



Dubbing vs. Subtitling: Complexity Matters

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Dubbing vs. subtitling

Complexity matters

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Despite the claims regarding the potential disruptiveness of subtitling for audiovisual processing, existing empirical evidence supports the idea that subtitle processing is semi-automatic and cognitively effective, and that, in moderately complex viewing scenarios, dubbing does not necessarily help viewers. In this paper we appraise whether the complexity of the translated audiovisual material matters for the cognitive and evaluative reception of subtitled vs. dubbed audiovisual material. To this aim, we present the results of two studies on the viewers' reception of film translation (dubbing vs. subtitling), in which we investigate the cognitive and evaluative consequences of audiovisual complexity. In Study 1, the results show that a moderately complex film is processed effectively and is enjoyed irrespective of the translation method. In Study 2, the subtitling (vs. dubbing) of a more complex film leads to more effortful processing and lower cognitive performance, but not to a lessened appreciation. These results expose the boundaries of subtitle processing, which are reached only when the audiovisual material to be processed is complex, and they encourage scholars and practitioners to reconsider old standards as well as to invest more effort in crafting diverse types of audiovisual translations tailored both to the degree of complexity of the source product and to the individual differences of the target viewers.

Keywords: film complexity, audiovisual translation processing, comprehension, memory, evaluation, subtitling, dubbing

1. Introduction

This paper presents two empirical studies analysing the cognitive (i.e., regarding comprehension and memory) and evaluative reception of films presented via two audiovisual translation (AVT) methods, namely, dubbing and subtitling. The central aim of these studies is to understand whether film complexity affects film

reception when films are presented through different AVT methods. More specifically, we want to understand whether processing, comprehension and memory for film information, as well as film appreciation, differ across AVT methods in films that vary significantly in their level of complexity.

As we will explain in the next section, addressing the issue of film complexity in relation to AVT reception in translation and related fields is important for both theoretical and practical reasons (Drew and Grimes 1987; Lang 1995, 2000; Lang et al. 2013; Perego, Del Missier and Bottiroli 2015). In this paper, we will first provide the theoretical and empirical background of our study and introduce the core issue of film complexity in relation to AVT reception; then we will describe the hypotheses tested in two empirical studies. Next, we will present the first study, carried out on a moderately complex film, and the second study, employing a more complex film. Finally, we will discuss the experimental results and implications, and we will acknowledge the limitations of the research in relation to future directions of inquiry.

1.1 Background and study motivation

In non-English speaking countries, dubbing and subtitling are the most popular methods for translating imported audiovisual products and making them available to the local audience. Decisions and attitudes regarding the employment of these techniques vary considerably. In some countries, the dominant method is dubbing, in other countries subtitling prevails. There are also countries where dubbing and subtitling co-exist (e.g., Switzerland) or which use less common translation methods (e.g., voice-over or narration), while in Anglo-Saxon countries broadcasting is mainly produced, imported and conducted in English with little need to be translated for distribution (Chaume 2013; Chiaro 2009; Kilborn 1993). In these various contexts the choice of the translation method was originally dictated by complex political, geographical, economic, and cultural reasons, but over the years viewers became accustomed to the method made available and grew resistant to change (Danan 1991; MCG 2007, 2011).

Presenting the same film via different AVT methods may require the users to deploy different processing resources depending on whether translated dialogues are delivered isosemiotically (i.e., speech rendered by speech, as in dubbing and interpretation) or diasemiotically (i.e., speech rendered by writing, as in subtitling) (Gottlieb 2004, 86). Determining whether one method is better, easier, or more enjoyable than the other requires a careful analysis of a wide array of aspects, taking into consideration the empirical evidence acquired in behavioural studies (Koolstra, Peeters and Spinhof 2002). Unfortunately, merits and limitations of different AVT methods, in particular dubbing vs. subtitling, have been identified

mainly on a speculative basis (e.g., Cary 1960; Reid 1978), until recent empirical literature started to offer evidence that is contributing to our understanding of this complex issue (e.g., Hinkin, Harris and Miranda 2014; Kruger, Hefer and Matthew 2014; Orrego-Carmona 2015; Perego, Del Missier and Bottiroli 2015; Winke, Gass and Sydorenko 2013; Wissmath and Weibel 2009; Wissmath, Weibel and Groner 2009, 2012).

The claim that processing subtitled materials requires more attention and greater cognitive effort than processing dubbed materials has been made by many (e.g., Díaz Cintas 2001; Gottlieb 1994; Koolstra et al. 2002; Marleau 1982), but no convincing empirical evidence has been offered to support such claims. On the contrary, existing empirical studies have shown that, in standard viewing conditions, watching subtitled audiovisual material does not require much effort and is very effective. In particular, d'Ydewalle and his team demonstrated that, when simple and moderately redundant information is presented on TV at standard rates, reading film subtitles does not pose high processing demands on the film viewer, and that subtitle reading is semi-automatic (d'Ydewalle and De Bruycker 2007; d'Ydewalle, Van Rensbergen and Pollet 1987). This appears to be true irrespective of age (in adult populations), sex (d'Ydewalle and Van Rensbergen 1989), and familiarity with the translation method (d'Ydewalle and Gielen 1992), even if a general decline in performance has recently been observed in older adults (Perego, Del Missier and Bottiroli 2015). Moreover, due to the written presentation, subtitling seems to be advantageous when more lexicon-based aspects of text processing are at stake (d'Ydewalle and De Bruycker 2007; Hinkin, Harris and Miranda 2014; Perego et al. 2010; Perego, Del Missier and Bottiroli 2015).¹ This explains why film subtitling provides substantial benefits in the context of literacy development, language learning and language acquisition (Ghia 2012; Kothari and Bandyopadhyay 2014; Van de Poel and d'Ydewalle 2001; Vanderplank 2010; Van Lommel, Laenen and d'Ydewalle 2006). Furthermore, although empirical studies specifically comparing the evaluative consequences of dubbing and subtitling are still scarce, the existing ones show that the potential differences in the evaluative effects of dubbing and subtitling have probably been overstated, given that dubbing does not seem to offer advantages over subtitling in terms of appreciation (Perego, Del Missier and Bottiroli 2015; Wissmath, Weibel and Groner 2009; Wissmath and Weibel 2012).

However, existing empirical research suffers from one main limitation: the role of the complexity of the AVT material has been neglected. Although opera-

1. In these studies, specific words or expressions included in the subtitles were always remembered well, and better than the same words and expressions contained in the dubbed material when the two AVT methods were compared in the studies.

tionalizing AV complexity is very challenging, this issue has significant theoretical and practical relevance and it casts serious doubts on the generality of the findings of existing studies. Indeed, it is known that structural features of TV messages may have a strong impact on users: processing strategies applied to audiovisual information and their outcomes may depend on the type of material (Lang et al. 2000), its redundancy and its relative importance (Grimes 1991; Lang 1995, 2000). Thus, it is reasonable to assume that AVT-related processing can be affected by the complexity of the presented material. In particular, the processing of very complex AVT material may be hindered or slowed down by the need of interleaving subtitle reading and visual scene encoding, and of integrating complex information coming from three sources (including the soundtrack) during the comprehension process. This may affect the cognitive processing and reception of subtitles, as well as visual processing, subjective effort, and overall enjoyment. Conversely, when AVT material is simpler, the encoding and integration processes can be relatively effortless and performed effectively.

Empirical studies on AVT processing all seem to have used moderately complex material in order to represent the typical properties of ordinary films. Thus, the very nature of the materials used may have prevented these studies from offering a fully comprehensive picture of AVT reception, at least in populations that are not accustomed subtitle users. In particular, as Perego, Del Missier and Bottiroli (2015, 16) noted, “the boundaries of the cognitive effectiveness of subtitle processing may emerge only when redundancy is very low, the material to be processed is very complex and potentially interfering, and the rate of delivery is faster than normal.” Thus, to deal with the important issue of AVT reception in relation to its complexity, we carried out two studies, described in the next section. The main aim of the studies was to answer the following question: Do the cognitive and evaluative consequences of different AVT methods vary in relation to the complexity of the material that has been translated and presented?

1.2 Plan of the studies and hypotheses

In Study 1, we employed a moderately complex film, with the aim of replicating our previous results on the effectiveness and positive reception of subtitle processing, thus addressing the replication issue raised in the fields of behavioural research (Klein et al. 2014; Pashler and Wagenmakers 2012). In Study 2, we used a more complex film, in order to expose the limits of subtitle processing and to examine AVT reception under these boundary conditions, thus fulfilling our main goal of overcoming the limitations of previous research.

In Study 1 we expected to replicate our previous findings obtained on a moderately complex film (Perego, Del Missier and Bottiroli 2015). In that study, we

observed no disadvantages in memory and comprehension measures for subtitling (vs. dubbing) or in evaluative measures (e.g., appreciation), but we did observe advantages for more lexicon-based aspects of performance (e.g., dialogue recognition, see *Method* section of the present paper for more details). In Study 2, we advanced a *subtitling complexity hypothesis*, implying that subtitling (vs. dubbing) highly complex AV materials can result in a less effective cognitive reception and possibly in a less pleasant experience in our Italian viewers, who are not very accustomed to subtitling.

Considering the absence of a comprehensive and operational theory of film complexity, we adopted an interdisciplinary approach to complexity measurement – one that can be expanded and refined in future studies – and relied on previous theoretical and empirical work in the field. Thus, in our studies, we operationalized this construct by considering three major dimensions of complexity (structural-informative, linguistic, and narrative), capitalizing on research and literatures on media communication (Lang et al. 1993, 2000), film language (Pavesi 2005), language complexity (Li 2000; Szmrecsányi 2004), and film narrative (Barsam 2007; Monaco 2009; Murphy 2007). Table 1 presents the complexity indices for the films employed in Study 1 and in Study 2.

More specifically, we measured *structural-informative complexity* through the number of camera changes (cuts and edits) per minute, obtaining a measure of pacing (based on Lang's works), and counting the overall number of video cuts as indicators of new information introduced.² Another index of structural-informative complexity was the overall number of subtitles included in the target excerpt, with attention to one- and two-line subtitles since one-line subtitles are easier for the viewer to follow than two-lines, provided they do not contain greatly condensed or implied information (Lomheim 1999, 192). *Linguistic complexity* was assessed by resorting to established indices, including total word number in the target subtitles and in the dubbed version, average sentence length in the target subtitles and in the dubbed version (Li 2000; Szmrecsányi 2004), and the standardized type/token ratio as a crude measure of lexical density and variation. To calculate these measures we used a computerized text analysis software (Word-

2. *Cuts* change from one camera shot to a different scene and they introduce new information following a camera change; *edits* change from one camera shot to another within the same visual scene and they introduce less new information than cuts (Lang et al. 2000, 100; Lang et al. 2013, 132). *Pacing* is obtained by dividing the overall number of cuts and edits by the film length, and it can result into four levels: slow (0 to 7 per minute), medium (8 to 15), fast (16 to 23), and very fast (> 24) (Lang et al. 1999; Lang 2000). Pacing is typically used in cinema to achieve dramatic emphasis. The overall number of cuts “serves as an indicator of resource required locally (immediately following the camera change) or globally by summing the information introduced at each camera change over the course of a message” (Lang et al. 2013, 132–133).

smith Tools 6; see Scott 2009). By *narrative complexity* we understand the more or less linear way a story is presented to a viewer (Barsam 2007, 54); this was measured by counting the number of locations where the story takes place, the number of primary vs. secondary characters,³ and the number of chronological alterations, mainly consisting of flashbacks (fsoesch 2013). In fact, along with the intricacy of the plotline, these are the main factors that can affect the viewer's engagement in decoding and following the spine of a film's story.

2. Study 1

2.1 Method

2.1.1 Participants

The original sample of Study 1 consisted of 62 undergraduates from the University of Trieste (74% female, mean age = 20.36 SD = 5.04) who took part in the experiment and received course credits for participation. Students came from the Translation and Interpreting Faculty and from the Psychology Faculty. All participants were Italian native speakers or have spoken Italian for at least ten years. Two participants who had already watched the film were removed from the analysis. One further participant was removed from the analysis due to knowledge of the original language of the film. In the final sample (n = 59), 83% of participants stated that they watch dubbed films from *fairly often* to *always*, whereas only 37% reported the same for subtitled films.

2.1.2 Design

A moderately complex video excerpt was presented to participants either dubbed into Italian or in an unknown language (Lebanese Arabic) with Italian subtitles, following a two-group between-subject design. Participants were randomly assigned to the two experimental conditions (Sub: n = 26, Dub: n = 33). Subtitle-reading checks were administered after the viewing session to participants exposed to the subtitled excerpt (see *Materials* section). The main dependent variables were measures of cognitive performance regarding comprehension and memory, as well as evaluative measures. Cognitive performance was assessed through measures of general comprehension, dialogue recognition, face-name association, and visual scene recognition, thus encompassing both visual and verbal aspects of performance. Evaluative measures included self-reported effort during film vision and film appreciation, the latter including items on future

3. These indices, along with cuts, might be also related to visual density.

Table 1. Complexity indices for the two film excerpts employed in the studies

	Caramel (Study 1)	Sherlock (Study 2)
Length of the excerpt	25''	26''
Structural-informative complexity		
Pace	11 (medium)	18 (fast)
New info introduced (# cuts)	21 (0.84)	63 (2.42)
Total number of subtitles	198 (7.92)	402 (15.46)
One-liners	50 (2.00)	141 (5.42)
Linguistic complexity		
Total word count Sub/Dub	1285/2148 (51.4/85.92)	2815/2447 (108.26/94.11)
Types (distinct words) Sub/Dub	547/726 (21.88/29.04)	975/891 (37.5/34.27)
Standardized type/token ratio Sub/Dub (%)	46.50/42.75	47/47.90
Words per minute Sub/Dub	50.8/84.9	107.4/93.4
Total sentence count Sub/Dub	374/484	449/441
Average sentence length Sub/Dub	3.4/4.5	6.3/5.5
Narrative complexity		
Number of locations	11 (0.44)	19 (0.73)
Total number of characters	16 (0.64)	21 (0.81)
Primary characters	6 (0.24)	8 (0.30)
Number of flashbacks	0	4 (0.16)

Note. Figures in parentheses, following raw complexity indices, indicate complexity values per minute (when applicable). Average sentence length was obtained by calculating the average number of words per sentence (Li 2000, 236). Words per minute was obtained dividing the total word number by the length of the film excerpt.

intentions (e.g., willingness to watch a sequel of the film or a film by the same director).

2.1.3 Materials

Video

A 26-minute video excerpt taken from the Lebanese comedy/light drama *Sukkar banat* (Eng. *Caramel*) (2007, directed by Nadine Labaki) was shown to two groups of participants either in its original version in Lebanese Arabic with Italian subtitles, or dubbed into Italian.⁴ The video was narratively conventional (no alter-

4. The verbal strand of both subtitled videos was chosen to be unknown to all participants – as in Perego et al. (2010) and Perego, Del Missier and Bottiroli (2015) – to make sure that the comprehension of the subtitled version of each video depended entirely on the subtitles (vs. spoken dialogues). Although English soundtracks with local-language subtitles are more common, we chose to avoid this situation in order to control for a potentially serious confounding variable (i.e., knowledge of the English language). However, although the investigation of the interac-

ations in chronology, linear plot; Barsam 2007; Monaco 2009; Murphy 2007) and medium-paced (as operationalized by Lang et al. 1999 and Lang 2000; cf. note 2). Overall, as shown in Table 1, this film can be considered moderately complex, and it reflects a common viewing situation. The film information in terms of gist and visuals was not too easy or too difficult to understand or to remember (as shown in the descriptive statistics in Perego, Del Missier and Bottiroli 2015, Tables 1 and 2). In order to ensure the ecological validity of the materials, in this study we used the commercialized DVD subtitles and dubbed version made by professionals in line with Italian standards.

Assessment materials

Tests and questionnaires for the cognitive and evaluative assessment of AVT reception were prepared following on Perego et al. (2010), Perego, Del Missier and Bottiroli (2015), and Wissmath, Weibel and Groner (2009). In the following paragraphs, we will briefly describe them (more details can be found in Perego, Del Missier and Bottiroli 2015).

Subtitle-reading check and questionnaire on dubbing and subtitling

A subtitle-reading check was administered to all participants exposed to the subtitled excerpt via a short questionnaire. Some questions checked whether viewers actually paid attention to the subtitles and correctly remembered their colour and alignment on screen, and they collected the viewers' responses on the ease of subtitle reading.

Measures of comprehension and memory

We employed the same cognitive measures used in Perego, Del Missier and Bottiroli (2015). The first measure was a 25-question multiple-choice *questionnaire on general comprehension* to appraise whether participants understood the plot and the main conceptual aspects of the film. Then, a 20-item *questionnaire on dialogue recognition* was proposed to appraise the ability to recognize specific components of the film dialogue. An 8-item *face-name association test* was used to understand whether participants were able to associate the name of each character with the corresponding freeze-frames depicting the characters' faces. Finally, a 60-item *visual scene recognition test* assessed whether participants remembered the visuals they saw; only half of the frames had been actually presented, while the remaining frames were foils.

tion between a slightly or somewhat known spoken language and the subtitles is not investigated here, this seems to be an interesting issue to be studied in the future. Therefore, the only comprehensible audio information came from the paralinguistic and extralinguistic elements of spoken communication, which were probably processed properly, as the comprehension and memory tests performed in both studies reflect.

Evaluative measures

Evaluative measures included questions to appraise the degree of film appreciation (evaluation of the film and related future intentions; eight items) and self-reported effort during film viewing (two items).

Cognitive tests: PMA Vocabulary and CPM tests

After the viewing experience and the administration of film-related tests and questionnaires, participants also underwent further cognitive tests to assess their cognitive abilities. The *PMA Vocabulary Test* (Thurstone and Thurstone 1963) is a 50-item vocabulary test that requires participants to identify synonyms of a target word within an eight-minute timespan. It assesses the scope of a person's recognition vocabulary and measures language knowledge and comprehension. Raven's Coloured Progressive Matrices (CPM) (Raven 1995) is a nonverbal test used as a measure of fluid intelligence, that is, a complex human ability that allows us to adapt our thinking to a new cognitive problem or situation (Carpenter, Just and Sell 1990). The CPM test was administered in groups, with participants answering on their own record form. No time limit was set. The maximum score of the test is 36.

2.1.4 Procedure

We carried out collective viewing sessions in small groups. Participants were gathered in a cinema room and received instructions and a general introduction. No mention of the film language or translation method was made. After viewing the video, participants were given the assessment questionnaires collected in a booklet and they were asked to fill them out in a specific order: (1) evaluative questionnaire; (2) face-name association task; (3) general comprehension; (4) visual scene recognition; (5) dialogue recognition; (6) subtitle-reading checks; (7) questionnaire on viewing habits and on dubbing and subtitling. A demographic questionnaire closed the booklet. Filling in the questionnaires was a self-paced task and it took approximately 30 minutes (for more details about procedure and materials, see Perego et al. 2010, and Perego, Del Missier and Bottiroli 2015). After a pause, participants were administered the two cognitive tests.

2.2 Results

2.2.1 Subtitle-reading checks and questionnaire on dubbing and subtitling

Ninety-six percent of the sample in the subtitling group correctly remembered the alignment of subtitles and 77% of the sample correctly remembered their colour. All of the participants in this group reported having used subtitles *often* or *always* to help their understanding of the film. As for the difficulty in reading subtitles, 88% of participants provided judgments ranging from *neither easy nor difficult* to

very easy. These findings indicate that participants read subtitles with apparent ease and seemed to rely on them to understand the film.

2.2.2 Cognitive measures

As shown in Table 2, no statistically significant differences between the dubbing and the subtitling groups were found in general comprehension ($t(57)=0.25$, $p=.81$, $d=0.07$), face-name association ($t(57)=-1.55$, $p=.13$, $d=0.41$), and visual scene recognition ($t(57)=0.32$, $p=.75$, $d=0.08$). A significant difference between groups was found in dialogue recognition ($t(57)=-2.64$, $p=0.01$, $d=0.70$), with an advantage for the subtitling group.

Table 2. Descriptive statistics for the dependent variables as a function of translation methods in Study 1

	Dubbing condition		Subtitling condition	
	M	(SD)	M	(SD)
Cognitive Measures				
General comprehension	.74	(.09)	.73	(.09)
Dialogue recognition	.68	(.13)	.77	(.14)
Face-name association	.44	(.25)	.54	(.24)
Visual scene recognition	.82	(.05)	.82	(.05)
Evaluative measures				
Film appreciation	3.57	(1.11)	3.98	(1.10)
Self-reported effort	2.48	(0.81)	2.69	(1.24)

Note. Ranges of scores for Cognitive measures (proportion of correct responses) were: .56–.88 for General comprehension; .25–1 for Dialogue recognition; .00–1 for Face-name association; .68–.92 for Visual scene recognition. Ranges of scores for Evaluative measures were: 1.75–5.88 for Film appreciation; 1–5 for Self-reported effort.

2.2.3 Evaluative measures

Data were analysed using summative indices: film appreciation, self-reported effort during film vision. As apparent in Table 2, results did not show significant differences between the dubbing and the subtitling group on self-reported effort ($t(57)=-0.77$, $p=.44$, $d=0.20$) and film appreciation ($t(57)=-1.42$, $p=.16$, $d=0.38$).

2.2.4 PMA vocabulary and CPM tests

Better scores on the vocabulary test were related to a better performance in general comprehension ($r=.31$, $p=.02$), but not in the other cognitive measures. No other significant correlations were found. The CPM scores were associated to better face-name association scores ($r=.29$, $p=.03$), but not to other cognitive mea-

asures. As for evaluative measures, participants with higher CPM scores tended to report less effort during the vision ($r = .26$, $p = .05$). No other significant correlations were found.⁵

2.3 Discussion

Study 1 aimed to replicate the findings of previous studies comparing dubbing and subtitling (e.g., Perego, Del Missier and Bottiroli 2015) and the results show that we achieved this goal. According to both the old and the new findings, watching a moderately complex film clip requires the same degree of subjective effort from viewers accustomed to dubbing both when the film is dubbed and when it is subtitled. Moreover, the appreciation of the film was not different across the two AVT methods.

As for the cognitive consequences of the AVT methods analysed, the findings of Study 1 confirm that subtitling (vs. dubbing) does not disturb viewers and it favours dialogue recognition. Indeed, participants in the subtitling and dubbing conditions showed the same level of understanding and memory for visual information, but participants in the subtitling condition showed an advantage for dialogue recognition. Moreover, Study 1 confirmed that participants with better cognitive skills seem to be better able to understand the film.

Overall, these results can be ascribed to the relative ease in processing and integrating written verbal information, pictorial information, and information coming from the audio channel when neither channel exposes the viewer to excessively complex messages (see also Perego et al. 2010, and Perego, Del Missier and Bottiroli 2015). The effectiveness of these processes, however, could be compromised if one or more of these channels is very dense or taxing to the viewer, and this possibility was tested in Study 2.

3. Study 2

3.1 Method

In Study 2, we used the same design and measurement instruments employed in Study 1, varying the AV material, which was more complex than the material employed in Study 1 as shown in Table 1.

5. The results of the correlational analysis were confirmed even controlling for the dubbing vs. subtitling condition: regression analyses showed no significant interactions between condition and CPM scores and between condition and vocabulary test.

3.1.1 Participants

The original sample of Study 2 consisted of 61 undergraduate students from the University of Trieste (88% female, mean age = 20.70 SD = 2.21) who took part in the experiment and received course credits for participation. Students came from the Translation and Interpreting Faculty and from the Psychology Faculty. Participants who have spoken Italian for less than ten years ($n = 2$), and participants who had already watched the film ($n = 5$) were removed from the analysis. The final sample counts 54 participants, 83% of them stated that they watch dubbed films from *fairly often* to *always*, whereas 35% reported the same for subtitled films. Participants were randomly assigned to the dubbing ($n = 26$) or the subtitling ($n = 28$) condition.

3.1.2 Video

One 25-minute video fragment was taken from BBC *Sherlock* (Series 1, Episode 1), a modern-day successful crime drama. The video was shown either in its dubbed version in Russian with Italian subtitles, or dubbed into Italian. We chose the Russian dubbed version to expose participants to an unknown language, and to prevent viewers from relying on information delivered from the original English soundtrack, known by all participants (see Note 3). As in Study 1, we used the commercialized dubbed version made by professionals in line with Italian standards. The video is fast-paced (as operationalized by Lang et al. 1999, 2000) and its narrative structure is complex: it includes several interweaving story lines and alterations in chronology that might entail strong viewer engagement and require observational skills (Barsam 2007; Murphy 2007). The subtitles were almost verbatim transcriptions of the original English dialogue and they were very fast. The complexity measures are presented in Table 1.

3.2 Results

3.2.1 Subtitle-reading checks and questionnaire on dubbing and subtitling

Ninety-six percent of the sample in the subtitling group correctly remembered the alignment of subtitles and 75% of the sample correctly remembered their colour. All of the participants in this group reported having used subtitles *often* or *always* to help their understanding of the film. As for the difficulty in reading subtitles, 64% of the participants provided judgments ranging from *neither easy nor difficult* to *very easy*. As in Study 1, the findings indicate that participants read subtitles and relied on them.

3.2.2 Cognitive measures

As shown in Table 3 and as expected, the dubbing group performed better than their subtitling counterpart both in general comprehension ($t(52)=3.44, p=.001, d=0.95$) and in visual scene recognition ($t(52)=2.79, p=.007, d=0.95$). The two groups did not differ in dialogue recognition ($t(52)=0.18, p=.86, d=0.76$) and in face-name association ($t(52)=1.25, p=.22, d=0.34$).

Table 3. Descriptive statistics for the dependent variables as a function of translation methods in Study 2

	Dubbing condition		Subtitling condition	
	M	(SD)	M	(SD)
Cognitive Measures				
General comprehension	.87	(.08)	.77	(.13)
Dialogue recognition	.67	(.09)	.67	(.11)
Face-name association	.93	(.13)	.88	(.18)
Visual scene recognition	.77	(.07)	.72	(.07)
Evaluative measures				
Film appreciation	5.28	(0.47)	4.96	(1.08)
Self-reported effort	2.73	(1.11)	3.38	(1.27)

Note. Ranges of scores for Cognitive measures (proportion of correct responses) were: .36–1 for General comprehension; .45–.90 for Dialogue recognition; .50–1 for Face-name association; .53–.88 for Visual scene recognition. Ranges of scores for Evaluative measures were: 1.88–6.38 for Film appreciation; 1–5 for Self-reported effort.

3.2.3 Evaluative measures

Data were analysed using summative indices of self-reported effort and film appreciation. As shown in Table 3, the results did not show a significant difference between the dubbing and the subtitling group on film appreciation ($t(52)=1.39, p=.17, d=0.38$), but they highlighted a marginal significant difference in self-reported effort ($t(52)=-1.98, p=.053, d=0.54$). As expected, participants in the subtitling condition reported more effort during the viewing.

3.2.4 Vocabulary and CPM tests

Better scores on the vocabulary test were related to a better performance in general comprehension ($r=.28, p=.05$) but not with the other cognitive measures. Results did not show significant correlations between vocabulary scores and evaluative measures. CPM scores were not significantly associated to cognitive measures, but better CPM scores were related to less self-reported effort during the vision ($r=.35, p=.01$).⁶ Thus, the findings on individual differences generally agree with Study 1, with some minor differences.

3.3 Discussion

Study 2 aimed to show that the subtitling (vs. dubbing) of complex AVT material leads to more effortful processing and negative cognitive and evaluative consequences. The findings support the hypotheses on effort and on cognitive consequences, as measured by general comprehension and visual scene recognition. However, greater effort and more negative cognitive consequences did not trigger a less favourable evaluation of the film in the subtitled (vs. dubbed) version. Overall, the present results show a clearly different pattern of findings when compared to the findings of Study 1 and previous investigations on simpler films. This indicates that complexity matters, at least for what concerns perceived effort and the cognitive outcomes of processing (i.e., comprehension and memory for presented information).

Other results of Study 1 were confirmed in Study 2. Namely, participants with better cognitive skills were better able to understand the film. This finding underlines the importance of individual differences in the study of AVT, a research topic almost entirely neglected by previous research.

4. General discussion and conclusions

Empirical studies on the effectiveness of dubbing and subtitling showed that both methods are appreciated and cognitively effective when it comes to accessing a moderately complex AV message. This has been recently established empirically (Perego, Del Missier and Bottiroli 2015; Orrego-Carmona 2015; Wissmath, Weibel and Groner 2009), allowing the rejection of part of the deep-rooted speculative claims about the disruptive nature of subtitles, especially for viewers who are not used to them. Study 1 in the present paper confirmed these findings, addressing the call for replication coming from various areas of the behavioural sciences. In spite of the valuable knowledge they brought, however, these AVT empirical studies share a major weakness, in that they failed to consider complex AV material and to acknowledge that the boundaries of the cognitive effectiveness of subtitle processing may be reached only when the material to be processed is complex and the rate of delivery is fast.

6. As in Study 1, results of regression analyses including the dubbing vs. subtitling condition as predictor (as well as interactions with the CPM scores and vocabulary test) confirmed the results of the correlational analysis, with one exception. A significant CPM scores by condition interaction was found on visual scene recognition ($\beta=2.08$, $t=2.08$, $p=.04$), showing that increasing CPM scores resulted in a better performance on visual scene recognition only in the subtitling condition.

To overcome this limitation, we carried out Study 2, comparing the reception of quite a complex film presented using different AVT methods (i.e., dubbing vs. subtitling). Results showed that, in this more complex film, subtitling is associated with more subjective effort than dubbing and leads to lower comprehension and lower memory for the visuals. These findings are in line with our subtitling complexity hypothesis, which assumes that highly complex material is more difficult to process and to integrate when translated via subtitling (vs. dubbing), and that this can even lead to less effective performance in terms of memory and comprehension (at least in viewers not accustomed to this AVT method). Somewhat surprisingly, these negative consequences did not affect the global evaluation of the film. This was similar across the AVT methods, possibly because the cognitive and the evaluative reception of a film are not necessarily strongly related, at least when the comprehension level is generally good, as it is in the present studies testing young adults (but see also Perego, Del Missier and Bottiroli [2015] testing both younger and older adults, or d'Ydewalle and De Bruycker [2007] testing children and adults).

From the applied point of view, our results suggest that viewers who are not familiar with subtitles might actually benefit more from dubbing when the AV material is complex. This may be especially true for users who have reduced sensory and cognitive resources and may therefore encounter more difficulty in information processing and integration (e.g., cognitively disadvantaged persons, slow readers, children suffering from attention deficit hyperactivity disorder, the elderly). Bearing in mind the limitations of this study (stated below) and the need to further investigate this area, we believe that practitioners could consider investing more effort in crafting diverse types of AVT tailored to the film to be translated. For instance, they might favour simpler and less burdening subtitles when the AV material is particularly complex or when its content is unfamiliar to the target viewers (cf. Winke, Gass and Sydorenko 2013), and they might offer alternative diasemiotic translations in specific situations (voice-over might do if dubbing is too costly, though the real effectiveness of these AVT methods should be demonstrated empirically).

Our studies represent a step forward in AVT research inasmuch as they tackle a critical but neglected issue in this research area and provide novel empirical evidence. However, some limitations need to be acknowledged and discussed in relation to potential future research directions. First, given that our main aim was to investigate the reception of dubbing vs. subtitling in films varying sharply in their level of complexity while retaining an ecological approach (i.e., using real films), we employed two films clearly differing in complexity. However, the two films varied significantly also in several other respects, such as genre, subtitling rate, source language, cultural context, and potential interest; this is something

that makes them difficult to compare and renders conclusions problematic. Thus, it is possible that the differences in the results we obtained in Study 1 vs. Study 2 were partly due to some of these factors. The fact that AVT studies on dubbing vs. subtitling obtained consistent results also when using films varying in genre (e.g., Wissmath, Weibel and Groner 2009) is somewhat reassuring, although not conclusive for this specific issue.⁷

Therefore, future studies are needed to replicate the current findings with films of the same genre and using the same language, in order to appraise the robustness of our results in relation to the complexity variation. A promising approach may consist in contrasting two films very similar in several respects but presenting a clear difference in complexity (e.g., using two episodes of the same series), even if identifying the appropriate material for setting up this kind of experiment could be very difficult. Another possibility to gain even more control on the different facets of complexity and the other film features is to resort to short films purposely produced for the experimental studies, but this solution is clearly very hard to implement, and very costly.

Another research direction that can be worth following is to understand whether the differences we observed in the comparison of dubbing vs. subtitling using more complex AV material still hold when the viewers are accustomed to subtitling (e.g., in subtitling countries). Indeed, familiarity and practice may increase the degree of automaticity of subtitle processing and thus reduce the differences observed. On the other hand, the differences may well be exacerbated in weak users, who have reduced cognitive resources for processing and information integration. Moreover, the potential influence on reception of users' individual differences, general viewing habits, attitude towards different AVT modes and AV genres, reaction to different languages, and complexity scenarios suggests the need to keep on assessing and considering also these factors in future research.

Furthermore, our study employed an ample interdisciplinary conception of complexity encompassing different facets of the construct, which was operationalized with multiple indicators derived from different research traditions and literatures (e.g., Barsam 2007; Lang 1995, 2000; Lang et al. 1999; Li 2000; Monaco 2009; Murphy 2007; Pavesi 2005; Szmrecsányi 2004). The operationalization of AV complexity could be further developed in future research, although other aspects (e.g., visual density) could be rather difficult to measure. Starting from this approach, more research is needed to shed light on the specific aspects of

7. It is also noteworthy that Study 1 provided results that are consistent with previous literature on different populations (e.g., d'Ydewalle and De Bruycker [2007] testing adults vs. children; Perego, Del Missier and Bottiroli [2015] replicating results with a population of older adults; Wissmath Weibel and Groner [2009]).

complexity that matter more for the behavioural reception of different AVT methods, as well as on the underlying cognitive mechanisms explaining the effects of complexity. Thus, understanding the relative role of different aspects of complexity on AVT reception and the cognitive mechanisms mediating these effects on viewers' understanding and memory may be a research direction particularly worth pursuing. More generally, an investigation of media complexity following a multidimensional and empirical approach that includes, as a fundamental pillar, the cognitive and evaluative reception of the translation target seems promising *per se*.

Finally, a full replication of our studies with eye tracking would make it possible to investigate attention allocation over visuals and text and to provide less indirect data on the extent to which viewers actually process the subtitles. Furthermore, eye-movement recordings would enable us to assess whether and how visual attention allocation strategies change with film complexity.⁸ However, our manipulation checks and the observed performance levels imply an attentive processing of the films and a good level of understanding in our participants.

To conclude, for what concerns the line of enquiry more directly followed in the present paper, we provided the first evidence supporting the view that, in complex semiotic environments, complexity matters for the dubbing vs. subtitling debate. Future work may build on this evidence and dig more deeply into the specific aspects of complexity that matter, the underlying cognitive processes mediating the effects, and the conditions that may compensate for complexity increases, such as familiarity with the translation method. Considering the undeniable theoretical and applied relevance of these issues, we expect that the results of these studies will have a significant scholarly and societal impact.

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8. Indeed, an eye-tracking study replicating part of Study 1 and 2 has been already carried out, and it suggests that both techniques are effective and positively received by viewers. However, the eye-tracking data also show that processing the more complex subtitled film requires more effort from viewers and requires them to accelerate the reading process (Perego, Orrego-Carmona and Bottiroli 2016), in agreement with the findings reported in the present paper.

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