems reasonable to argue that AV content with interlingual subtitles also provides children with engaging, entertaining opportunities to read text in their L1 and to make

connections between the text and the images, any words they may understand in the source language, and the non-verbal auditory information, all of which may reinforce their understanding of the vocabulary in the subtitles. However, while the results of Koolstra, van der Voort & van der Kamp (1997) are promising, particularly given the large sample size and that it was a longitudinal study, further experimental research needs to be undertaken to support this claim.

6. Conclusion

This study has found considerable evidence from existing research that subtitled AV content can indeed aid the acquisition of other languages in children and adolescents, and that it can moreover enhance the literacy skills of children learning to read in their L1 or the official language of the country in which they live and receive schooling. It has also identified areas where there is a need for future research, such as testing L2 grammar acquisition. Moreover, since little experimental research on the acquisition of other languages has been conducted with participants under the age of 11 years, as is observed in section 4.1, studies in this area with younger children as participants are needed. In addition, since as can be observed in Table 1, the majority of these studies were performed with participants whose L1 is Dutch, further work is required in other countries, e.g., in dubbing countries and in countries where children do not watch much subtitled AV content in other languages. Furthermore, most of the research presented in Table 1 has focused on incidental language acquisition rather than intentional language learning, since most of the children in these studies either had no knowledge or only elementary knowledge of the L2. Thus, further studies on using interlingual subtitles for L2 learning as part of a programme of study are warranted.

One limitation of this study is that the body of literature reviewed is relatively small. However, the contributions of this study have been to provide a more comprehensive understanding of the advances made in this area of research thus far, and to confirm that there is substantial evidence that subtitles boost children's acquisition of other languages and literacy skills. Overall, the findings of this study support the idea of providing children with opportunities to watch subtitled AV content in other languages both at home and in educational settings. If broadcasters offered more subtitled foreign language films and television programmes for children, young viewers could benefit from exposure to other languages and cultures at home. Moreover, turning on the intralingual subtitles on our television screens could, in addition to their essential function of providing access to viewers who are d/Deaf or hard of hearing, be used to support children's literacy skills, as highlighted by the Turning on the Subtitles (TOTS) campaign⁸, which is calling for broadcasters and streamers to turn on the subtitles by default for child viewers.

In terms of recommendations for further research, future studies in this area could combine performance testing with eye tracking, since measuring children's eye movements while viewing subtitled AV content can provide real-time, objective data on their attention to and cognitive processing of such content, and is an under-researched area. The past decade has seen the rapid development of research using eye tracking to investigate adult viewers' reception and processing of subtitled AV content, with such studies focusing on a wide and growing range of subtitle issues.⁹ In contrast, there is a general lack of such research with children as participants. A few studies have examined children's eye movements while watching subtitles for the deaf and hard of hearing (SDH) (Jensema 2003; Cambra, Leal & Silvestre 2013; Cambra et al 2014).¹⁰ There is a similar dearth of research that has used eye tracking to test children's attention to interlingual subtitles. It appears that only a handful of such studies have been performed to date, and have provided promising insights into children's subtitle reading behaviour compared to that of adults (d'Ydewalle & Van Rensbergen 1989; d'Ydewalle & De Bruycker 2007; Muñoz 2017), children's processing of subtitles presented at

⁸ <https://turnonthesubtitles.org/>

⁹ It is beyond the scope of this article to list them here, but a useful overview can be found in Szarkowska & Gerber-Morón (2019).

¹⁰ Several other experimental studies have been conducted in recent years on children's reception, and particularly comprehension, of SDH with a range of enhancements (Zárate 2014; Zárate & Eliahoo 2014; Tamayo 2015; Tamayo & Chaume 2017). The recent emergence of this limited but significant body of studies indicates that there is increasing academic awareness of the need to better understand children's reception of SDH, although much work remains to be done in this area.

different speeds (Koolstra, van der Voort & d'Ydewalle 1999) and children's reception of integrated subtitles (Black 2020). There is a need for further research which includes a comprehensive range of eye tracking metrics and combines eye tracking with consecutive performance tests to assess the effectiveness of children's processing of subtitled AV content/different aspects of language acquisition. Moreover, these can be triangulated with socio-cultural and attitudinal data, to provide rigorous, comprehensive accounts of children's reception of subtitled AV content. Future experimental studies could also incorporate physiological measures such as electroencephalography (EEG) and galvanic skin response (GSR) given these methods have been shown to further empirical investigations into AVT reception.

Furthermore, there is need for further investigations into the issues involved in subtitles specifically for a child audience, such as the most appropriate subtitle speeds for child viewers, including children with varying sensory and cognitive abilities. Other potentially fruitful areas for future research using eye tracking might include investigating children's attention to/processing of subtitled video games and other forms of dynamic text on different platforms and devices. Moreover, just as translation process researchers are beginning to consider "situated cognition" (Risku 2010, 98; Angelone, Ehrensberger-Dow & Massey 2016, 50-51) – that is, studying translators' cognitive processes and behaviour in their natural environment – AVT reception researchers might usefully investigate children's reception of translated AV content in the natural environment of their own homes, which would increase the ecological validity of such research.

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