



Kaunas University of Technology
Faculty of Social Sciences, Arts and Humanities

Machine Translation and Post-Editing Evaluation in Subtitling

Master's Final Degree Project

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Kaunas, 2022



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Translation and Localization of Technical Texts (6211NX031)

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Summary

Globalization could be considered a propulsion of the modern world, since masts of information, and accordingly, translation, are growing. With the intention to ease translators' work, in the first part of 20th century, the development of machine translation (MT) engine was started. It has been developed and currently, neural MT engines are acquiring a lot of attention. MT engines are of everyday use and has emerged in different areas, mainly technical texts, and documentation, while it is not incorporated in audiovisual translation (AVT) due to the complexity of it. While audiovisual content continued to increase, financial resources designated for translators stagnant. Taking this into account, a new approaches should be incorporated in order to satisfy the need from both sides, one of them is machine translation post-editing (MTPE). AVT in Lithuania have been started investigated in late twenties and since then, many different topics regarding subtitling, dubbing, voice-over, etc., were reviewed and analysed, although research of MT incorporation in AVT is inadequate. Thus, the object of the thesis are subtitles of a documentary. The aim is to analyse MT output and MTPE efforts of a documentary and identify their interdependence. The objectives of the thesis are the following: to overview AVT, MTPE, and an evaluation of MT from the theoretical perspective; to analyse MT output of a documentary subtitles according to MQM metrics; to analyse MTPE by measuring temporal and technical efforts; to determine the quality of machine translation output by defining correlation with temporal and technical post-editing efforts for English-Lithuanian language pair. The conducted MT output evaluation according to MQM metrics revealed that grammar and punctuation errors from language conventions branch constitute half of the total errors; literal translation and word order constitute more than one-fifth of the total amount of errors, while stylistic and terminology issues are common as well. The reason for the results could be a complex nature of AVT, context deficiency for MT engine and its insufficient incorporation in the MT engine. In terms of temporal efforts, post-editors spent more than hour to machine translation post-edit the selected subtitles. Temporal efforts are related to technical efforts, while an increase of one number conditions increment of another number. Total user events, text production, and text elimination, which comprise technical efforts could be stated to be proportional to one another. The highest amount of temporal efforts were required for literal translation, word order, and over-translation, they all belong to an accuracy branch; hence it partially corroborates MT output evaluation. Results suggest that language conventions could be post-edited in a shorter time, while accuracy errors are related to the meaning of subtitles and, due to which, more temporal efforts are required. The quality of MT output is evaluated as unsatisfactory based on measured MTPE technical and temporal efforts.

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Santrauka

Globalizacija gali būti laikoma šiuolaikinio pasaulio varomuoju varikliu, kadangi informacijos ir, atitinkamai, vertimo mastai didėja. Siekiant palengvinti vertėjų darbą, XX a. pradžioje pradėta vystyti mašininio vertimo (MV) sistema. Pastaruoju metu neuroninis MV pritraukia vis daugiau dėmesio. MV sistemomis naudojamosi kiekvieną dieną ir jos pradėtos naudoti skirtingose srityse, daugiausia techniniams tekstams ir dokumentacijai versti, tačiau dėl sudėtingumo, MV nenaudojamas audiovizualiniame vertime (AVV). Nors audiovizualinis turinys ir toliau auga, vertėjams paskirti finansiniai ištekliai stovi vietoje. Atsižvelgiant į tai, nauji būdai, patenkinantys abiejų pusių poreikius, turėtų būti įtraukti, vienas iš tokių – mašininio vertimo postredagavimas (MVPE). Lietuvoje AVV pradėtas tirti XX a. pabaigoje, nuo tada apžvelgta ir tirta daugybė temų apie subtitravimą, dubliavimą, užklotinį vertimą, t. t., vis dėlto tyrimų apie MV panaudojimą AVV nepakanka. Taigi baigiamojo darbo objektas yra dokumentinio filmo subtitrai. Tikslas – išanalizuoti dokumentinio filmo MV ir MVPE pastangas ir nustatyti jų tarpusavio ryšį. Magistro baigiamojo darbo uždaviniai yra šie: apžvelgti AVV, MVPE ir MV vertinimą teoriniu požiūriu; išanalizuoti dokumentinio filmo subtitrų MV pagal MQM metrikas; išmatuoti MVPE laiko ir technines pastangas; nustatyti MV kokybę išskiriant koreliaciją su laiko ir techninėmis MVPE pastangomis anglų-lietuvių kalbų porai. Atliktas MV vertinimas pagal MQM metrikas atskleidė, jog gramatikos ir skyrybos klaidos, priklausančios kalbai būdingų normų šakai sudaro penktadalį viso klaidų kiekio, stilistinės ir terminologijos klaidos taip pat vyrauja analizėje. Rezultatai galėtų būti pagrįsti sudėtingu AVV pobūdžiu, konteksto trūkumu MV vertyklei ir nepakankamas AVV vertimas MV vertykle. Laiko pastangų atžvilgiu postredaktorės praleido daugiau nei valandą postredaguodamos pasirinktus subtitrus. Laiko pastangos susijusios su techninėmis pastangomis, kadangi vieno skaičiaus padidėjimas sąlygoja kito skaičiaus augimą. Bendri naudotojo veiksmai, teksto rašymas ir teksto pašalinimas, kurie bendrai sudaro technines pastangas gali būti laikomi vienas kitam proporcingi. Didžiausio skaičiaus techninių pastangų prireikė pažodinio vertimo, žodžių tvarkos ir perteklinio vertimo klaidoms, jos visos priklauso tikslumo klaidų šakai, taigi dalinai paremia MV įvertinimą. Remiantis rezultatais teigiama, kad kalbai būdingos normos galėtų būti postredaguojamos per trumpesnę laiką, kadangi tikslumo klaidos yra susijusios su subtitrų prasme, dėl kurių reikalingos didesnės laiko pastangos. MV kokybė vertinama kaip nepatenkinama remiantis MVPE techninių ir laiko pastangų rezultatais.

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Introduction

Globalization has made a huge impact on the modern world: masts of information are rapidly increasing and there are different types of texts written in different languages. Therefore, due to acceptability and access to information, information should be translated, which is a difficult task considering the amount of it. The situation is well described in the following citation: “Our world is becoming ever smaller, while the demand for information in every corner of the globe is growing.” (Burchardt, Lommel, Bywood, Harris and Popović, 2018, p. 23). In order to facilitate the work of translators, in the first part of 20th century, first signs of machine translation (MT) started to appear. Machine translation nowadays is of everyday use, and many people cannot imagine life without it. For example, Google Translate machine translation engine is used by more than 200 million people every month; translated content of Google Translate in one day can be equated to all professional translators work in an entire year (Och, 2012). In addition, the scale probably is not going to reduce.

A translation system, which acquires a lot of attention from scientists nowadays, is neural machine translation (NMT). The benefits of NMT are ability to learn directly, in an end-to-end fashion, the mapping from input text to associated output text (Wu et al., 2016). However, there are some NMT drawbacks, like its slower training, inference speed due to the large number of parameters and a large-scale dataset, ineffectiveness in dealing with rare words, sometimes failure to translate all words in source language (Wu et al., 2016). Machine translation has emerged in different areas, mainly in translation of technical texts, though nowadays localisers use MT in their everyday tasks as well (Remael, 2010). In localization industry, which can be compared with audiovisual translation (AVT) from the cultural point of view, as the content should be adapted for a target culture, along with time or/and space constraints, such software solutions, as translation memories, computer-aided translation tools and MT have been adopted for two decades (Bywood, Georgakopoulou and Etchegoyhen, 2017). Resultantly, there are still areas, in which MT is not incorporated, such as AVT and it induces researchers' interest.

Audiovisual content is continually increasing, although the financial resources designated for translators are static. (Bywood et al., 2017) Therefore, a necessity for an additional task in conjunction with translation is emerging. It is essential to analyse the current situation in research and practical applications, which could be beneficial both to translators and translation service providers. There already are projects executed regarding audiovisual translation automatization: ALTo project investigated MT of closed-captions of North American television programs from English to Spanish; MUSA and eTITLE incorporated rule-based MT with translation memory in order to examine potential; in SUMAT project statistical MT was trained on subtitles in seven bi-directional language pairs and afterwards MT quality was evaluated; EU-Bridge has investigated automatic speech recognition (ASR) combined with MT; HBB4ALL covered automatic interlingual subtitles; and ALST project combined speech synthesis, automatic speech recognition and MT in voice-over and audio description, as well including quality assessment of raw material and post-editing.

Relevance and novelty. Research in terms of ADV translation in Lithuania started in late twenties with Ieva Grigaravičiūtė and Henrik Gottlieb (1999) work about voice-over of Danish series. One of the pioneers was Alina Baravykaitė, who examined tendencies and issues in film translation, application, and types of audiovisual translation in Lithuania, role of subtitles in language learning, and compliance with language norms in audiovisual translation (Alosevičienė, 2020). Nonetheless,

there is not enough research of machine translation post-editing (MTPE) to Lithuanian and, for this reason, it should be analysed in more detail.

Problem of the thesis: as machine translation demonstrates a better quality when translating more of a technical nature text, the output of audiovisual content is unpredictable due to its ambiguity and context-dependency: thus, it can be a difficult task to post-edit it. Moreover, MTPE is considerably new method in translation studies; therefore, there are no established norms of it and could be confusing for post-editors to perform it.

Methods: descriptive analysis, qualitative data analysis, comparative analysis.

Aim of the thesis: to analyse machine translation output and post-editing efforts of a documentary and identify their interdependence.

Objectives of the thesis:

1. To overview audiovisual translation, machine translation post-editing, and an evaluation of machine translation from the theoretical perspective;
2. To analyse machine translation output of a documentary subtitles according to MQM metrics;
3. To analyse machine translation post-editing by measuring temporal and technical efforts;
4. To determine the quality of machine translation output by defining correlation with temporal and technical post-editing efforts for English-Lithuanian language pair.

The object of the master's final project is subtitles of "Solar System: The Secrets of the Universe" documentary, written and directed by Kalle Max Hofmann.

Related research: identifying the perspectivity of machine translation incorporation in the translation of audiovisual material, a "Machine Translation in the Context of Audiovisual Translation" research paper was presented in the Scientific Student Conference "SMILES 2021: Social Sciences, Arts and Humanities in Contemporary Society". Continuing to delve into this subject, it was chosen to analyse the current situation of machine translation output and post-editing possibilities with English-Lithuanian language pair.

The master thesis consists of two parts: theoretical overview and practical analysis. The theoretical overview consists of three subparts, explaining audiovisual translation concept and presenting its types; specifying requirements and constraints of subtitles; analysing existing translation strategies, which can be applicable for audiovisual translation, specifically subtitles. The second section presents the complexity of the machine translation and metrics, which are suitable for MT evaluation and the third subpart analyses post-editing and guidelines adapted for this job. The second part of the research encompasses methodology of the practical analysis, presenting carried out steps and grounding chosen methods and their practicality for the research. The analysis is based on the theoretical background implementing analysed metrics for MT output evaluation and PE guidelines for performing an experiment in order to measure temporal and technical efforts of three post-editors.

1. Overview of audiovisual translation and machine translation post-editing

The first part of this master thesis will aim to overview three components, which are interrelated with each other. As the object of this research is subtitles, they will be analysed in the context of audiovisual translation; requirements of subtitles will be presented in detail as well as strategies for translating subtitles will be introduced. MT operated in order to provide output of translated subtitles from English to Lithuanian, therefore, it will be introduced together with metrics, which accordingly will be relied on to analyse the mistakes in the MT output. The last part is related with post-editing, in the research efforts of it will be distinguished and explained, as well as guidelines will be indicated that the experiment would be executed in a controlled way.

1.1. Insights into audiovisual translation and its types

Audiovisual translation possibly started with the advent of audiovisual products and a translation of intertitles, in around 1880s; though later, when actors in movies started talking, the demand for translation rose (Remael, 2010). Audiovisual material has become popular due to globalization, growing export of films as well as production systems, financial growth in audiovisual industry, and digitization (Remael, 2010). Nowadays it has paved the way to the recognition not only in translation studies, though in the practice, using the content as well. Although many people enjoy watching audiovisual products, the translation process requires time and a lot of efforts, taking into account subtitling constraints, requirements, and implemented strategies; they will be reviewed in forthcoming subchapters.

1.1.1. Audiovisual translation concept and current situation

Audiovisual translation is focused on processes, practices, and products involved in this activity or results of multimodal and multimedia content across different cultures and languages transfer (Pérez-González, 2022). Alternatively, the whole process can be named as a professional activity, involving audiovisual media content localisation (Bolaños-García-Escribano and Díaz-Cintas, 2019). AVT comprise of many different and unique types and the list is not finite; therefore, it is worthy to analyse, in what context does subtitles prevail. According to Gambier (2003), there are 14 types of audiovisual translation subdivided to dominant types and challenging types. Starting with dominant types, **subtitling** can be defined as a translation of original spoken text by different speakers in writing; alternative terms are audiovisual texts or polysemiotic texts. Two types of subtitling can be distinguished: interlingual, signifying the translation of a message from spoken source language to written target language, while intralingual deals with at times edited transcription of the source language; for this reason, interlingual subtitles can be perceived as diagonal, whereas intralingual subtitles are vertical (Pedersen, 2011). Commonly, subtitles consist of two or three lines translated from one language to another or, in some cases (e. g., in Finland), two languages, this type is called bilingual translation (Gambier, 2003). Subtitles include other visual, verbal (letters, banners, inserts) and oral information (lyrics, voices off) (Remael, 2010). From the financial perspective, subtitling is probably a fairly effective and economically beneficial translation delivery for spectators mode, as compared with dubbing and voice-over (Kerevičienė and Urbonienė, 2017). **Dubbing** is stated as the most popular revoicing practice; it replaces the original soundtrack with the target language soundtrack and due to this aspect, an impression is created that actors speak in the target language (Remael, 2010). Díaz-Cintas (2020) distinguishes three types of message reproducing: lip synchrony, when the target language visemes fits in the source language visemes; isochrony mostly deals with

the duration of speaking, i.e., that lines of target language are no longer or shorter than the lines of the source language; and kinetic synchrony ensures that the target text is in compliance with actors' performances as well as voices of speakers does not sound bizarre compared to characters' physical appearance and personal attributes. **Multilingual distribution** is mainly related to DVD (Digital Versatile Disc), in which a teletext, i.e., a certain language can be chosen in to modes: up to 32 subtitles of different languages or dubbing in a few languages as well (Gambier, 2003). **Consecutive interpreting** is divided to three types: live, to translate, for instance, an interview of a politician, a singer, or a sportsman on the radio; pre-recorded, which has similar features to voice-over; and link up, when a long-distance communication is executed (Gambier, 2003). **Simultaneous interpreting** and sign language interpreting usually are performed in dynamic situations as, for example, during a debate; this type of AVT is used on ARTE (French-German channel) (Gambier, 2003). The voice and the ability to keep talking is of the most importance in media interpreting (Gambier, 2003). **Voice-over** is an oral translation that can be heard over the source language speech, although the original voice is entirely reduced or after a few seconds turned down to a lower audibility (Remael, 2010; Gambier, 2003). **Free commentary** can be stated as an adaptation for a new audience; the attention is paid for synchronization not with a soundtrack, but with on-screen images and it consists of many strategies, as additions, omissions, comments, and clarifications. This type is commonly used in documentaries, corporate videos, and children's programmes (Gambier, 2003). **Simultaneous or sight translation** can be fulfilled from a dialogue list, a script, or subtitles available in a foreign language, so-called *pivot* language. This translation is used in film archives or during film festivals (Gambier, 2003). **Multilingual production** includes double versions of audiovisual material, while actors play in their own language(s) and afterwards a film (remake) is dubbed and post-synchronized in one general language (Gambier, 2003). Although the list could seem quite extensive, there are more types.

Five challenging types can be distinguished: **scenario-script translation** is, as Gambier (2003) explains, necessary in the case of getting grants and subsidies for a co-production; in addition, this translation is not edited. **Surtitling** is a one-line subtitling in another language and is displayed non-stop above the stage on a screen or places at the back of the seats; the conventions are as in subtitling and it is considered as translation of live performances, for example, conferences, theatre, opera, concerts, etc. (Cintas and Remael, 2014). **Subtitling for the deaf and hard of hearing** is one of intralingual subtitling types which are for the benefit of the audiences with hearing impairment; moreover, migrants can be attributed in this group as well, since it can help them to learn or improve foreign language (Gambier, 2003). Kerevičienė and Urbonienė (2017) indicates the rise of new tendencies induced by technological innovations for a specific audience intended audiovisual products, which can be read linguistically, paralinguistically, and auditory. **Live (real-time) subtitling** differ from live subtitles, which are translated in advance, though inserted by a subtitler only during a film or TV programme, whereas live subtitling is performed in various types of interviews (Gambier, 2003). **Audio description** for the blind and visually impaired includes interlingual transfer of visual information into a verbal narration, whether it is between dialogues or in sequence with audio-subtitling (Remael, 2010). Verbal narration can cover various aspects: action, facial expressions, body language, costumes, and etc. (Gambier, 2003). From this section a conclusion can be made that AVT is a very wide spectrum of various types of translation, though it is not finite. It is probably undeniable that in the future the existing types modify and change, for example, a number of challenging types can turn into the dominant ones, as the attention is paid for specific audiences, which previously were not provided with the same material and accessibility as the others;

new types will emerge, and the list will lengthen. Moreover, AVT is not merely of entertaining nature, it brings the society towards acceptability, in order that every person, despite his/hers impairment or disability could engage and experience the same sensation of audiovisual products as the rest of the society.

Audiovisual translation is evidently a dynamic and sophisticated area, which attracts a lot of attention both from the viewers and researchers. Research in terms of AVT translation started in late twenties with Ieva Grigaravičiūtė and Henrik Gottlieb (1999), when voice-over of Danish series was analysed. One of the pioneers of AVT research in Lithuania was Alina Baravykaitė, who examined tendencies and issues in translation (2006), issues in film translation (2005), and film subtitles as a language learning tool (2007) (Alosevičienė, 2020). There are defended doctoral dissertations in AVT as “Transformations of the expression of humour in audiovisual translation” by Daiva Šidiškytė (2017), who has also analysed multimodal language of subtitles in American romance-comedy films and the translation of English film title into Lithuanian and Russian (Šidiškytė, 2017; Šidiškytė and Tamulaitienė, 2013). A few dissertations worth mentioning are written by Maksvytytė (2013) “Translation Strategies in the Rendering of Culture-Bound Terms from German to Lithuanian” and Koverienė (2015) “Dubbing as an Audiovisual Translation Mode: English and Lithuanian Phonemic Inventories in the Context of Visual Phonetics” mainly analysing perception of visemes. Judickaitė-Pašvenskienė (2013, 2014) has analysed subtitled anthroponyms in children’s cartoons as well as incorporating them into language learning process. In “Subtitling Peculiarities in the Lithuanian Translation of the Documentary Film “Super Size Me” by Morgan Spurlock” authors investigated language and material culture transfer from English to Lithuanian (Ivanovaitė and Baranauskienė, 2010). Ulvydienė and Aleknavičiūtė (2014) have published “Gricean maxims and semiotic aspects of audiovisual translation: a case study of the iron lady” article with an intention to examine the change of verbal semiotic channel (from capacious to less capacious). Voice-over is analysed in “Audiovisual Translation of Feature Films from English into Lithuanian”, the aim of this article was to examine language and authenticity transfer, when a film is voice-overed (Baranauskienė and Blaževičienė, 2008). Danguolė Satkauskaitė has written a number of influential papers on influence of other languages for Lithuanian: “Conveying Frenchness in the Dubbing of Animated Film *Ratatouille*”, “German accents in English-language cartoons dubbed into Lithuanian”; analysed deictic reference in “Deictic Reference as a Means for Constructing the Character Image in a Dubbed Cartoon *Snow Postman*: Comparative Analysis of the Lithuanian, Russian and English Versions” and synchrony of dubbing in “Synchrony in Dubbed Films (a Case Study of the Animated Film *Up*)”, culture-specific items in dubbing “The Translation of Culture-bound References for Dubbing: A Model for the Analysis”, and dubbing popularity in animation “Determinant Factors of the Popularity of Dubbed Animation in Lithuania”; moreover, AVT was analysed from another perspective, i.e., audiences’, and how they approach AVT types in “Attitude of the Lithuanian Audience towards the Mainstream Audiovisual Translation Modes” (Asali-van der Wal and Satkauskaitė, 2018; Astrauskienė and Satkauskaitė, 2022; Koverienė, Pasvenskienė, and Satkauskaitė, 2014; Koverienė and Satkauskaitė, 2014; Satkauskaitė and Drėgvaitė, 2011; Satkauskaitė and Kuzmickienė, 2020; Satkauskaitė, Onskulytė, and Abraitienė, 2015). It is indisputable that research in AVT is actively carried out from various perspectives and the scale will probably increase; though what could be distinguishable that MT is not a component of research, for this reason it could be summarized that MT incorporation in AVT context is insufficient.

Given these points, AVT is widely spreading, considering the amount of translation types; it is predictable that the list will lengthen in the future, as the speed of consuming audiovisual media is rapidly growing. AVT is making its way without passing Lithuania as well; since the late twenties, the research has started and now a number of various articles, PhD Thesis contribute to translation studies. Topics as subtitling, voice-over, and dubbing are recognized and induces researchers' interest, although other topics as audio description or subtitling for the deaf and hard of hearing are analysed as well, seeking for a greater scale accessibility. Nevertheless, as technologies are employed in our everyday life, they should be taken into account in research likewise, currently, technological approaches, as MT incorporation in AVT are neglected or, another possibility, that it is too early to examine it in Lithuania and in the future more research will be carried out.

1.1.2. Complexity of translating subtitles

AVT, as introduced in 1.1.1 subchapter, is a complex area involving the producing of multimodal and multimedial content for the target audience, subtitles are no exception. Cintas and Remael (2014) acknowledge the complexity of subtitles and indicate that three main AVT types (subtitling, dubbing, voice-over) are constrained by synchrony and time, i.e., characters' actions have to be supported and the translation should be synchronised with the original (Cintas and Remael, 2014). For this feature AVT can be described as a constrained translation, while the text is a more complex communicative event and a message is conveyed through drawings, pictures, music, etc. Bartrina and Espasa (2005) emphasizes this factor as well, that the specificity of this type of texts is that they are received through acoustic and visual channels; moreover, the synchrony between verbal and non-verbal messages is of crucial importance (Bartrina and Espasa, 2005). Therefore, the translation is influenced by other elements and attention should be paid to specific issues (Bartrina and Espasa, 2005). The rest of the section will broadly overview, what constraints determine the translation of subtitles process.

Audiovisual translation is a unique type of translation due to its multifacetedness, as from one side there is a product with its genres, many different channels and semiotic meaning, while from the other there is target audience, language peculiarities, culture, etc. For the former characteristics, AVT nature is widely recognized as complex, since there are many factors and constraints to consider. Preparatory to analysing the constraints, it could possibly be practical to get acquainted with subtitlers activities and types of tasks.

Firstly, a subtitler segments the target language units that they would coherently correspond the source language subtitles; then translates the content and, he/she can be asked to cue subtitles as well (Pedersen, 2011). Despite the latter mentioned processes, a subtitler performs even more of them; he/she edits subtitles in order to meet spatial and temporal constraints and consequently condensing or reducing the original content (Pedersen, 2011). Research should be taken into consideration as well, because sometimes there is a necessity to check any references in the source text, for instance, names or cultural elements, since the subtitler should understand and accurately render these references (Pedersen, 2011). The last step is to proofread the translation, this step should be valid regardless of whether the company, which ordered a task, has in-house editor for such jobs (Pedersen, 2011). During all of these steps constraints should be taken into account; they are presented in the following paragraphs.

Subtitling nature is distinguishable by a dynamic multimedia environment, in a way that a dialogue is translated according to semiotics of audiovisual material and is not only a linguistic practice; since

subtitles signify the translation of a spoken text to a written one, a semiotic switch takes place, constraining the whole translation process (De Linde & Kay, 2016; Pedersen, 2011). Three peculiarities of subtitles could be singled out: the transmittance of the target text should correspond a dialogue of the source text and subtitles should conform with characters' actions; the second one is that spoken language is changed into the written one, in many cases omitting redundant lexical units (Matkivska, 2014). The third and the most conspicuous constraint of subtitles are spatial and temporal with respect to the limited space on a screen, subtitles consists usually no more than two lines; moreover, there is a character (any written symbol by pressing a key) limit, which should not be exceeded due to the space and the reading speed (Pedersen, 2011). Based on practice, subtitles usually contain no more than 35 signs, while two-line subtitle consist of 70 characters at maximum (Matkivska, 2014). Reading speed is influenced by the nature of the original text itself, precisely if the lexis and syntax are more complex, it requires longer exposure time (an amount of time for displaying subtitles); polysemiotic element should be taken into account as well, for example, if the plot is filled with special effects and actions, probably the viewer's attention will focus more on the visual channel instead of the verbal one or if the subtitles closely reflects the verbal channel, maintaining the equal word length, the reading speed might be too long (Pedersen, 2011). Notwithstanding definitions of the main constraints of subtitles, it is beneficial to analyse deeper technical and linguistic parameters of subtitles.

Subtitles can be analysed by an additional amount of technical and linguistic parameters. Pedersen (2011) indicates that translation for subtitles is distinctive from other forms of translation due to technical aspects, with which many subtitlers encounter every day in their work. The author highlights the weight of technical aspects for translating subtitles; when the translation is mentioned, probably for most of the people the linguistic aspect firstly comes to their minds. However, when translating subtitles, the technical aspect influences the translation process and is stated as a priority, while the linguistic, stylistic, or cultural decisions are constrained and should be pushed aside (Pedersen, 2011). To start with the technical restrictions, the positioning of subtitles ordinarily is indicated in guidelines or by mutual consent. Position of subtitles depends on each country, for example, in Japan subtitles are positioned vertically, on the side, although in Europe they are traditionally places at the bottom of the screen, usually centred; nevertheless, subtitles on the screen are not static, because if in language service providers or translators opinion they should be raised, since they cover an important visual detail or credits, then they are welcomed to do or instruct so (Pedersen, 2011). In most cases, television and video subtitles for the deaf and hard of hearing are placed underneath interlocutors; consequently, they are not necessarily centred (Bartoll, 2004). Filing of subtitles could be explained as whether they are an inseparable part of an audiovisual product (overprinted), or contrarily, they are stated as independent from the product and can be easily altered (Bartoll, 2004). Mobility refers to fixation of subtitles, are they in motion while appearing; it is stated that in Western countries, they usually appear from right to left, while in particular Eastern countries, they are positioned from left to right (Bartoll, 2004). Consequently, optionality divides optional (closed) subtitles and non-optional (open) subtitles. Optional subtitles can be chosen to be shown or not, for example, in television or the Internet, as non-optional subtitles are fixed on screen and cannot be turned off (Bartoll, 2004). The abovementioned parameters should be taken into account deciding how much time it will take for a subtitler to translate subtitles, an audiovisual product and where it will be broadcasted.

In terms of linguistic restrictions, language is the first linguistic parameter and is mainly intended for intralingual subtitles, since they can be specified by a target audience; subtitles can be transcribed for the deaf and hard of hearing or they are completed for the cases of learning languages or singing karaoke, where the lyrics should be complete (Bartoll, 2004). Audiovisual products share more linguistic attributes; first of all, most audiovisual products contain dialogues, which represent spontaneous speech, abundant of questions, exclamations or interjections, rhymes, jokes, ellipses, grammatical deviations, and etc. (Matkivska, 2014). Other linguistic issues for AVT are dialects, accents, and slang, which give an impression of a specific shades and features for characters, either negative or positive; however, they are inherent for the product and grab audience's attention, therefore, the effect should be retained to a broader or a lesser degree, which can be a challenging task (Matkivska, 2014). Although the linguistic constraints were presented in this section, they are present in most of audiovisual products, since the human speech is a very live and unpredictable process.

AVT nature is multifaceted and consisting of many components therefore, translation of these products can be a challenging task. In addition to that, it can be problematic to translate subtitles particularly, since there are many constraints to consider, such as the conformity to the dialogue and characters' actions, conveyance of the spoken text to the written one, as well as conformity to spatial and temporal constraints. Translators have to make important decisions and prioritize necessary tasks, determining the quality and the result of subtitles and, in a way, the quality of the whole audiovisual product, which will be broadcasted for the target audience. Considering all these aspects, a system is necessary in order to choose correctly in the most efficient way. Translation strategies might ease the whole translation process and help to reason translators choices; consequently, they will be presented in the next subchapter.

1.1.3. Strategies for translating subtitles

Subtitles, as analysed previously, are a complex mode, requiring not only good linguistic skills and the knowledge of different cultures, but also sharp thinking and decision making. Translators have a possibility to dilate, if there is enough space, or on the contrary, compress subtitles and omit some kind of information. While subtitles have limited time and space available, some speech elements could have to be declined; though there is no unanimous opinion, which elements are best to be omitted (Jing, 2021). The multiplicity of semiotic resources in audiovisual material is present; therefore, subtitles synthesizes with other semiotic elements (Jing, 2021). These elements encompass linguistic, i.e., linguistic, paralinguistic, sound arrangement, musical, and special effects codes, whereas visual elements comprise of photographic, graphic, iconographic, montage, syntactic, and mobility codes (Varela and Jiménez, 2004). Per contra, Gotlieb (1998, as cited in Kerevičienė and Urbonienė, 2017) name four channels of information in total: verbal audio channel (dialogues, songs, off-screen speech or voices); non-verbal audio channel (music, off-screen sounds, sound effects); visual and verbal channel (subtitles, notes, signs, on-screen inscriptions); non-verbal visual channel (on-screen pictures). Considering all the present elements it can be stated that AVT could be explained as a synchronized correlation between verbal and non-verbal elements, in this way mediating interaction of a language and other communication modes, existing withing the text (Kerevičienė and Urbonienė, 2017). This mediation is essential for the translation of audiovisual products, on the grounds that: "Only translators can be aware of the totality of the message, which determines their decisions. In the final analysis, it is the message alone, a reflection of the situation, that allows us to judge whether two texts are adequate alternatives." (Vinay and Darbelnet, 1995).

The authors' view is supported by Matkivska (2014) who states that the concept of equivalence is significantly extended by the multimedial character of AVT; AVT equality ought to be prevailed as the equivalence not only between linguistic elements of source and target languages, as well as the original and its translation should provide a suitable link between the verbal and non-verbal structures (Matkivska, 2014). Chesterman (1997) adopts another perspective, stating that the aim should be not equivalence, though the best version that translation can think of, which would be regarded as an optimal translation. In order to warrant this kind of intention and reach the best possible decision, subtitlers' actions should be reasoned; therefore, a systematic approach is necessary, in this case it is translation strategies.

Before analysing existing strategies for translating audiovisual production, it could be beneficial to know, what factors affect subtitlers and their choice. Pedersen (2011) categorizes seven parameters: transculturality, extratextuality, centrality, polysemiotics, media-specific constraints, co-text, and subtitling situation (Pedersen, 2011). The first three parameters are specifically intended for extralinguistic cultural references, therefore, it is worth focusing on the rest, as they can be applied for more general subtitles. As mentioned above, polysemiotics play a crucial role in the translation of subtitles, as a whole consists of many components, as the view, sounds, subtitles, characters, etc. Polysemiotic interplay can be of a high level between those components (during on-screen action or intense dialogue) and of a low level (during a monologue) (Pedersen, 2011). It is worth memorizing for subtitlers, since it can depend, whether intersemiotic redundancy is relevant and how much information is significant to translate. Media-specific constraints were mentioned in the previous subtopic; for this reason, it will not be repeated again. Co-text basically signifies a repetitive verbal information, which have been already presented in subtitles; therefore, subtitlers can replace the firstly mentioned term with an abbreviation or a pronoun, which promotes faster reading speed (Pedersen, 2011). Subtitling situation raises questions about the texts, as the production norms, genre, style, register, a target audience, broadcasting, pragmatic issues, etc., which helps to create a bigger picture and understand the situation, and, consequently, necessary actions more explicitly (Pedersen, 2011). Matkivska (2014) complements this idea suggesting that during the translation of audiovisual product, the age and status of the target audience, as well as the genre should be taken into consideration; subtitlers' decisions can depend on this particular information. Since there are even more aspects to be considered while translation, subtitlers' contemplating could be supported by translation strategies, which are able to systemize the features of audiovisual product and to make decisions.

Scholars had formulated different methods to identify, what types of choices translators make in order to translate texts from a source language to a target language; in addition, they name these methods differently. Gambier (2010) reasons this ambiguity of terms by various disciplinary backgrounds, investigations purposes, and the scope of studies. One of the terms is *procedure*, describing the process of shifting between languages, which can be applicable for smaller language units, e. g., sentences, while *techniques of adjustment* signifies an aim to provide correct equivalents; *translation strategies* serve as a tool, mechanism, or a method to solve issues arising during translation (Gambier, 2010). Explication of translations strategies could be supplemented that it is a set of rules or principles which are used in order to reach a goal raised by a translator in the most efficient way (Matkivska, 2014). It can be assumed that procedures or techniques are narrower terms of strategies, because procedures or techniques can be implemented while translating various smaller units, though one main strategy is followed throughout the whole translation process. Correspondingly, translation

strategies are widely implemented by translators and accepted as a standard conceptual tool (Chesterman, 1997). A few types of strategies are worth to mentioned in order to create a bigger picture, how they are described and put into practice.

Vinay and Darbelnet (1995) distinguish seven of them; the first one is borrowing, when in the target language a new and unfamiliar concept is presented, and a knowledge gap is necessary to be filled. In this case, a term from the source language is borrowed, it is a common case with culture specific items; at first it can seem quite foreignized, although after time the term can be of everyday use and well-known for the target audience. It is worth noting that borrowings have been widely spread and they are not considered as foreign words anymore, for instance, 'menu' or 'déjà vu' are of French origins, though they are recognized in English speaking regions, as well as in Lithuania (Vinay & Darbelnet, 1995). The second strategy is calque, when an expression is translated literally, though at the same time the form is borrowed from the source language; calques can be lexical, reserving the syntactical structure of the target language, or structural, presenting new constructions into the target language (Vinay & Darbelnet, 1995). Calques can become a part of the target language as well as borrowings, the only difference between them is that calques sometimes undergo a semantic change, during which they can turn into faux amis (Vinay & Darbelnet, 1995). Literal translation is the third strategy, alternatively labelled as word-for-word translation and this strategy serves as a direct transfer from the source to the target language with the maintenance of the grammar and the idiomaticity (Vinay & Darbelnet, 1995). Transposition denote one word class replacement with another one, while not changing the meaning of a message (Vinay & Darbelnet, 1995). Authors emphasize the awareness of this strategy implementing for translators, that they should choose the transposed translation if it fits the utterance better or allows to retain a peculiar nuance of style; moreover, it can be added that subtitlers employ this strategy quite often, as due to space and time constraints they are compelled to transfer an idea in shorter way (Vinay & Darbelnet, 1995). The fifth strategy is modulation: changing the point of view in order to varyate the form of the message; it can be used, when a translation is grammatically correct, although lack suitability, idiomaticity, and appear as awkward (Vinay & Darbelnet, 1995). Consequently, equivalence is stated to be used, when the same situation can be translated in an absolutely different structural and stylistic way, a good examples could be onomatopoeias, clichés, idioms, proverbs, and adjectival or nominal phrases (Vinay & Darbelnet, 1995). The last strategy, adaptation is used in situations, when the idea in the source language is completely unfamiliar for the target language and translators should create a new situation, which will be acceptable as well as understandable for the target audience (Vinay & Darbelnet, 1995). Although seven strategies could seem as an optimal number, neither too much nor too little, the number can vary, as it is evident in next presented strategies.

Chesterman (1997) has distinguished even more comprehensive list of strategies, 30 of them in total, each category comprise of 10 strategies. Syntactic strategies define entirely syntactic changes and form manipulation: literal translation, loan or calque, transposition, unit shift, phrase structure change, clause structure change, sentence structure change, cohesion change, level shift, scheme change (Chesterman, 1997). Semantic strategies principally specify changes of lexical semantics and clause meaning, during which, the meaning is manipulated, they are as follows: synonymy, antonymy, hyponymy, converses, abstraction change, distribution change, emphasis change, paraphrase (Chesterman, 1997). The last group is of pragmatic strategies are related to the sorting of information in the target text, they can possibly manipulate the message, they compose of cultural filtering, explicitness change, information change, interpersonal change, illocutionary change, coherence

change, partial translation, visibility change, transediting, and other pragmatic changes (Chesterman, 1997). This list is particularly extensive; however, some other researchers intend to compress the amount strategies and to simplify them.

Each strategy could be stated to have its own peculiarities, however, one in particular might have more significance than the others and it is condensation (reduction). It does not necessarily should be included in the list of translation strategies; though due to its commonality, it is regularly frequent in the audiovisual translation process (Pedersen, 2011). Kovačič (1994) entitles this process as reductions, which can be partial, i.e., implementing condensation and simplifying sentences of a complex structure, or merging conversational turns and dialogues into single units (Ghia, 2012). The other possibility to compress subtitles is via total reduction, which comprise of information deleting, since it is considered redundant and unnecessary, for example, repetitions, addresses, or phatic expressions (Ghia, 2012; Kovačič, 1994). Pedersen (2011) strengthens the prevalence of condensation that subtitling process could not be discussed without taking into consideration the condensation itself (Pedersen, 2011). Principally, implementation of condensation happens when a subtitler leaves any parts of subtitles out and prioritizes other elements or edits the original idea in order to transfer the almost identical idea in other words, which are shorter than they would be of literal translation of the original text (Pedersen, 2011). Nevertheless, the situation is not entirely negative: the viewers does not experience only loss when watching audiovisual material with the target language subtitles, as the condensation is compensated through other channels (gestures, actions); therefore, this choice of subtitler could be expedient and fruitful (Pedersen, 2011). The idea is supported and generalised by an opinion that the polysemiotic nature of audiovisual products benefit in retrieving any of the missing items from co-occurring information (Ghia, 2012). It is possible that the word 'condensation' could have a negative connotation, while it signifies loss of information in subtitling case; nevertheless, if the strategy is employed meaningfully and reasonably, it can benefit both for subtitlers, as they can translate subtitles faster by omitting a part of information, as well for the audience, as they can read subtitles faster and capture the missing information by other semiotic audio or visual channels.

During the subtitling process, not only above-named constraints, though norms, genre, style, register, broadcasting, pragmatic issues a target audience, its age, status, and others as well, for the reason that they help subtitlers to create a bigger picture and understand the essence of their translating product, for whom it is intended. Knowing this information, certain actions could be done, believing that they would be the best for the viewers. Audiovisual products consist of four different channels: verbal or non-verbal audio channels, and visual and verbal or non-verbal channels. They are very important when analysing translations strategies or using them in practice. Subtitlers are aware of these channels and can use them for their benefit while making translation-related decisions, omitting some parts if they are obvious and compensated by other semiotic channels, or adding more information if it is not present or would be difficult to understand for the target culture. Merging all these parameters together, an effective synergy can be created, assisting subtitler to determine necessary actions while saving efforts and time, which nowadays plays an important factor in AVT industry, and consequently, the audience experience no or minimal loss in terms of the content and the amount of information, then the translation quality is stated to be good and satisfying.

1.2. Challenges in machine translation

Machine translation nowadays is of everyday use, and many people cannot imagine life without it. It is incorporated by both professionals (translators, post-editors, etc.) as a working tool, and by lay people for gathering information, which is written in unknown for them language. Although MT systems exist for more than 70 years, there are points of concern in terms of quality and performance of MT, people should be aware of them while using it for their needs; thus, it will be reviewed in a subsequent subchapter.

1.2.1. Metrics for evaluation of machine translation output

Considering the fact that MT is widely used in many spheres and not necessarily by professionals, it is worth analysing deeper how MT is incorporated in everyday routine. Machine translation is increasingly used for gist translation, meaning only to perceive the idea of the source language text; for this reason, MT portals are available on the Internet (Allen, 2003). It is advantageous for users, as it bridges the gap between the source language and the target language; therefore, more people can access valuable information not knowing the language, in which the original was written and which would otherwise be meaningless (Burchardt, Lommel, Bywood, Harris and Popović, 2018). Authors elaborate to this idea explaining that gisting is popular among intelligence services and other bodies, since they firstly gists documents in order to evaluate, whether the information should be translated in higher-quality, or the latter is sufficient (Burchardt et al., 2018). The quality of the output depends on many different factors (source text input, language pair, domain, genre, similarity of the text and optimization material for MT) and if for 'gisting' it is sufficient, typically MT output is needed to be edited for publishing or where higher quality is required (Burchardt et al., 2018). MT could create an impression that it is an easy, open practice, from which people can only benefit in many ways. However, it is more complicated than that, while working with MT professionally can demand a lot of efforts and dealing with the problematicity of MT, which is presented in the following paragraphs.

MT is generally used for translation of texts with predictable vocabulary and structures, where the language is restricted, for instance, technical texts (Burchardt et al., 2018). The reason for it is MT training with traditional written texts, as written restricted text usually has the same structure, there is not so much creativity used. AVT material is of completely different nature, since subtitles or scripts are written representation of spoken dialogue and MT engines are not trained to deal with this kind of texts; therefore, it might not produce high quality and accurate translation. (Burchardt et al., 2018) Bywood et al. (2017) indicate this issue as well, clarifying that statistical MT engines can quite efficiently process naturally occurring language, it does not handle high levels of grammatical irregularities, notably if it is live programmes. AVT is not the only weak point that MT could have issues, they are presented in the next paragraph.

Burchardt et al. (2018) highlights problematic points for MT in AVT: the first one is domain and genre, as audiovisual content is of the broadest spectrum and even with a long and extensive training it will not be sufficient to correctly understand all structure, vocabulary and grammar of texts. Another issue is visual context, since translators usually have visual material and can adjust to intricacies of circumstances, while MT has no access to it; as mentioned above, oral speech is very much different from the written text, for this reason, MT cannot provide a consistent output (Burchardt et al., 2018). Lack of context is the last issue and is related to oral style in which many pronouns are used to describe the situation, due to ambiguity of words or pronouns (you, who, etc.), MT is confused and

can choose the incorrect one (Burchardt et al., 2018). Bywood et al. (2017) adds output quality depending on language pair, as SMT translates better between similar morphology and syntax languages, for example, Spanish and Portuguese, then MT can translate it more directly. There is a possibility that the list can expand or, in contrast, shorten, as MT system is constantly advancing and what was understood as impossible 50 years ago, now is stated as a norm. What is irrefutable that MT advantage work or everyday navigating, although it still has shortcomings.

Machine translation systems can exempt translators from mechanical work and to benefit in a way, that translators' increase of productivity satisfy the increasing demand, though MT quality should not be expected to be the same as human. The system will not understand the text in the same way, not always solve ambiguities or produce texts according to sought norms and intended purpose. (Remael A., 2010) After almost a decade, machine translation is debatable, whether it really cannot match human translation, though it is agreed that the usage of MT technologies in more creative sphere, as AV, is not so common. It still cannot be predicted, how and at what level MT technology will support translators' productivity and creativity in the future; yet in AVT this technology is used less frequently than in other types of translation. (Burchardt et al., 2018) Taking into consideration AVT, translators in this area have technological support, for example, software for subtitling or dubbing scripts preparation and recording, audiovisual translators do not implement translation memories, which are broadly used in text translation (Burchardt et al., 2018). Authors emphasize a prosperous area for MT incorporation, since it could be assumed that MT will percolate in our everyday life more and more. Translators fear that MT could take away their job, leaving them jobless, although from the current view an assumption can be made that MT could be a very good friend of people, working with languages and help for their benefit.

Improvement always requires exact results, in order to provide feedback and observe problematic points. MT is no exception and researchers noticed a need to measure the quality of MT output; there are a few ways to do that. Lommel et al. (2014) distinguish evaluating methods into two main types; the first one is analytic method used for a quantitative analysis, being more specific, to count errors in a translation, they are considered as deviations from the text, while the text is normative and complies with the guidelines. The second type is holistic method, during which a text is perceived as a whole, not categorising it to segments or errors; questions are expected to be raised and convenient scalar values are provided, therefore, this method can be effective, when an evaluation is performed impromptu and promptly (Lommel et al., 2014). In addition, the authors emphasize that aforementioned methods could be connected together by forming questions from issue types of the metric, or on the contrary, identify issue types from the present questions (Lommel et al., 2014).

Burchardt et al. (2018) categorize the most common research types for evaluating quality of MT output, which can be applied in subtitling as well:

1. Automatic MT output evaluation based on algorithmic comparisons of MT output with human reference translations: quick and repeatable method, which can possibly be improved applying automatic metrics;
2. Automatic MT output evaluation without human reference translations (quality estimation): a trained system uses scores or rankings, which are assigned by translators in order to improve metrics;

3. MT output ranking of different systems by human evaluators: relative performance of particular systems and their variants, since neuro-linguistic programming researchers perform a ranking during the Workshop of Statistical Machine Translation tasks;
4. MT output post-editing by human evaluators: different aspects of PE efficiency are measured, and the acquired data is analysed. PE is performed again, during the Workshop of Statistical Machine Translation by neuro-linguistic programming researchers;
5. MT output error annotation by human evaluators: a detailed MT output error analysis, consisting of accuracy and fluency errors, distance, word order, etc., can be provided.

MT output is estimated differently, as it was already mentioned, people or institutions have different expectations, needs, knowledge; therefore, they can evaluate MT output differently. This opinion is supported by a statement that the translation of a high quality should take into consideration and comply with specifications, while demonstrating required fluency and accuracy for the purpose of the product and the target audience (Melby, Fields and Housley, 2014, p. 279). The authors highlight the meaning under this citation, as it is meaningful only in a situation, where specifications for translations are determined; therefore, two translations for different purposes or companies could be hardly compared with one another, as their specifications, intent, audience, and many more factors can be completely different (Melby et al., 2014). As Lommel, Uszkoreit and Burchardt (2014) append, translation quality is usually evaluated by bilingual reviewers; though it not necessarily mean that a conclusion will be reached, since their evaluation can be subjective and based on personal expectations; therefore, from that an obscure translation could possibly follow. It is quite subjective and not useful neither for researchers, nor for the industry; for this reason, the search for ways to evaluate it began. The first attempts of establishing universal error types started back in the late 1990s with SAE J2450 standard for quality evaluation of automotive service manuals and by Localization Industry Standards Association developed LISA QA Model quasi-standard, which is based on the best practices (Lommel et al., 2014). These specifications share severity score evaluating, which reduces a possibility of biased opinions, and it is clearer, whether the quality of translation is met (Lommel et al., 2014). However, one of the drawbacks of these specifications was customization, which from one extremity point was too general and in the other extremity was too limited, whereas Multidimensional Quality Metrics (MQM) system were introduced to avert such problems (Lommel et al., 2014). It is developed in the European Union-funded Quality Translation Launchpad and based on already existing metrics for evaluation of translation quality (QTLaunchPad) project are flexible in a sense that can be easily altered to address specific needs, although maintains a degree of interchangeability and consistency (Burchardt et al., 2018; Melby et al., 2014). MQM metrics are developed in order to be language neutral, i.e., suitable to any language pair (Lommel et al., 2014). A few more metrics are related to MQM metrics, one of them is International Tag Set (ITS) 2.0 specification consists of localization quality issue types, which derived from an early stage of MQM, while it constituted of less granular issue types (Internationalization Tag Set (ITS) Version 2.0). MQM metrics could be present in ITS 2.0, although some data could be lost relying on the MQM measurement used, as ITS 2.0 cannot fully represent MQM granularity (Lommel et al., 2014). Another metric in relation to MQM is TAUS Dynamic Quality Framework (DFQ); since the late 2014, developers of these two metrics have joined forces to bring metrics into harmony (Lommel et al., 2014). The two metrics complements each other, because MQM metrics provide standardised and comprehensive metrics, though no interpretation of results or guidance is present; conversely, DFQ metrics does not include an extensive issue type, thus provide guidance, how could quality

evaluations be interpreted for various types of scenarios (Lommel et al., 2014). Hereinafter a comprehensive review of MQM metrics and their definitions are presented.

MQM metrics are updated from time to time, and for this theoretical review the newest version of MQM 2.0 launched in 2022 is presented. MQM is chosen instead of TAUS DQF error typology for a reason that it is a subset of MQM metrics with an aim to satisfy common needs of localization and commercial translation, while MQM can be adjusted for any type of translation and language, definitions and practical examples are present as well to clarify obscure points. The metrics consist of 7 branches, which are consequently specified in sub-branches:

1. Terminology errors occur when a target language term does not conform the source target term, i.e., the meaning of that word is misrepresented.
 - 1.1. Inconsistent with terminology resource – an incorrect use of a term, which is specified in terminology databases.
 - 1.2. Inconsistent use of terminology – different terms are used throughout the text, while consistency should be retained.
 - 1.3. Wrong term – the meaning of a term in the target language does not contravene the term in the source language.
2. Accuracy errors occur when the main idea of the source language passage is conveyed inexactly.
 - 2.1. Mistranslation – the target text deviates from the main idea due to changed meaning.
 - 2.2. Over-translation – the translation is inappropriately more specific than it is required, and general term would be suitable.
 - 2.3. Under-translation – the translation is inappropriately less specific than it is required.
 - 2.4. Addition – the target text includes more information than it is in the source text.
 - 2.5. Omission – part of the source text is missing in the target text.
 - 2.6. Do not translate – instructions are not followed, when it is specified not to translate some part, though it is translated anyway.
 - 2.7. Untranslated – content which should have been translated, but it is not in the translation.
3. Linguistic conventions errors occur when the linguistic well-formedness of the language is not retained.
 - 3.1. Grammar – nonconformity to grammatical rules of the target language.
 - 3.2. Punctuation – incorrect punctuation according to the style or a locale.
 - 3.3. Spelling – letters of a words are spelled in incorrect order.
 - 3.4. Unintelligible – the target text is distorted and not understandable.
 - 3.5. Character encoding – character garbling as a result of choosing incorrect encoding.
4. Style errors occur when organisational or language guide is not respected, although it is correct grammatically.
 - 4.1. Organizational style – violating specific company or organisation style guides.
 - 4.2. Third-party style – violating a third-party style guide.
 - 4.3. Inconsistent with external reference – nonconformity with external resources, e. g., court decision is wrongly relied on, or a citation is not in quotes.
 - 4.4. Register – a particular level (higher or lower) of formality is not retained as it is specified in guidelines or by common language conventions.
 - 4.5. Awkward style – redundant usage of words, or subordinate clauses, because the style of original was not adhered completely.

- 4.6. Unidiomatic style – grammatically correct translation, which sound unnatural for the target culture.
- 4.7. Inconsistent style – different style throughout the translation, possibly due to multiple translators translating the same text.
5. Locale conventions errors occur when locale-specific details or formatting requirements in the target language text are not followed.
 - 5.1. Number format – number format is not adapted for the target locale.
 - 5.2. Currency format – currency format is not adapted for the target locale.
 - 5.3. Measurement format – measurement format is not adapted for the target locale.
 - 5.4. Time format - time format is not adapted for the target locale.
 - 5.5. Date format – date format is not adapted for the target locale.
 - 5.6. Address format – address format is not adapted for the target locale.
 - 5.7. Telephone format -telephone format is not adapted for the target locale.
 - 5.8. Shortcut key – shortcut combinations are not adjusted for the target locale in this way meaning no sense.
6. Audience appropriateness errors occur when the translation is inconsistent comparing it to the target locale or audience.
 - 6.1. Culture-specific references – usage of culture-specific items, which are familiar for the target audience, although would not be understandable for the target audience.
7. Design and markup errors occur when a presentation or a physical design of a target text does not reflect the presentation or design of the source text.
 - 7.1. Character formatting – any irrelevant usage of glyph variations applied to character(-s), e. g., font, font style, font size, color, shadows, etc.
 - 7.2. Layout – inappropriate formatting and arrangement of content (headings, paragraphs, visual material, user interface).
 - 7.3. Markup tag – markup tag or tag component is used mistakenly and due to this reason, the formatting is unacceptable.
 - 7.4. Truncation/text expansion – the length of the target text is either too long, resulting in truncation, or too short, causing uncertainty about the translation quality.
 - 7.5. Missing text – missing part of translation due to technical issues.
 - 7.6. Link/cross-reference – invalid or no longer existing link or URL is indicated.
8. Custom branch can be chosen optionally according to the target language, text type, complexity, as well as other factors (The MQM Error Typology, 2021).

MT is incorporated by many people, to gist information for lay people, who search for information and otherwise could not be able to read it, and for professionals, who are shifting towards automatization and technology employment in their workplace. MT could help translators or linguists by exempting them from mechanical work and increasing their productivity; therefore, allowing to conform the current needs in AVT industry. However, MT has imperfection and if it translates very good for technical documentation, other areas are not so favorable. There are constraints as domain and genre or the lack of general or visual context, due to which, AVT is existing without or with minimal MT interference. Nevertheless, researchers endeavor to improve it, one of approaches is MT output evaluation by creating a specific metrics, which would unify the evaluation process, and, in this way, subjectivity would be avoided.

1.3. Post-Editing Requirements and Norms

Although machine translation is widely used by both non-professionals and professionals, the quality is not always adequate, as MT does simple for the human eye mistakes. Therefore, new ways for a quality increase were sought; one of it is the advent of PE. Post-editing can be executed by a human or automatically. If it is carried out by a human, MT engines firstly obtains a “raw” output and afterwards translators correct if there are any mistakes and verify that a target text is of publishable quality (Chatterjee, 2019). In simple words, post-editing can be explained as a comparing of a source text with a machine translation by humans (usually translators) and making changes for the purpose of creating an acceptable for the intended audience text (Kring, 2001). PE could be explained in more detail, revealing its complexity in terms of the aim of it, possible post-editing methods or guidelines, as well as measurement of this process.

Kring (2001) supplements this idea from the target point of view, as for a person, who will be working with machine translated output, it is essential to be aware of an end user’s expectations for quality, which could possibly be lower than for a translator (Kring, 2001). Allen (2003) strengthens the preceding idea by adding more factors influencing the choice of PE: a client, the expected quality (gisting or publishable) of the final document, the volume of it, turn-around time of translation, residual value of the information, etc. (Allen, 2003). Taking this into account, post-editing is divided into two main types: light (also called fast or rapid) and full (or heavy) post-editing. It is beneficial to analyse these features and researchers have a slightly distinctive opinion, what features compose it.

Allen (2003) explains inbound and outbound translation, taking translation into account and not only PE; he explains that the first one is intended for understanding the translation, as the second one is for communication. Each type has more specifications; inbound translation is divided into rapid PE and MT with no post-editing, though it will be excluded, as gisting was already described in 1.2.1 subsection. The aim of a rapid translation is to translate documentation only in urgent cases, when it is necessary for restricted circulation or information purposes, it could be working papers, annexes, reports, and etc. (Allen, 2003). Rapid PE requires the minimum amount of editing, simply to remove crucial errors, the stylistic errors can be left out without any changes (Allen, 2003). Contrastingly, outbound translation should be corrected appropriately for the publishing, i.e. when many people can read it and evaluate the quality; moreover, there are three types of it: MT without PE, partial PE, and full PE (Allen, 2003). The first type does not entirely support its title, since at least minimal effort of PE is necessary in order to provide a good quality document; it is stated that MT output was sufficient only for weather bulletins, nonetheless, for other documentation, 10 or 20 percent of PE was necessary to correspond to outbound translation (Allen, 2003). Partial PE can be a quite challenging task, since it is hard to describe the term “partial”, how many changes post-editors should make and each of them interprets the level of corrections to MT output differently (Allen, 2003). The last part of the outbound translation is full PE, when the documentation will be published and the quality of it should be parallel to human translation (Allen, 2003). Different PE types might give an impression to be a challenging task, as the borders between them are blur. It is essentially important for translators or post-editors, while they are paid for this task; therefore, it should not require more effort and time that it supposed to, since then part of the whole work would be done for free. Accordingly, PE types were defined with regard to clarify the differences between them and in this way ease PE process.

In terms of light post-editing, an international standard ISO 18587:2017 “Translation services — Post-editing of machine translation output — Requirements” was passed with a reference to TAUS (2016) for determining processes related to PE, as well describing requirements for providing light post-editing:

1. Use as much output of MT as possible;
2. Ensure that information is equal to the source language text, nothing is added or omitted;
3. Edit any inappropriate units;
4. Reformulate sentences, which would not be of incorrect or fuzzy meaning (Translation services — Post-editing of machine translation output — Requirements, 2017).

ISO 18587:2017 standard identify full post-editing features as well:

1. Ensure that all the information is present in the target language text and is not omitted;
2. Edit any inappropriate units;
3. Reformulate sentences, if a meaning is vague or incorrect;
4. Produce correct target language content in relation to syntax, grammar, and semantics;
5. Comply with domain or client provided terminology;
6. Apply punctuation, hyphenation, and spelling rules;
7. Ensure appropriateness for the text type and adherence of client guidelines;
8. Apply formatting rules, if needed. It can be added that the usage of MT output as much as possible is recommended (Translation services — Post-editing of machine translation output — Requirements, 2017).

Krings (2001) analysed and compared examples of light and full-editing and has made a conclusion that performing a light post-editing, machine translation output was changed to be readable without primary difficulties by deleting meaning-distorting and irrelevant for the context words; though it nevertheless can sound unidiomatic and not stylistically conventional to native speakers. As for the full-editing text, it was noticed that the MT output served post-editor as a raw material and it was reformulated (Krings, 2001). Since there are two types of MTPE, which is light and full PE, they require disparate amount of efforts, which are presented below.

Post-editing efforts are differentiated to three types: temporal, cognitive, and technical (Krings, 2001). As claimed by Krings (2001), temporal post-editing effort is the most important economically, the most visible, and the most easily measured, as in order to evaluate the quality of MT, post-editing time is measured. Cognitive post-editing effort encompasses types and the extent of cognitive processes stimulated for the purpose of correcting MT output (Krings, 2001). Technical post-editing effort is emphasized not to be confused with the cognitive one; although it is influenced by cognitive processes, the third post-editing effort is technical, since it deals with technical implementation, for example, the number of cursor movements or deletion/insertion operations (Krings, 2001). Although MTPE is related to human performance and efforts, there is also an automatic post-editing, which assists human machine translation post-editors.

Automatic post-editing (APE) differently than MT can proceed with one language; it corrects errors learning from MT text and human PEs or from triplets (source text, machine translation, post-editing) (Chatterjee, 2019). APE engine can be employed as an interface between post-editor and MT engine; post-editors receive source and MT translated texts for a human correction (Chatterjee, 2019). During this kind of semi-automated translation including post-editing, a vast parallel data is collected of

machine translated output and post-editing done by human; this data can benefit in that MT apply corrections on new data, which can apply terminology to a specific domain, fix typos, or create translator's individual style (Chatterjee, 2019). Automatic machine translation post-editing (MTPE) can reduce costs of repeated manual corrections and, therefore, improve translator's productivity (Chatterjee, 2019). With the improvements of MT and its gain in performance in recent years, it is predicted that nature of work is shifting towards MTPE tasks (Chatterjee, 2019). In addition, it is presumed that MTPE will be a necessity in media field; therefore, the usage of MT in the subtitling industry will be a commonplace and a new job position as subtitle post-editor will be created (Bywood et al., 2017). It is practically discernible that in the future more and more PE tasks will be in demand; this is valid not only for AVT industry, though for others as well.

MTPE is a relatively new practice in translation studies, though it becomes more and more popular and is already described in detail and performed in practice. MTPE is distinguished to be of two types: light, when a vague translation and understanding of information is needed, and full post-editing, which should equate the quality of raw translation. MTPE is measured in terms of temporal, technical, and cognitive efforts to analyse the data and find new or more advanced ways to post-edit material. PE is performed not only by humans, but automatically as well, which helps to improve MT engines. It is a prevalent practice, since it requires less finances, increases productivity and helps translators to translate more content during the same time. Moreover, it is believed that post-editing will take place in translation industry as the main task and in AVT this process will be spreading likewise.

1.3.1. Machine Translation Post-Editing Guidelines

Machine translation is a constantly developing system, which is gaining popularity and the usage of it is growing. Hand in hand with MT, post-editing is gaining more recognition between language service providers and freelancers, due to the fact that it can save costs and improve everyday tasks. For the reason that it is performed by a human translator or post-editor, there is a possibility that PE will be performed subjectively, according to the task performer himself/herself. Post-editing could be meaningless, unless the guidelines are well-defined and presented (Melby, Fields and Housley, 2014). As these guidelines offer clear indications about the performance of a task to post-editors, it saves time, because an unnecessary post-editing is averted (Pérez and Torrejón, 2012). The choice in such cases is made objectively and ensures confidence, since it is not based on their own subjective perspective in terms of a natural flow or style of the text (Pérez and Torrejón, 2012). In this subchapter, a few specific guidelines will be presented to form a broader view and present them from different perspectives.

PE processes can vary according to relatedness to specific processes; based on this, post-editors can define the aim of the text, discourse, register, style, etc. PE processes were defined by Krings and Koby (Krings and Koby 2001, as cited in Pérez and Torrejón, 2012), on the basis of which further PE guidelines and tasks can be distinguished:

1. Source text-related processes are related with reading the source text in segments, paragraphs, or as a whole text with a purpose of reformulation the text morphologically, syntactically, or semantically;
2. Machine translation-related processes indicate a reading MT output as a whole text or divided into segments, analysing elements in the source text, which may need a confirmation, and deciding, if a reformulation is needed;

3. During target text production processes, a new text from already present old elements or new ones added is created. These processes are stated to be as the longest and the most comprehensive one, as it consists of many tasks: correcting the language according to PE guidelines, resolving terminology issues, ensuring terminology and style coherence;
4. Target text evaluation processes comprises of positively or negatively evaluating MT output and comparing the output with the source text;
5. Reference work-related processes refers to choosing of dictionaries, finding collocations, connecting parallel texts, asking for informants. Taking into account these factors, it also involves dictionary or terminology maintenance in translation memory systems, as well as in MT to advance phraseological and lexical accuracy;
6. Physical writing processes consist of linear writing, inserting or deleting, as well as overwriting or rewriting elements;
7. Global task-related processes are related to task management, such as PE tasks, feedback report, collection of issues samples, updating MT and pre-/post-editing tools, guidelines and other related documentation, which is necessary in order to provide MTPE (Krings and Koby 2001, as cited in Pérez and Torrejón, 2012).

These clarifications could benefit for scholars or industry representatives for defining specific PE guidelines, which would improve PE quality and efforts. However, linguists can take advantage of this list by defining their offered tasks and, especially, for determining their rates, since all seven characteristics require different resources and skills.

Relying of a peculiar PE process, distinctive guidelines can be defined, as it was with EDI-TA project. EDI-TA project by *Linguaserve* and *Universidad Europea de Madrid*, which was started in March 2012 and was carried out for 7 months, was conducted in order to define with PE related processes and guidelines (Rico and Ariano, 2014). This project were implementing the following Language Dependant PE rules:

1. To replace upper-case letter with low-case letter, when it is applicable;
2. Date format;
3. Time format;
4. To change the order of figures when it is used as adjectives;
5. To translate -ing forms as infinitive forms, when it is used as a subject;
6. To correct -ing adjectives by translating them as relative clauses or adjectives;
7. To translate the infinitive phrase 'to be + infinitive' with a future tense;
8. To translate the present continuous tense with a future tense, when it is used to refer to a future event happening in the future;
9. To correct translation for verbs 'estar/ser';
10. To replace prepositions 'de' if it is apparently excessive;
11. To insert articles, when it is necessary for conveying the meaning;
12. To translate 'for' as 'para/por' as the case may be (Rico and Ariano, 2014).

It is worth mentioning that the last four MTPE rules would not be applicable in Lithuanian case, as it is specifically for Spanish as a target language; therefore, it has less weight in this literature overview.

It is a good example of how PE guidelines can be language dependant, and, conceivably, benefit for PE process and, in the end, the output could be of a better quality. Language dependant rules can be created for different languages with the aim that it would reflect the language peculiarities more effectively than the general ones.

The quality of the final version of the text is of the highest importance; therefore, an international standard ISO 18587:2017 “Translation services — Post-editing of machine translation output — Requirements” was passed with the intent to describe post-editing types, requirements of it, acquaint and regulate pre-production, production, and post-production processes, as well as describe post-editors’ competences and qualifications. This standard determines three objectives of post-editing process: comprehensible post-edited MT output; corresponding content of source and target language; and compliance with PE specifications and requirements, which are defined by translations service provider (Translation services — Post-editing of machine translation output — Requirements, 2017). PE requirements are specified in the standard as well, which are:

1. Lexical and terminological consistency, compliance with domain terminology;
2. Standard spelling, punctuation, diacritics, special symbols, abbreviations, syntax and different orthographical practices of a target language;
3. Compliance with existing standards;
4. Correct formatting of the source document;
5. Relevance for a purpose of the target language content and a target audience;
6. Compliance with client-translation service provider agreements, if they are provided; in such cases, additional requirements can be provided and asked to be followed (Translation services — Post-editing of machine translation output — Requirements, 2017).

A question could be raised, whether post-editing should be carried out with both source and target text, or only with one, target text. Pérez and Torrejón (2012) point at this issue from a practical position, i.e., that in the translation industry there is no unified agreement due to time-saving aspect; whether post-editors should have access to the source document, while it may be ascertained as decreasing productivity (Pérez and Torrejón, 2012). The authors complements this idea from their personal position that providing the source document for post-editors is crucial in cases of low quality MT output, when it is impossible to understand and, consequently, post-edit the text in a qualitative manner (Pérez and Torrejón, 2012). This idea is emphasized by ISO 18587:2017 standard, which establish post-editor’s tasks, which are as follows: to read an MT output and evaluate, whether a reformulation of the target language output is indispensable; to use the source language text as a reference for the reason of understanding and correcting (if necessary) the target language text; and to produce target language text from MT output elements or to translate from scratch (Translation services — Post-editing of machine translation output — Requirements, 2017). Precisely the second task highlights the importance of the source language usage in order to provide PE of better quality and without any errors or inaccuracies.

PE is mostly scrutinized from the human perspective, how they should perceive the text, what guidelines should be followed, and etc. Though PE is not that elementary, while MT is incorporated in this activity as well and should be taken into account while preparing or performing PE. Research indicates that post-editing output of high-quality machine translation can increase translators productivity comparing to translation from scratch (Plitt and Masselot, 2010). Another crucial aspect is emotional preparation and informativity. According to SUMAT project in terms of post-editing

process, post-editors post-edited subtitles faster and had a positive attitude towards the task when an extensive, careful preparation was provided, afterwards, a comprehensive briefing and a possibility to ask as many questions as possible were available (Bywood et al., 2012). The importance of post-editors' feedback should be also taken into consideration, as well as communicating prevailing limitations of MT, since it influences the emotional state of post-editors. Another important aspect for the research of post-editing is that subtitlers felt more confident and the task became uncomplicated for gaining practice and understanding typical errors made by MT (Bywood et al., 2012). It is clear that the key to successful PE is communication without preconceived notions about it; of course, it could be unpleasant to present MT and its output as flawless, with a necessity to correct irritating or mechanical mistakes, although if post-editors are informed about it, the attitude towards it will be much more positive.

An implication can be strongly made that as PE is gaining awareness and might be not understood as naturally as translation, revision, proofreading, and other linguistic tasks. For this reason, clear guidelines should be distinguished in order to create credibility and facilitate the job for post-editors, as it is stated that without them, PE will be meaningless. Guidelines help linguists to plan their time and rates accordingly, as they decidedly can take the task without doubting every action. Guidelines can be language dependant, i.e., created for a specific language and its norms, or general, which could be applicable for any language. The former is ISO 18587:2017 "Translation services — Post-editing of machine translation output — Requirements" standard, in detail describing post-editing types, requirements of it, acquaint and regulating pre-production, production, and post-production processes, defining post-editors' competences and qualifications. Guidelines are not the only material that should be provided for post-editors; they should have source and target documents, since it is proved that in this way quality could be enhanced and post-editors obtain a better knowledge of area field; therefore, they can adapt the MT output in greater detail. The last suggestion is to communicate about the components of the process, as MT output, possible errors and expectations, as it changes post-editors attitude towards a more perspective side. Generally, it is evident that MTPE is taking place in the language industry; the situation and attitude could drastically change in the future, as it might become the new standard.

AVT can be stated as one of translations studies areas, i.e., it is universally recognized field, gaining importance and popularity both by researchers and users. It is a unique field comprising of many types and there are many linguistic, temporal, and technical constraints to consider, especially in subtitling. Despite AVT acknowledgement, MT, existing more than 50 years, is scarcely or insufficiently incorporated in AVT, while other industries have adopted this technique in order to exempt translators from mechanical work, diminish turnaround times and costs of translation. It can be peculiar due to problematic point of MT engines while translating audiovisual products, e.g., domain and genre and a lack of context, since for human translators are provided with supplementary material and translating process usually do not cause difficulties as for MT. It is assumed that in the future procedures will change and MTPE, which is further divided into light and full PE, could be the main activity in the language field for translators and subtitlers. In order to obtain a MT output of high quality, PE guidelines should be defined unambiguously and in regard to the target language conventions. All in all, both AVT and PE consist of more than one type, and they include different requirements for translation or post-editing; therefore, specifications are of the utmost importance and guidelines should be clearly determined and presented to translators/post-editors, since the result can drastically differ from expectations and the quality might not meet the intended purpose.

2. Machine Translation and post-editing evaluation of “Solar System: The Secrets of the Universe” documentary

In this part, MT output and MTPE of “Solar System: The Secrets of the Universe” documentary is analysed. In the selected examples it is displayed, what specific metrics types could be attributed to indicated errors of the MT output. In this analysis, MTPE will be integrated to present in what way indicated errors could be edited in Lithuanian and how post-editors efforts correlate with existing errors in the MT output. MT post-editing could be a demanding task, while post-editors are required to have a very good knowledge of both working languages in order to understand the meaning. The documentary is of astronomy field; therefore, post-editors are required to have some knowledge in this sphere or to have skills of gathering information. Lastly, this could be not a usual text, to which they are accustomed; the material consist of subtitles and, accordingly, the task could be challenging due to constraints and the fact that it is more complicated to change the structure of a sentence; hence, improvisation should be invoked. It is evident from the analysis that accuracy and grammar are the most substantial errors identified in the analysis. MT engine is lacking employment of language conventions on a bigger scale; moreover, the information in the output could be more thorough produced, since a part of errors consist of slightly or greater discrepancies, which might affect the audience in a negative way not only for the quality of subtitles, though for an audiovisual product in general.

2.1. Methodology

The data for the final master’s project was chosen “Solar System: The Secrets of the Universe” documentary, from which 300 subtitles were selected. The reason for this decision is based on Ortiz-Boix (2016), who explained that according to analysed free and online MT engines and their promising results, as well as their types of errors, this genre could be possibly post-edited successfully (Ortiz-Boix, 2016). It is of a science related field, specifically physics, astronomy; therefore, an assumption can be made that it could be easier to translate for MT engine. Notwithstanding, the documentary remains of audiovisual nature, as the product is subtitled and the text is not coherent, though divided into segments of subtitles; therefore, it might be not usual for post-editor’s eye. In practice, subtitles have time/spatial constraints which should be taken into account and conformity should be present not only with the language norms, though reading speed, character limit and construction of subtitles as well. In this master thesis it will not be scrutinized, since an assumption is made that it is too early to incorporate MT in AVT professionally and MT engines are ought to be acquainted with audiovisual texts at first; therefore, this analysis will focus on linguistic parameters of the object. As of MT engine, Google Translate engine was chosen. This step was justified according to Och (2012) that more than 2.4 billion people are using Google Translate every year; for this reason, it is learning incredibly fast and has much information to rely on and there is a high possibility, that the number is higher at the current moment. It is believed that a huge database and a usability could provide a better output of subtitles translation.

The analysis consists of qualitative approach; evaluation is based on the MT output, classified by error types and their quantity. For this research, a Multidimensional Quality Metrics (MQM) developed by Lommel, Uszkoreit, and Burchardt at the QT-LaunchPad project were chosen (Lommel et al., 2014). MQM error typology is chosen for the analytical part for a reason that it can be adjusted for any type of language and translation domain. There are definitions and practical examples as well with the aim to resolve any ambiguities. Evaluation in this taxonomy is performed manually and

standardised types of issues itself are extensive due to definitions and explanations; therefore, an analysis should be more precise and beneficial. It is worth mentioning that some parts of the typology were omitted, which are: design and markup types, since it tackles formatting of a document and technical aspects, while in this analysis the language itself is focused on; unintelligible and character encoding from linguistic conventions, as there were no necessity to open the document with a specific coding; organizational style, third-party style, and inconsistent style under style errors, since there were general guidelines for translation without real clients and MT translated the text itself; therefore, the style can be stated to be consistent; and shortcut key under locale conventions, while it is intended for software products therefore. Two particular types were added to the typology under *accuracy* branch, which are *literal translation*, while it was observed that this type of error is quite frequent, and no possible equivalent was not identified, and *word order*, since it is not a crucial mistake, though the right word order increases coherence of a text.

For the post-editing part, three participants were chosen; all of them have a bachelor's degree in translation and one has a master's degree in translation; therefore, they have more than basic understanding on how the text should be conveyed, what level their quality should be and other peculiarities. The number of participants is not incidental, while TAUS guidelines provide a valuable insight that productivity varies by individual (Massardo, et al., 2016). Consequently, it is suggested to choose three post-editors for a small scale productivity tests, since participants have different background and experience in translation or post-editing and in this way, the results and average measures could be more concrete (Massardo, et al., 2016). The process is monitored considering temporal and technical aspects; therefore, Translog program is adopted to track keystrokes, cursor activity, and changes in the target text. For the analytical part, statistics and linear view data is analysed in order to measure technical and temporal MTPE efforts and visualise MT post-editor's actions. Since the data of the linear view is included in the analysis, it is essential to understand symbols: pauses are marked as dots or numeric value, signifying a longer duration between two passages; a triangle point to the left signifies backspace; triangles pointed up and down represent mouse clicks; arrows are intended to mark cursor activities to four possible sides; and information in brackets is generally related to deletion or copying (Stachowiak, n.d.). Defined symbols were categorized by colors, i.e., fixation events (pauses) are marked in red, dark blue color signifies keyboard events, while mouse events are of brown color; it is worth to mention that these categories will constitute a part of MTPE analysis.

The analysis is structured as follows: subtitles of "Solar System: The Secrets of the Universe" documentary are converted into text implementing Subtitle Edit software; afterwards, they are manually machine translated using Google Translate engine; the output is categorized according to the provided types of errors; post-editors are familiarized with post-editing guidelines; post-editors post-edit the translated output; from the classification and evaluation of MT output and post-editing, conclusions are drawn. Limitations of this research can be related to the MT engine; although it is learning extremely rapidly and the output could appear of a better quality than before the rise of NMT, there are weak points of it and the output might not be of expected quality; although it is fundamental to conduct a research, on the basis of which it would be possible to determine state of the art situation. Moreover, every post-editor has its own perception of the world and there can be not only one possibility of post-editing. For this reason, there is a need of awareness and interpretation of results.

2.2. Evaluation of machine translation output and post-editing efforts

Subtitles of the selected documentary were machine translated and afterwards post-edited by human post-editors. Error classification of machine translated subtitles of a documentary, based on MQM error typology, is presented in Fig. 1. Percentages represent the amount of mistakes identified during the classification.

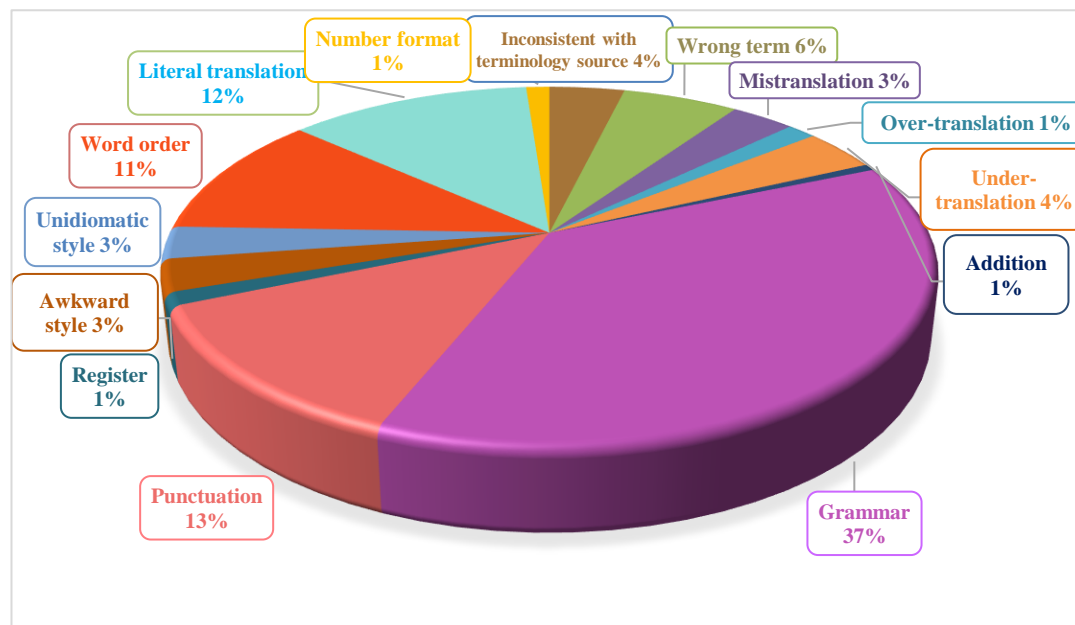


Figure 1. Number of error types in subtitles

From the above presented diagram it is evident that the largest amount of mistakes is under grammar type, which is 37 percent, punctuation from linguistic conventions branch is in the second place with 13 percent, while literal translation from the accuracy branch has 12 percent, and word order comprises 11 percent. Other worth mentioning error types would be wrong term (6%), inconsistent with terminology source (4%), awkward style (3%), unidiomatic style (3%), and mistranslation (3%). The frequency of other types was not so high, it could be worthwhile to mention that two types of issues, i.e., inconsistent use of terminology and untranslated were identified one time each; for this reason, they are not presented in the diagram, since percentage conversion comprises zero percent. Nevertheless, their worth and influence for the final product is not diminished and they are analysed equally, as the other types. Interestingly, 81 cases out of 300 are identified as correct, which could be presumed as quite promising results in terms of MT incorporation in AVT.

From the types, which have the most mistakes in the MT output, two of them belong to the linguistic conventions branch and the equal amount (literal translation and word order) to the accuracy branch. Accuracy mistakes are a complex task for a MT engine and researchers acknowledge that; hence, one of the possible outcomes would be machine translating more texts of audiovisual nature. Subsequently, MT engines might comprehend it in more detail and provide a translation of improved quality. Regarding linguistic conventions, issues may be straightforwardly solved for translation into Lithuanian language, in case that existing rules would be transferred to the MT engine. On the Internet, many grammatical rules and general conventions with comprehensive explanations and examples are published. The suggestion is strengthened by a fact that the possible learning information is stored in authorized websites for Lithuanian, for example, The Term Bank of the

Republic of Lithuania, State Commission of the Lithuanian Language, Dictionary of the Lithuanian Language, Universal Lithuanian Encyclopaedia and the list is not finite. Overall, these results indicate that these branches are the most difficult for a MT engine to translate and (post-)editors should pay more attention to the mentioned types, as they are essential for a target language and the audience acknowledge the present mistakes and the quality in general.

MTPE was performed in order to measure required efforts for post-editing of audiovisual material, specifically subtitles. Three post-editors completed the task using Translog software; therefore, statistics could be valuable to present.

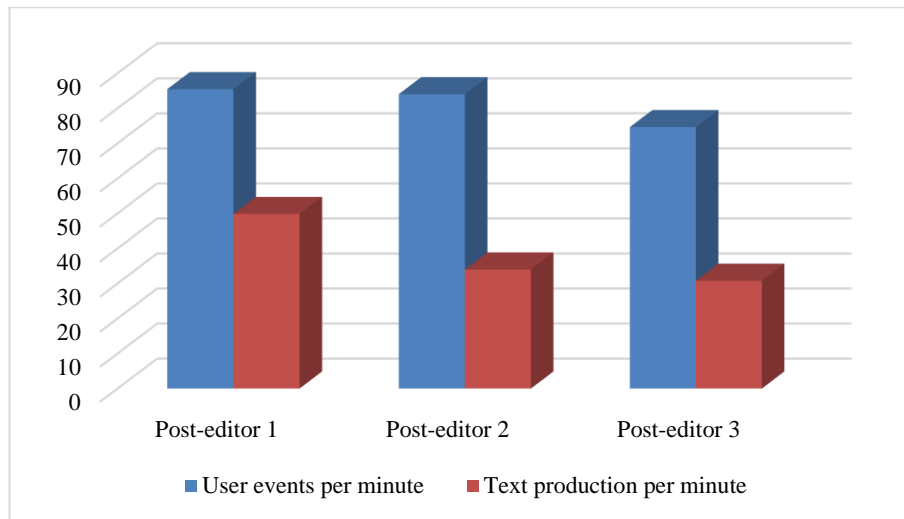


Figure 2. Temporal MTPE efforts

In terms of temporal MTPE efforts, post-editor 1 spent 1 hour, 35 minutes and 75 seconds, while post-editor 2 spent 1 hour, 38 minutes and 58 seconds, and post-editor 3 dedicated 2 hours, 35 minutes and 42 seconds. Accordingly, user events per minute differs in the highest amount of the post-editor 1 events, the number of which is 85.45, while the post-editor 2 is 84.02, and the post-editor 3 is 74.62. Text production of the post-editor 1 is 49.82, the post-editor 2 is 33.98, while the post-editor 3 is 30.76. This data could be based on other diagram, in which technical MTPE efforts are presented.

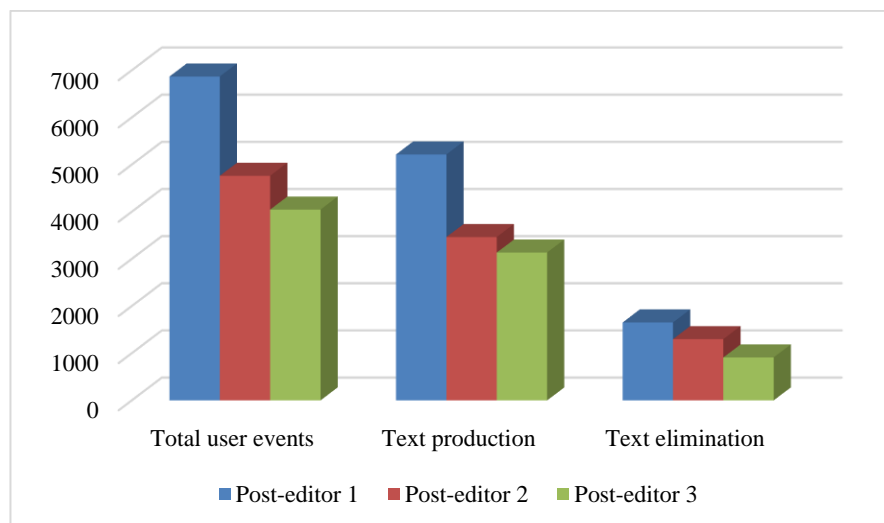


Figure 3. Technical MTPE efforts

From the demonstrated graphs it is apparent that the post-editor 1 performed the most actions from all three post-editors. The number of total user events of the post-editor 1 is 6869, the post-editor 2 is 4763, while the post-editor 3 is 4047. The number of text production of the post-editor 1 is 5216, the post-editor 2 is 3464, and the post-editor 3 is 3136. Lastly, the post-editor 1 eliminated text 1653 times, the post-editor 2 eliminated 1299 times, while the post-editor 3 eliminated 911 times. Reasoning of the statistics could be interpreted differently; perhaps the post-editor 2 have not delved deeply into the MT output and an astronomy area and, therefore, performed less alterations in the text than the post-editor 1. On the other hand, experience could play an influential role, while the post-editor 2 could have more experience in MTPE; for this reason, less changes were decided as necessary, since during MTPE only unavoidable changes should be executed. This reason could be stated for the post-editor 3 performance as well, since she, in most cases, clearly comprehended the material and provided results of appropriate quality. It is worth analysing selected examples in more detail in order to perceive post-editors actions and presume, whether the quality meet the standards and the presented data corresponds to the overall MTPE.

MTPE efforts were analysed in detail according to MQM metrics, the results are presented Fig. 4.

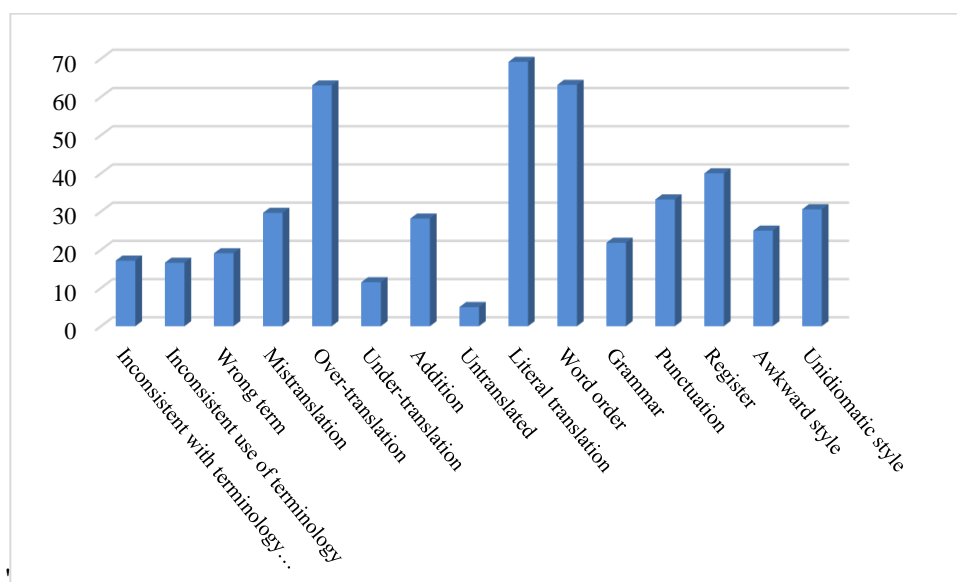


Figure 4. MTPE efforts based on error types

Based on the results, post-editors' temporal efforts, counted in seconds, were of the greatest amount for literal translation (69.16), word order (63.16), and over-translation (63); therefore, it could be stated that these types of errors require the most attentiveness and accordingly time and what is interesting that all three errors appertain to a branch of accuracy errors. Other results distribute as follows: register (40), punctuation (33.16), unidiomatic style (30.6), mistranslation (29.660), addition (28.16), awkward style (25), grammar (21.83), wrong term (19.08), inconsistent with terminology source (17.16), inconsistent use of terminology (16.6), under-translation (11.5), untranslated (5). It is worth to emphasize that the time might depend not only on the error itself, though with the whole subtitle or combination of at least two related subtitles. For example, register error could be related to other words as well, since Lithuanian is an inflected language, and more changes are necessary. Summarizing, it is also observable that MT output analysed based on MQM metrics correlate to MTPE efforts, since accuracy errors were of the highest number in both results.

2.2.1. Inconsistent with terminology source

Inconsistent with terminology source error type defines that a term is written differently in a target language, than it is required by a specialized termbase. This type of error comprises 4% of the selected subtitles.

To begin with, in the first example, a term *snapshot* is presented.

1. OR¹ *Looking at real snapshots from faraway worlds is pretty exciting,*
2. MT² *Žiūrint į tikras akimirkas iš tolimų pasaulių yra gana įdomu,*

According to Cambridge Dictionary, snapshot is a photograph, also could be an informal one (Snapshot, n.d.). The Term Bank of the Republic of Lithuania is one of national termbanks, which is intended to ensure the consistency of Lithuanian terms, which would be available for various public authorities, as well as specialist in different fields not only in Lithuania, though in other countries (Regarding the Approval of the Methodology of The Term Bank of the Republic of Lithuania, 2004). This information database suggests *momentinė kopija* term, which would highlight the informality and a short duration of time for taking it. MT engine translated this term as a *moment*, which would rely on a feeling instead of a clear evidence, as in this case, photograph (Momentinė kopija, 2004). The suggested reformulation of this passage could be *Žiūrėti į tikras nuotraukas iš tolimų pasaulių yra gana įdomu*. Different insights could be interpreted from PE of this subtitle.

3. PE1³ *Žiūrėti į tikrus vaizdus iš tolimų pasaulių yra gana įdomu,*
4. PE2⁴ *Žiūrėti į tikras akimirkas iš tolimų pasaulių yra įdomu,*
5. PE3⁵ *Žiūrėti į tikras užfiksuotas akimirkas iš tolimų pasaulių yra gana įdomu,*

Additionally, linear view of their activity is presented:

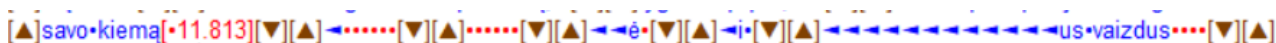


Figure 5. Post-editor's 1 MTPE of term *snapshot*



Figure 6. Post-editor's 2 MTPE of term *snapshot*



Figure 7. Post-editor's 3 MTPE of term *snapshot*

Post-editors edited this subtitle quite similarly as it was corrected in the first table. The term *snapshot* vary throughout the three versions, while the first post-editor spent 11 seconds and chose to translate it as a *view*, the second edited the verb *look*, while taking 6 second, the third post-editor spent 19 second and added *captured* for a more natural sound of the subtitle to the machine translated one. It

¹ OR – original

² MT – machine translation

³ PE1 – post-editor 1

⁴ PE2 – post-editor 2

⁵ PE3 – post-editor 3

could be due to the lack of in-depth analysis, or the term was implied as appropriate and fitting to the context.

The next example is *Eta Carinae*, one of the biggest binary star, which could also be visible in the sky. It could be presumed that the Latin title could be adopted in other languages as well, though in Lithuanian case it is translated as *Kilio Eta*, possibly to domesticate the term that it would be easier for the target audience to pronounce and understand it (Dvinarė žvaigždė savo egzistenciją ruošiasi baigti hipernovos sprogimu, 2014).

6. OR *In this case here, the gigantic star Eta Carinae,*

7. MT *Šiuo atveju čia gigantiška žvaigždė Eta Carinae*

The term is used in Lithuanian National Radio and Television article, which is a reliable source and would not publish fallacious information. In the article *Eta Carinae* is presented as *Kilio Eta*, while leaving the former title in brackets, perhaps for the reason that this name is recognized better in Latin that it is translated in Lithuanian by experts or those interested in this field. It could also happen assuming that the term is created not so long ago, then it is followed by the original name. In Lithuanian language its equivalents are preferred if possible; therefore, the term *Kilio Eta* is chosen as a correct one, resulting in possible reformulation as *Šiuo atveju čia gigantiška žvaigždė Kilio Eta*. Moreover, in order for the target audience to adapt a new term, it should be used by different channels, as in this MT output editing likewise.

MTPE results are as follows:

8. PE1 *Šiuo atveju matoma gigantiška žvaigždė Eta Carinae,*

9. PE2 *Čia matome gigantišką žvaigždę „Eta Cariane“,*

10. PE3 *Gigantiška žvaigždė Kilio Eta*

In MTPE versions there were not a great amount of corrections; although, they are of no less importance. All post-editors altered the subtitle instead of *here written you can see and it is seen*, formalizing the content and raising the register. What is essential in this case that only one post-editor found the equivalent of *Eta Carinae* and translated it as *Kilio Eta*; though the post-editor 2 added quotation marks, distinguishing that the term is not of Lithuanian origin.

Linear view of this term is presented in this way:

Figure 8. Post-editor's 1 MTPE of term *Eta Carinae*

Figure 9. Post-editor's 2 MTPE of term *Eta Carinae*

Figure 10. Post-editor's 3 MTPE of term *Eta Carinae*

The time corresponds to MTPE, since the post-editor 1 changes practically one letter in the output and spent 14 seconds on it, while the post-editor 2 altered the first part of the subtitle and added quotation marks; therefore spending 19 seconds. The third post-editor spent 34 seconds in total in order to find an appropriate term and reformulate the subtitle in a shorter and more coherent way.

Another example is about Mars environment, the term is *pole caps*. Subtitle of it is demonstrated in the below presented example.

20. OR *In summer, the pole caps made of ice melt down,*

21. MT *Vasarą, ištirpsta ledo stulpai,*

As Collins dictionary states, pole caps could be defined as two bright areas at the poles of the planet Mars; they consist of frozen carbon dioxide and water ice (Polar cap, n.d.). The official equivalent for this term is found in Universal Lithuanian Encyclopaedia, which accumulates legitimate information about 22 different topics, for example, human, history, culture, politics, etc. *Ašigalinės kepurės* is the official translation of *pole caps*, which should be rendered in the former MT translation as well (Marsas, n.d.). Unfortunately, it is translated as *stulpai*, backtranslation would be *pillars*; it has a distinctive connotation, not applicable in this case. The reason for it could be literal translation and word-for-word understanding, while a word *pole* could signify the same pillars, although in compound, the pole receive a completely new meaning. If the translator or post-editor is not experienced in this field, it can be assumed that it would be difficult to translate this subtitle and avoid literal translation; therefore, terminology resources help considerably in this exemplification. *Vasarą ištirpsta ašigalinės ledo kepurės*, would be a possible reformulation according to terminological accuracy.

MTPE of the analysed subtitles is demonstrated below:

22. PE1 *Vasarą ištirpusios ledinės ašigalio „kepurės“*

Linear view supplements results:

Figure 11. Post-editor's 1 MTPE of term *pole caps*

Despite the fact that the analysed subtitle were in all three post-editor's work file, only one post-editor corrected the term, which may be not comprehended by the audience or creating a different impression of it. MTPE *ledinės ašigalio „kepurės“* is different from the correction *ašigalinės ledo kepurės*, though it might be reasoned based on term variability; in different sources terms could fluctuate in terms of word order or formulation. In post-editor's selected option quotation marks are present, perhaps due to unfamiliarity. On the other hand, it is usual to create terms from existing words and adding a different meaning and connotation to them. What is evident that this editing could be of appropriate quality and correct regarding terminology.

In methodology of this analysis, it was distinguished that post-editors should have knowledge in the field of astronomy or have information gathering skills in order to provide an appropriate translation. They took advantage of that and translated in a more accurate manner than it did MT. The explanation is simple: MT does not have an ability to search for the information on the Internet as human post-

editors can. It can only use its own corpus to provide translation of as good quality, as it is possible with these circumstances. To sum up this subchapter, MT cannot produce terminology accuracy as satisfactory as human post-editors. One of the reasons is a lack of science, to be specific, astronomy related corpus in order to demonstrate a better quality.

2.2.2. Inconsistent use of terminology

The second error type distinguished in this analysis is inconsistent use of terminology. Supposing that other, more informal genres do not require a higher level of consistency, science and astronomy genre requires it, otherwise the audience could be misinformed or create their own assumptions about different terms, which would not be entirely truthful. In the chosen number subtitles, one case with inconsistent use of terminology occurred; therefore, the percentage of this type of error is insignificant and does not carry a considerable weight.

The precedingly mentioned term is *O-stars*, denoting blue stars, of which temperature reaches 50,000 kelvins according to Merriam-Webster dictionary (O star, n.d.).

23. OR *This is lit by O-stars*

24. MT *Tai apšviečia O žvaigždutės.*

25. OR *With O-Stars being the heaviest and hottest.*

26. MT *O žvaigždės yra sunkiausias ir karščiausias.*

The original version of it consist of one difference: a word *stars* is not capitalized in the first subtitle, as it is in the second one; though it is assumed as a spelling mistake and both of the words carry the same idea. What is interesting that in Lithuanian MT output, the first term is translated as *O žvaigždutės*, i.e., a diminutive form of a word *star*, while the second one as a simple word. It could be implied that it is not significant, and it is just a few words; however, as it was mentioned before, it is of scientific nature and for this reason a consistency is of utmost importance. It could frustrate the target audience in terms of this term, whether there are two different types of stars, some of them bigger and the other ones smaller, or it is equal and script writers intended to liven the speech. In order to avoid assumptions like this, it is always advantageous to choose invariable terms, where the constraints and circumstances require it.

Inconsistent use of terminology error reflect in MTPE:

27. PE1 *Ją apšviečia spektrinės kvalifikacijos žvaigždės.*

28. PE1 *O žvaigždės yra sunkiausias ir karščiausias.*

29. PE2 *Tą apšviečia O žvaigždės.*

30. PE2 *ir O žvaigždės yra sunkiausias ir karščiausias.*

31. PE3 *Jos yra apšviečiamos O-žvaigždžių.*

32. PE3 *O-žvaigždės yra sunkiausias ir karščiausias.*

Linear view could benefit to the analysis of MTPE results:

fishes, or beings not unfamiliar to us, which we have not discovered yet. Although one aspect is evident that the compound signifies a noun and a real object. The translation can be stated as a mistake, since the term is translated as *protingas gyvenimas*, which is a noun as well, though the abstraction is different; the Lithuanian term is stated to be a process or an action, which is life and not a real being and possible editing as *kaip mes galime būti vienintelė žvaigždžių sistema su protingomis gyvybėmis?* The reason of this kind of translation could be due to ambiguity of a word *life*, since it signifies the process of living, a lively expression of emotions, the existence of different beings, and others. The subtitle is comprehended as quite explicit and understandable, nonetheless, presumably MT engine oblige for more context that it could understand, what was meant exactly with the compound. Since MT analyses passages sentence by sentence, a subtitle format could culprit as well, hypothetical, if the passage would be an integral sentence or with more sentences from the sides, perhaps the output would be of a different quality.

Results of MTPE of the first example are presented below:

35. PE⁶ *kaip mes galime būti vienintelė žvaigždžių sistema su protinga gyvybe?*

Linear view supports MTPE actions:

A screenshot of a subtitle editor interface. The subtitle text is 'rotinga•gyvybe'. A mouse cursor is positioned over the word 'rotinga', which is highlighted in blue. The rest of the subtitle is in black. The interface includes standard editing icons like backspace, delete, and undo.

Figure 15. Post-editor's 1 MTPE of intelligent life phrase

A screenshot of a subtitle editor interface. The subtitle text is 'a•gyvybe'. Two mouse cursors are positioned over the word 'gyvybe', which is highlighted in blue. The rest of the subtitle is in black. The interface includes standard editing icons.

Figure 16. Post-editor's 2 MTPE of intelligent life phrase

A screenshot of a subtitle editor interface. The subtitle text is 'a•gyvybe'. Three mouse cursors are positioned over the word 'gyvybe', which is highlighted in blue. The rest of the subtitle is in black. The interface includes standard editing icons.

Figure 17. Post-editor's 3 MTPE of intelligent life phrase

Post-editors noticed the wrong term and its unnaturalness and unanimously edited it equally, i.e., editing *protingu gyvenimu* to *protinga gyvybe*, which would signify live creatures and not a living process. Although results are identical, temporal efforts differ, post-editor 1 edited the subtitle in 7 seconds, post-editor 2 edited in 8 seconds and post-editor 3 edited in 21 seconds; there can be multiple reasons regarding this specific case, though it may be related to other subtitles as well, since the example may not be challenging for human editor.

The second example tackles *drive apart* collocation, which could be interpreted as division of two or more groups apart.

36. OR *driven apart by the cosmic radiation of the suns.*

37. MT *išvartyta kosminės spinduliuotės sauliu.*

38. OR *the shockwave generated by the explosion also drove the cloud apart,*

39. MT *sprogimo sukelta smūgio banga taip pat išsklaidė debesį,*

⁶ PE – equally post-edited subtitle by all post-editors

The main concern regarding this subtitle is that it contains a collocation, consequently, a possibility of a literal translation might emerge. The concern is grounded, as MT engine translated it inaccurately, while a domain expert possibly would have chosen a different expression for this subtitle. To provide some context, the narrative is about “Pillars of Creation”, which consists of gas and dust; thousands of years ago they crumbled due to the mentioned cosmic radiation of the suns. Lithuanian translation for this term is *išvaryti*, backtranslation of it would be expel, banish, drive, etc. The last option conforms the primary term, although just a half of it and MT engine did not grasp the meaning of the compound, in this way translating it not specifically, as it would be expected. It is the effect of the radiation, therefore, *atskirti* (separate) is more appropriate in this context, accordingly, *atskirti saulų kosminės spinduliuotės* might be a better option as the final result. signifying expelling something out by force, it describes an action; taking this into consideration, the translation is partly correct, as the pillars were expelled, though it is more related with a cause and effect, not a direct pushing something away, as the radiation is possible of doing that. To strengthen the inconsistency, the second example is provided, in which the same collocation *drive apart* is used; the only difference is that between the two words, a noun is inserted. To sum up, collocations are a challenging task for MT engine to translate, although there is a chance that it will be translated correctly.

The wrong term error was corrected as presented below:

40. PE1 *juos išardė kosminė saulės spinduliuotė.*

41. PE2 *dėl kosminės saulų spinduliuotės.*

42. PE3 *saulių kosminės spinduliuotės dėka.*

Linear view supports post-editors' actions:

Figure 18. Post-editor's 1 MTPE of term *drive apart*

Figure 19. Post-editor's 2 MTPE of term *drive apart*

Figure 20. Post-editor's 3 MTPE of term *drive apart*

In terms of editing time, the first post-editor spent 10 seconds, the second post-editor spent 16 seconds, and the third post-editor spent 21 second. MTPE results support temporal efforts, since the time could be related with reformulation of this and a previous subtitle, as they comprise a full sentence. Two post-editors employed omission or shifting strategy, while omitting ambiguous term or adding it to another subtitle, since it may be comprehended more smoothly.

The next example includes a term *charged particles*, which is translated as *įkrautos dalelės*.

43. OR *when charged particles of the solar winds enter the atmosphere.*

44. MT *kai įkrautos saulės vėjų dalelės patekti į atmosferą.*

It might be an appropriate translation, while it is understandable that particles are somehow charged; though the word *įkrauti* associate more with charging electronic devices, when the battery is running out. For human post-editors or translators this subtitle should not be problematic, as The Term Bank of the Republic of Lithuania presents the translation of this term and a clearer translation would be *elektringosios dalelės*, signifying electronic charge of the solar winds (Gaivenis et al., 2000). Therefore, edited option *kai elektringosios Saulės vėjų dalelės patenka į atmosferą* is suggested.

The second example correlated to MTPE in this way:

45. PE1 *kai elektringosios saulės vėjų dalelės patenka į atmosferą*

46. PE2 *kai įkrautos saulės vėjų dalelės patenka į atmosferą*

47. PE3 *kai įkrautos saulės vėjų dalelės patenka į atmosferą*

Linear view represents MTPE performed actions:

Figure 21. Post-editor's 1 MTPE of term charged particles

Figure 22. Post-editor's 2 MTPE of term *charged particles*

Figure 23. Post-editor's 3 MTPE of term *charged particles*

Time efforts for the analysed subtitle differ, since post-editor 1 edited it in 12 seconds, post-editor 2 in 8 seconds, and post-editor 3 in 14 seconds. Although the third post-editor spent the most time and edited the infinitive case to the present simple time, only the first post-editor noticed inaccuracy of terminology and found the correct equivalent. Therefore, it could be stated that according to analysis of the specific subtitle, time efforts do not correspond to results and the quality.

In this subsection subtitles, in which a term was chosen incorrectly by MT engine, were analysed. In summary, these results show that MT perceives the meaning of subtitles comparatively inaccurately. The engine either choose an imprecise term due to its ambiguity and multifacetedness or translate relying on its corpus and its own terminology, while the translation in approved sources of terminology in various fields demonstrate different results. This could provoke irritation or confusion, since science field require terminological accuracy.

2.2.4. Mistranslation

Mistranslation error is quite often mentioned by researchers, since it carries quite solid weight. It is defined as inaccurate representation of the content; thus, the idea of the source document is distorted, and the target audience is not provided the same information as the source audience. Results indicate that four percent of total errors were identified as mistranslation and it is a gratifying result. However, it is worth to analyse examples in order to understand, how there errors are displayed in subtitles.

The first example is about a cosmic cloud, which is made of a dense matter and resemble a fire Drake.

48. OR *we reveal the shape of a fantastic firedrake*

49. MT *atskleidžiame formą apie fantastišką ugnikalnį*

To be specific, a firedrake is explained as a fire-breathing dragon, which is a huge serpent with wings, claws and often pictured in mythology and fiction (Fire Drake, n.d.). For this reason, editing could be similar of *atskleidžiame fantastišką drakono formą*. Although it seems uncomplicated, since there is Lithuanian equivalent *drakonas*, MT output interpreted the subtitle differently and, instead of a fire drake, translated it as a volcano, i.e., a mountain, from which hole lava, dust and other material can exude. These two objects are hardly comparable, as one is a creature, a live conscious object, while the other is a mountain, an inanimate object and a part of a landscape. Although it could be stated that this error is not crucial, all the same it is important, as people create an image, how this object looks in the space; therefore, they are misled with the wrong information.

In MTPE, the analysed subtitled was edited in this way:

50. PE1 *atskleidžiame fantastiško grožio drakono formą*,

51. PE2 *pamatome fantastišką ugninį drakoną*,

52. PE3 *matome fantastiškos ugniažolės formą*,

Linear view is presented below to support MTPE actions:



Figure 24. Post-editor's 1 MTPE of term *fire drake*

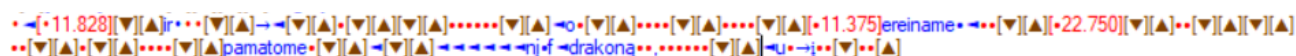


Figure 25. Post-editor's 2 MTPE of term *fire drake*



Figure 26. Post-editor's 3 MTPE of term *fire drake*

In terms of temporal efforts for the presented subtitle, post-editor 1 spent 21 seconds, post-editor 2 spent 23 seconds, while post-editor 3 spent 10 seconds. The third option can be excluded, since the post-editor have mistranslated the passage by translating *fire drake* as *Chelidonium*, which is a type of a plant. As for the other two examples, both post-editors understood the term correctly, as a dragon, in this way correcting mistranslation error. Moreover, the first post-editor might have performed more actions and changed the subtitle, adding that the shape is of fantastic beauty; it is not stated as inappropriate edit, since the adjective *fantastic* signifies a connotation of a similar tone and positivity.

The second example includes mistranslated verb *develop*.

53. OR *But as long as mankind hasn't developed any hyper-light-speed drives,*

54. MT *Bet tol, kol žmonija nesivysto bet kokie didelio greičio važiavimai,*

well, to that end, this type of error is crucial from the perspective of the audience, as it acknowledges these mistakes and could form an incorrect worldview.

2.2.5. Over-translation

Over-translation error is defined as translating the idea in too much detail; therefore, slightly changing the meaning of a passage or adding additional information, which is not present in the source text. In the selected subtitles, only five cases were identified, in total consisting of one percent of the total amount of errors.

In the first example, *Serpens* constellation is mentioned, it is the object of this example.

58. OR *Seven thousand light years away, in the star constellation of the serpent,*

59. MT *Už septynių tūkstančių šviesmečių, žalčio žvaigždyne,*

Naming cosmic objects after real life objects is a common practice; thus, many constellations have well-recognized for the majority of people names, for instance, Leo, Aries, Eagle, Dove, Dolphin, etc., one of the, is *Serpens*, or Snake, constellation. Since these word are not newly formed in different languages, it is assumed of not causing many difficulties. Yet MT engine over-translated it and instead of a serpent, which is a general term for a noxious snake, which is distinguished by creeping, hissing, and stinging (Serpent, n.d.), translated it more specifically. *Žaltys* name, differently than in Lithuanian, varies in English according to more specific type (water snake, grass snake, etc.). Moreover, although it is called as a snake, Dictionary of the Lithuanian Language explains this creature as nonnoxious snake reminiscing reptile (*Žaltys*, n.d.). According to this information it, an edited version *Už septynių tūkstančių šviesmečių, gyvatės žvaigždyne* is suggested. It could be stated that this example of an error could be assigned to wrong term category; however, the reptile is bewildered with a snake, and it might the reason, why MT engine translated exactly in this manner.

Results from MTPE could be demonstrated:

60. PE1 *Už septynių tūkstančių šviesmečių, Gyvatės žvaigždyne,*

61. PE2 *Už septynių tūkstančių šviesmečių, Žalčio žvaigždyne,*

Linear view supplements the performed MTPE:




Figure 30. Post-editor's 1 MTPE of term *Serpens* constellation



Figure 31. Post-editor's 2 MTPE of term *Serpens* constellation

The following subtitle was edited by two post-editors, one spent 9 seconds, while the second one spent 14 seconds. Notwithstanding, temporal efforts do not represent MTPE quality and appropriateness, since as it was analysed, *Serpens* constellation equivalent in Lithuanian is *Gyvatės žvaigždynas*, not *Žalčio žvaigždynas*. It could be emphasized that gathering of information skill is essential not only in translators and subtitlers, though for editors and machine translation post-editors likewise.

meaning of the examples is grasped; therefore, primitive need are satisfied; although for a higher quality, this type of error should not prevail in audiovisual products.

2.2.6. Under-translation

In contrast to over-translation, under-translation is significantly less compared to the original. This type of error could be of an essential importance for audiovisual material, when many channels are present and there is not so much time for text listening/reading. In addition, the meaning should be coherent in order to lessen cognitive efforts for the audience. This type is in the sixth place according to the number of mistakes; therefore, it is important to analyse them and their possible impact to the audiovisual product.

The below presented example is analysed due to a verb *named*.

67. OR *This is why Neptune was named after the Roman god of the seas.*

68. MT *Štai kodėl Neptūnas buvo pavadintas romėnų jūrų dievas.*

In Lithuanian, an equivalent *pavadinti* is used, which is undoubtedly correct; although what is missing, is a word *vardu*. In Lithuanian these two words generally co-occur together with possible insertions, as in the provided example. It is specified that the planet Neptune was named after the Roman god of seas name; although this word is not present in the original, Lithuanian norms require to write in this manner, as it is the appropriate version. Taking this into consideration, *Štai kodėl Neptūnas buvo pavadintas romėnų jūrų dievo vardu* correction is suggested.

The first under-translation error was corrected in the following way:

69. PE *Štai kodėl Neptūnas buvo pavadintas romėnų jūrų dievo vardu.*

Linear view represents performed MTPE:

Figure 35. Post-editor's 1 MTPE of the 1st under-translation example

Figure 36. Post-editor's 2 MTPE of the 1st under-translation example

Figure 37. Post-editor's 3 MTPE of the 1st under-translation example

As analysed after presenting the machine translated subtitle, an addition of the word *name* should have been added with the intent for the subtitle to sound natural in the target language. The time spent to edit this subtitle range between 7, 4, and 16 seconds. Although the exact time necessary in order to MTPE material differ due to many features of a person, as well as influencing factors. According to two post-editors' efforts it could be stated that this case is quite effortless to comprehend and afterwards edit missing parts.

In the next example, laws of probability compound is the analysed object.

is an MT output not reviewed by a human editor, since MT engines are not able to comprehend all peculiarities of a language as humans can. In the analysed part of MT output, one percent of the total error count includes type of addition error.

The first example demonstrated to what degree can temperature plummet in Mars.

75. OR *At night, it plummets to as cold as minus 121.*

76. MT *Naktimis krenta iki tokio pat šalčio kaip minus 121.*

The number of the temperature is rendered correctly, as 121, the issue is with the phrase *as cold as*, by which the temperature is introduced. A difficulty in Lithuanian is due to the fact that the phrase is translated as *tokio pat šalčio*, since its backtranslation is *an equal cold*. Consequently, a question could be raised, with what the cold is compared to? In previous or following subtitles there are no reference to another planet or place, of which temperature could be compared. Therefore, it is identified as an error, which could confuse the target audience assuming that perhaps they did not view an audiovisual material closely or subtitles are to a lower quality and errors are present. A more appropriate version could be suggested, for example, *Naktimis krenta iki tokio šalčio, kaip minus 121.*

Post-editors MT output post-edited in the following way:

77. PE1 *Naktimis krenta iki tokio pat šalčio kaip - 121 °F.*

78. PE2 *Naktimis ji krenta net iki minus 121.*

79. PE3 *Naktimis ji nukrenta iki 121 laipsnio šalčio.*

Linear view represents MTPE:

Figure 41. Post-editor's 1 MTPE of *as cold as* phrase

Figure 42. Post-editor's 2 MTPE of *as cold as* phrase

Figure 43. Post-editor's 3 MTPE of *as cold as* phrase

Post-editor for MTPE of the subtitle spent 24 seconds, post-editor 2 spent 26 seconds, and post-editor 3 spent 13 seconds. Although there is a frequency of probability and temporal efforts correlate to MTPE, they do not reflect results. The first and the third examples could be stated of appropriate quality, it is reasoned by Lithuanian conventions, it could be related to stylistic issues of the language. The number itself could appear as incomplete, as it is in the second example; moreover, it could be stated as misleading as well, as unit of temperature can be Celsius or Fahrenheit. As for the phrase *as cold as*, it was edited in the second and the third examples as *even to* and *to*; both options are applicable, while they convey the meaning correctly, only their impact could be different, since the second example accentuate the huge number of the temperature.

The complexity of the second example is due to the fact that it was supplemented in Lithuanian.

87. *mankind has undertaken numerous unmanned missions to our neighbouring planets.*

88. *žmonija ėmėsi daugybės nepilotuojamų veiksmy misijos į mūsų kaimynines planetas.*

In the target subtitle *unmanned missions* in English were translated as *nepilotuojamų veiksmy misijos*, it would be backtranslated as *unmanned action missions*, even though it is not present in the original. An edited version is proposed: *žmonija ėmėsi daugybės bepiločių misijų į mūsų kaimynines planetas*. Although it may be undetected by the viewers due to time constraints, it might as well be misleading, while the meaning of *unmanned actions* could be taken into consideration. Moreover, in Lithuanian this type of translation could be stated as a redundant information, which is one of the most crucial factor in audiovisual industry.

MTPE carried out for this subtitle results in these versions of MTPE:

89. PE1 *žmonija ėmėsi daugybės nepilotuojamų misijų į mūsų kaimynines planetas.*

90. PE2 *žmonija vykdė daugybę nepilotuojamų misijų į mūsų kaimynines planetas.*

91. PE3 *žmonija vykdė daugybę misijų nepilotuojamais įrenginiais į mūsų kaimynines planetas.*

Results are noticeably similar to the edited version, as in both post-editings the redundant word *veiksmy* is omitted and grammatical cases edited accordingly. What could be mentioned that post-editor 2 corrected a verb *undertake* as well, changing *ėmėsi* to *vykdė*; in this way the target subtitle could possibly appear to be more accurate and domesticated.

Linear view for this term is presented below:

Figure 44. Post-editor's 1 MTPE of *unmanned missions* phrase

Figure 45. Post-editor's 2 MTPE of *unmanned missions* phrase

Figure 46. Post-editor's 3 MTPE of *unmanned missions* phrase

The post-editor 1 spent 14 seconds on the subtitle and the post-editor 2 spent 48 seconds, and the third one spent 3 minutes and 44 seconds. The time supports post-editors actions, since the second post-editor made more corrections than the first post-editor, while the third post-editor analysed the subtitle the most extensively, in this way anticipating potential vagueness.

In particular cases, additional information could be beneficial, when a translator intends to familiarize the audience to a new concept or clarify inaccuracies. Although in the analysed subtitles type of

addition error was identified, which is asserted as information altering practice, which could misinform or frustrate the audience. A drawback of this identification is that it depends largely on specific examples, while a part of them could be of minor weight, while the other could be more critical.

2.2.8. Untranslated

Untranslated error type occurs, when a text segment in the source text was not rendered in the target text, though left untranslated. It is a self-evident mistake, which induces a negative opinion about the audiovisual product in overall. Fortunately, in the analysis only one case was detected with this type of error.

A lottery jackpot is the object of the following example in table. Although this example could be assigned to other group of errors, it was decided to appoint it to untranslated type, since the provided MT output could be stated as improper due to minimal change to grammatically adapt the English phrase.

92. OR *Winning a lottery jackpot*

93. MT *Laimėti loterijos jackpotą*

The compound could be explained as winning a big prize in a contest or a game; usually, it is a fund of money (Jackpot, n.d.). There is an exact equivalent for it, which is *aukso puodas* and an exemplary subtitled could be *laimėti loterijos aukso puodą*. It is possible that the MT engine is not acquainted with this term and, therefore, could not translate in such manner. Nevertheless, other options are available, for example, generalize the term and translate it as a *prize*, a *reward*, or a *winning*. Regardless of that, it was translated into Lithuanian as *jackpotas*, which is a loanword with grammatically adapted form. It is an unusual decision, since this type of practice generally is applied for culture-specific items, when no other equivalent or a word of similar meaning is found.

MTPE of untranslated type of error is edited in this way:

94. PE1 *laimėti loterijos didijį prizą 100 kartų iš eilės.*

95. PE2 *laimėti loteriją 100 kartų iš eilės.*

96. PE3 *laimėti aukso puodą 100 kartų iš eilės.*

Linear view represents MTPE, carried out by three post-editors:

Figure 47. Post-editor's 1 MTPE of untranslated type of error

Figure 48. Post-editor's 2 MTPE of untranslated type of error

Figure 49. Post-editor's 3 MTPE of untranslated type of error

All three post-editors spent a quite similar amount of time (4-6 seconds) in order to edit the presented subtitle, though results are contrastive. Post-editor 2 simplified the translation by writing *a lottery* and not specifying more details, while the other two post-editors emphasized the fact that it is the greatest prize in the lottery or a contest by writing *aukso puodas*, which is a picturesque idiom, while post-editor 1 employed a descriptive method and explained it as *the biggest prize of a lottery*.

Untranslated words in the target language are self-evident; therefore, efforts should be invested to clarify discrepancies. An assumption could be made from the demonstrated example that it may not be undoubtedly understood, especially taking into account a part of the community, who does not know English language.

2.2.9. Literal translation

Error type of literal translation was included, while a necessity was observed, and no other type could possibly replace this one. It occurs when subtitle is translated word-for-word, not taking into account the overall picture of the passage and what was intended to convey. 12 percent of total errors consist of literal translation; therefore, it can signify a problematic point to MT engine, which it cannot translate of appropriate quality.

To provide some context, in the documentary, Eta Carinae star was named as a father of newly arising stars, since it induces this process.

The translation is declared as imprecise, for the outlandish impression for the target audience.

97. OR *is the father of numerous baby stars, in a manner of speaking.*

98. MT *yra daugelio kūdikių žvaigždžių tėvas, kalbėjimo maniera.*

Firstly, a star is a feminine gender noun, accordingly, it is evident that a better translation would be *mother*, not *father*. Secondly, while a phrase *baby stars* appear to be regular in English, in Lithuanian it is translated as *kūdikių žvaigždės*. There is no agreement, as *kūdikių* (baby) is of a masculine, and *žvaigždės* (stars) are of a feminine gender, which could sound odd to the viewers ears. Consequently, *kūdikių* signifies young children, infants, which are live human beings and for this reason it appears more unfamiliar and bizarre. Therefore, a version of possibly better quality is suggested: *tam tikra prasme yra daugelio gimusių žvaigždžių mama*. In addition, the idiom *in a manner of speaking*, which signifies truthfulness of a statement to a specific degree, is translated literally as well, since for MT engine it could be quite difficult to grasp the meaning of it (In a manner of speaking, n.d.), resulting in a requirement to edit almost the whole subtitle.

During MTPE, the error of literal translation was corrected as presented below:

99. PE1 *galima sakyti, yra daugelio naujai atsiradusių žvaigždžių mama.*

100. PE2 *kuri yra daugelio kūdikių-žvaigždžių mama.*

101. PE3 *yra daugelio gimusių žvaigždžių pradininkė.*

Linear view of the MTPE of the above presented subtitle is as follows:

[▲]←a.....[▼][▲]←a[▼][▲]←é.....[▼][▲]←←←galima•sakyti•yra.....[▼][▲]naujai•atsirad•usių.....[▼][▲]←←←←←mama[▼][▲][▼][▲][▼][▲][▼][▲]←[▼][▲]←←[▼][▲][Return].....[▼][▲].....[▼][▲]•[+11.687][▼][▲]←←negu[▼][▲][▼]

Figure 50. Post-editor 1 MTPE of *baby stars* phrase

[▲]←ą•←ę•[▼][▲]•••••[▼][▲]←←←←←[▼][▲][Ctrl+C][▼][▲]•[▼][▲]•••••[▼][▲]••[▼][▲]kuri•yra.....[▼][▲]•[▲]mama•[▼][▲][Return]•[▼][▲]•••••[▼][▲][▼][▲][▼][▲][▼][▲]••[▼][▲]•[▲][Ctrl+C][▼][▲]←[▼][▲][Ctrl+C][▼][▲]žvaigždžių[▼][▲]←[▼][▲]←[▼][▲][Return]••[▼][▲]←[▼][▲]•[▼][▲]•[▼][▲]•[▼][▲]•••••[▼][▲]•••••[▼][▲]•[▲][Ctrl+C]•[▼][▲]•Eta Carinae°, ←[▼][▲]•yra.....[▼][▲]←és[▼][▲][▼]

Figure 51. Post-editor 2 MTPE of *baby stars* phrase

[▲]←←←[▼][▲][▼][▲]•[▼][▲][▼][▲]•[▲]•••••gimusią.....[▼][▲][▼][▲][+38.812]pradininkė.....[▼][▲][▼][▲][Delete]←←←

Figure 52. Post-editor 3 MTPE of *baby stars* phrase

Errors of literal translation could be considered one of the most noticeable MT provided errors; MTPE supports this statement, since all post-editors identified the error and edited it. Post-editor 1 spent 33 seconds, post-editor 2 spent 34, and post-editor 3 spent 57 seconds to prepare MTPE. Therefore, although errors are identified, they are not necessarily easily edited, especially in this case, where pictorial speech figures are used. Regarding the first questionable issue, the word *father*, two post-editors edited it to the antonym *mother*, thus adapting the noun to the feminine noun *žvaigždė* in Lithuanian. The other post-editor chose to generalize the subtitle by changing the word to an *initiator* or a *pioneer*, which could also be accepted as an appropriate option, since the documentary itself is of a scientific genre. The next analysed object is the idiom; it was interpreted as a redundant, for this reason, two post-editors decided to completely omit it without writing any equivalent. The first post-editor changed the idiom to *it could be said* phrase, which could correspond to the original, since it conveys an impression of uncertainty, that it might not be completely true. All in all, edits could be identified as not quite conforming the requirements, although it might be too critical approach, since it reflects the main meaning; furthermore, the process of audiovisual product viewing is rapid and the audience might not take into account the idiom, which, undoubtedly, serves meaning, though perhaps it is not crucial and subtitlers/post-editors decide correctly, prioritizing the viewers.

The next example includes a military term *battering ram*, which in simply words could be explained as a heavy and long pole used to break down the doors (Battering ram, n.d.).

102. OR *the heated gas has the effect of a battering ram*

103. MT *Šildomos dujos turi poveikį mušančio avino*

This subtitle is translated literally, without deepening into the area, as MT engine could not do that. The evaluation does not cause issues, as in Lithuanian it sounds bizarre, its backtranslation is ‘a ram that beats’, which is not possible in the real life; therefore, entailing an absurd situation and translation, which would completely confuse the target audience. Whereas *taranas*, which is an official term for battering ram, found in The Term Bank of the Republic of Lithuania is recognized by the people and correspond quite well; for this reason, *šildomos dujos veikia tarsi taranas* correction is suggested.

MTPE of the presented subtitle appears like this:

104. PE1 *Šildomos dujos sukuria trankančio tarano efektą.*

105. PE2 *Šildomos dujos sudaro Tarano poveikį.*

106. PE3 *turi mušamo cilindro poveikį*

While the linear view of MTPE, presented as screenshots could be seen hereunder:



Figure 53. Post-editor's 1 MTPE of term *battering ram*

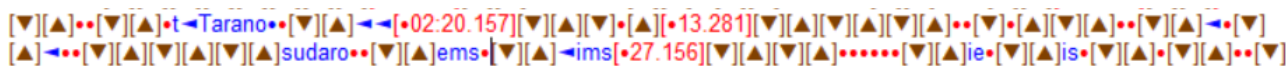


Figure 54. Post-editor's 2 MTPE of term *battering ram*



Figure 55. Post-editor's 3 MTPE of term *battering ram*

Post-editor 1 spent 5 seconds, post-editor 2 spent 2.27 minutes, while post-editor 3 spent 2.19 minutes. The temporal efforts could prove that this is one of the most difficult subtitle to edit and there could be multiple reasons to justify it. Firstly, two terms are present in the analysed subtitle, which should be checked in Lithuanian in order to ensure that the output is correct; while two post-editors left *heated gas* as *šildomos dujos*, one post-editor corrected it to *įkaitintos dujos*, since the former refers more to an action than the state. The second term is the object of this example, *a battering ram*, the second reason could be mentioned that in Lithuanian it is translated as a bizarre and unexpected; for this reason, it could require more time in order to comprehend the context of the situation. Efforts were worthy, since all post-editors edited this problematic term, although used different expressions. Two of them found an equivalent of the term, which is *taranas*; however, post-editor 2 distinguished it by capitalizing the term, while it was not based on language conventions. The other post-editor used a descriptive method by editing the term to *beating cylinder*; it might not be the most perfect option, though it is applicable in this situation.

Literal translation is undeniably a visible error for the target audience, which could distort the initial meaning without presenting the main idea. Similarly, in addition, literal translation should be carefully examined in order to evaluate, whether the meaning is completely incomprehensible, or stylistic alterations are needed in order for the target text to sound coherent.

2.2.10. Word order

Word order is the second customized type of error; it was included in the list, since it was discerned that some subtitles lack of fluency due to the word order. 11 percent of selected subtitles were identified as constituting of inappropriate word order.

In the below example, a story about cosmic forms is presented. Stars can emit radiation and charged particles, on which stardust could be blown, in this way it is visible in the space.

107. OR *and chaotic shapes of veins and pillars have formed.*

108. MT *ir chaotiškos venų formos ir susiformavo stulpai.*

audiovisual product. An alteration of *hydrogen in a greenish tone* was essential, while switching them together as well and a few grammatical changes, e.g., *čia matome žalsvo tonu, šalto vandenilio sankaupas*. In the final result, a structure of verb-adjective-noun structure is more appropriate for Lithuanian.

Word order errors are perceived and corrected by post-editors in this way:

- 114. PE1 Čia matome žalsvo tonu vandenilio šaltos sankaupas.
- 115. PE2 Čia žalsvu tonu matomos vandenilio šaltos sankaupos.
- 116. PE3 Žalsva spalva yra pažymėtos šaltos vandenilio sankaupos.

Linear view supplements results:



Figure 59. Post-editor's 1 MTPE of the 2nd literal translation error



Figure 60. Post-editor's 2 MTPE of the 2nd literal translation error



Figure 61. Post-editor's 3 MTPE of the 2nd literal translation error

For the presented subtitle post-editor 1 spent 49 seconds, post-editor 2 spent 1 minute, while post-editor 3 spent 1 minute 30 seconds. The time dedicated for this subtitle signifies that word order requires a lot of cognitive efforts in order to provide a satisfactory result. All post-editors edited the subtitle differently, though the meaning was perceived. The first two examples differ in word order: one starts with a verb, while the other starts with an adjective, nevertheless, both options are appropriate in this case. The third post-editor reformulated the subtitle and *greenish tone* was changed into *a green color*, as well as *marked* was added to provide a coherent sentence. The choice could be reasonable, since the viewers might imagine the green colour, since the exact tone was not specified; therefore, post-editor saved cognitive efforts of the audience. Nevertheless, the word *marked* could be criticized, since accumulations of hydrogen are of a greenish tone, and not marked by someone in this color. Yet again, since audiovisual production is of a rapid pace, the viewers might not capture this peculiarity.

Word order errors frequently occurred during the analysis. They could be considered as of medium enormity, while the meaning of the output is comprehensible, though the audience is required to invest more cognitive efforts to connect the dots and perceive the main idea. It is possible that the MT engine lacks texts of this type and genre; thus, it could learn from them and accordingly translation would result in improvement of quality.



Figure 64. Post-editor's 3 MTPE of the 1st grammar error

For the following subtitle, post-editors spent accordingly 4 to 6 seconds; therefore, temporal efforts could indicate uncomplexity of this subtitle nature. In this case, a lesser amount of time was dedicated than, for example, in style subsection, which might be due to the reason that the structure of the subtitle is correct, the meaning is comprehensible, the only issue is grammatical error, while it is stated to be quite easily solved.

The second analysed example is the second subtitle.

127. OR *So let me take you on a little tour to have a closer look*

128. MT *Taigi leiskite man pakviesti jus į nedidelę ekskursiją kad atidžiau pažiūrėčiau*

129. OR *at the eight major planets of our solar system,*

130. MT *aštuoniuose pagrindinėse planetose mūsų saulės sistemos,*

One of the issues is corresponding to the above analysed example, since grammatical cases are translated in an improper manner. While a narrator invites the audience to look at the eight planets, the accusative grammatical case is used, it explains who implies what or what is in the focus. A presumption could be raised that this type of error take place due to a divided format of subtitles. There are no grammatical mistakes present in the first subtitle; though in the second one, MT engine relies on a conjunction, which could indicate the locative case. If two subtitles would be merged, perhaps the engine would possibly grasp the meaning and translate it in appropriate way.

Moreover, *the solar system* is translated violating grammatical norms of Lithuanian. The Sun is a proper noun; therefore, together with other unique objects, for example, Moon, Mars, Jupiter, etc., it is written with a capital letter. In Lithuania the practice is equal, proper names are written with a capital letter. Solar system in Lithuania is backtranslated as *system of the Sun* and this is the key to correcting the mistake; capitalization is required by grammatical conventions. Possible variations of the two subtitles could be: *Taigi leiskite pakviesti jus į nedidelę ekskursiją atidžiau apžiūrėti/aštuonias pagrindines planetas mūsų Saulės sistemoje.*

MTPE appears to be similar as an edited version according to the specified error:

131. PE1 *Taigi leiskite man pakviesti jus į nedidelę ekskursiją ir iš arčiau pažiūrėti į*

132. PE1 *aštuonias pagrindines planetas, esančias mūsų Saulės sistemoje,*

133. PE2 *Taigi leiskite man pakviesti jus į nedidelę ekskursiją, kurios metu atidžiau pažvelgsite į*

134. PE2 *aštuonias pagrindines saulės sistemos planetas,*

135. PE3 *Taigi leiskite man pakviesti jus į nedidelę ekskursiją kurios metu aprodyčiau jums iš arčiau*

136. PE3 *aštuonias pagrindines mūsų saulės sistemos planetas,*

From the first two subtitles it can be assumed that the post-editor corrected all problematic areas; *to have a closer look* was translated as in the source text, as infinitive and, consequently, added *to* to connect the meaning of where the gaze should be directed. The post-editor capitalized *the Sun*, as it is specified by grammar rules. The second post-editor paid attention to grammatical cases as well by rewriting the second half of the first subtitle and adding a relative clause to introduce, what will be presented; although did not corrected the term *the Sun*, which is stated as a mistake.

Linear view of this subtitle supplements the analysis:

```
.....[▼][▲]ir•iš•arčiau•pažiūrėti•j•.....[▼][▲]←←←←as•[▼][▲]←←←←es[▼][▲]←←←←as••esančias•[▼][▲]→S•[▼][▲]
[▲]←←←←je.....•[▼][▲]•us•[▼][▲]←←←←us.....[▼][▲]elis.....[▼][▲]←←←←čiū•[▼][▲]←←←←ų•kuriuos.....[▼][▲]
```

Figure 65. Post-editor's 1 MTPE of term *the Sun*

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.....[▼][▲][Ctrl+C][▼][▲]išsidėstę→••[▼][▲]→[▼][▲]•[▼][▲][▼][▲].....[▼][▲]••[▼][▲]
urios•metu•atidžiau•pažverl→lgsite••i[▼][▲]←←←←as[▼][▲]↓↑←←←←es••[▼][▲][▼][▲]•[▲][Ctrl+C][▼][▲]saulės sistemas•[▼][▲]
[▲]←←←←as[▼][▲]←[▼][▲][Return][▼][▲]←[•14.828]••[▼][▲]us•[▼][▲]←←←←us•[▼][▲].....[▼][▲]•[▲]
```

Figure 66. Post-editor's 2 MTPE of term *the Sun*

```
•jums•[•47.891][▼][▲]•urios•metu•aprody•čiau••jums•iš•arčiau••[▼][▲]as[▼][▲]ws←←←←es•[▼][▲]•[End]←←←←as••[▼][▲]
[▲][▼][▲]••[▼][▲][▼][▲][▼][▲]planetas[▼][▲][▼][▲]mūsų saulės•[▼][▲][▼][▲]mūsų saulės•[▼][▲][▼][▲][Delete]••[▼][▲]
```

Figure 67. Post-editor's 2 MTPE of term *the Sun*

According to the linear view of the above analysed subtitles, the post-editor 1 spent approximately 26 second, while post-editor 2 spent 16 seconds and post-editor 3 spent 73 seconds. It could be presumed that due to the shorter editing time, the second post-editor did not corrected with the Sun related error. Moreover, it could be possible due to the fact that the third and the fourth subtitles are longer than the former two; therefore, perhaps the focus was directed on the relative clause and how to formulate it and for this reason, the next mistake was overlooked.

Grammatical mistakes are important for the analysis due to the total amount of them. Analysed examples revealed that grammatical cases could be a challenging task for MT engines. While in the first example both subtitles were translated in the same grammatical case and, accordingly, corrected, the second example is more complicated. The results of this subchapter suggest that the format of subtitles could be the possible reason, why the MT output is of such quality regarding grammar.

2.2.12. Punctuation

Punctuation is the second type of linguistic conventions and handles inaccuracies related to punctuation. The number of this error type is comparably high, i.e., 13 percent; therefore, reasons for it should be clarified and possible solutions provided.

The first example presents a repetition issue.

137. OR *In the cooler north, we find the low plains,*

138. MT *Vėsesnėje šiaurėje, randame žemumas,*

Usually after introducing a place comma is written in English. The MT engine adapted English pattern and translated the subtitle with a comma in after the same word, although it should not be written, since there is no specification of marking commas after a location; *vėsesnėje šiaurėje randame žemumas,* could be the correct version of this subtitle.

MTPE was performed by three post-editors:

139. PE *Vėsesnėje šiaurėje randame žemumas.*

Linear view supports post-editors' actions:



Figure 68. Post-editor's 1 MTPE of the 1st punctuation error

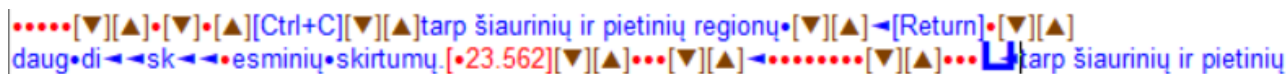


Figure 69. Post-editor's 2 MTPE of the 1st punctuation error



Figure 70. Post-editor's 3 MTPE of the 1st punctuation error

Post-editor 1 edited the demonstrated subtitle in 10 seconds, post-editor 2 in 9 seconds, while post-editor 3 in 5 seconds; although the results is equal, without a comma, where it was faulty and adopted from the English language. The time might range due to external consequences or distractions, though the other solid reason could be experience and confident. There is a possibility that the first post-editor was not certain, whether the comma should be deleted and omitted it in hesitation.

Another example is, contrastively, including a comma, when it was unnecessary, and it could be stated even incorrect.

- 140. OR *are gigantic, hot suns that illuminate these shapes,*
- 141. MT *yra milžiniškos, karštos saulės kurie apšviečia šias formas,*
- 142. OR *and thereby render their three-dimensional shape visible.*
- 143. MT *ir tuo perteikti matoma jų trimatė forma.*

The incorrectness could be reasoned by the fact that after the first comma a conjunction *and* follows, hence commas are not written before any conjunctions in Lithuanian. Possible translation of both subtitles could be *Milžiniškos, karštos saulės, kurios apšviečia šias formas/ir taip matoma jų trimatė forma*. The issue with this case could be with the arrangement of subtitles; sentences are separates according to the video and time constraints, due to this, the meaning can be not perceived by the MT engine.

Two following examples were MT post-edited:

- 144. PE1 *yra milžiniškos, karštos saulės, kurios apšviečia šias formas*
- 145. PE1 *taip perteikdamos jų trimates formas.*
- 146. PE2 *yra milžiniškos, karštos saulės apšviečiančios šias formas,*
- 147. PE2 *taip matoma jų trimatė forma.*

148. PE3 *yra milžiniškos, šias formas apšviečiančios karštos saulės,*

149. PE3 *ir tuo perteikti matoma jų trimatė forma.*

Linear view could be presented as well:

Figure 71. Post-editor's 1 MTPE of the 2nd punctuation error

Figure 72. Post-editor's 2 MTPE of the 2nd punctuation error

Figure 73. Post-editor's 3 MTPE of the 2nd punctuation error

The total time intended for the translation of the two analysed subtitles are 27 seconds, 1 minute 28 seconds, and approximately 2 minutes. The third post-editor spent the largest amount of time, though the result is not impeccable; while the upper subtitle appears of appropriate quality, the lower one is left unchanged, though it comprise errors. Moreover, since the first subtitle ends with a comma, it is faulty, since afterwards the word *and* is written; for this reason it is a violation of Lithuanian conventions. The first post-editor edited the material and for this reason it sounds natural; however, the same error was left, since in Lithuanian a comma should be written before subordinate clause. The second post-editor post-edited both subtitles correctly; therefore, it could be assumed that post-editors concentrated more on the linguistic aspect, disregarding punctuation and a relation of subtitles.

Punctuation errors are important for the overall quality of an audiovisual product. Either their lack or redundancy create an impression of estrangement, if the punctuation is adopted according to the source language conventions, or a low quality, if the conventions of the target language are not adhered to.

2.2.13. Register

Register appertain to style conventions; it defines inconformity to a level of formality obligatory by language conventions or specific regulations. It is essential for the source document, as it represent the tone of the product. In the analysis register does not comprise a huge amount, there is one percent of total errors. Nevertheless, cases could be analysed in order to determine the weight of these errors.

In this subchapter, one example was decided to demonstrate, while the nature of it is equal to the rest of mistakes.

150. OR *Also the high pressure would make your skin boil,*

151. MT *taip pat aukštas slėgis užvirintų tavo odą*

152. OR *so better bring a spacesuit.*

153. MT *tad geriau atsinešk skafandrą.*

The main marker or register is pronoun *your* in the first subtitle, while in the other subtitle it is not revealed explicitly. In English pronoun *you* could signify both singular and plural; for translators it might not cause any further issues, since it can be comprehended from the context, as well as complementary audiovisual material, although it could be differently for MT engine. In Lithuanian this pronoun can be used for singular or plural as well, though what is distinguishable that singular is divided according to a level of formality, i.e., it can be used informality for relatives, friends, lovers, etc., or in a more formal context, for example, teachers, lecturers, doctors, or unknown people in general. In this case, a documentary maintains a quite formal register; therefore, instead of *tu* (informal), *jūs* (formal) may have been a better solution in this context, resulting in *Taip pat aukštas slėgis nudegintų jūsu odą, tad geriau atsineškite skafandrą.* These results provide support for Burchardt et al. (2018) theory that lack of context is a considerably important issue, resulting in ambiguity of pronouns, since the MT engine choose a pronoun inappropriate for the context.

MTPE versions are demonstrated hereinafter:

154. PE1 *Taip pat aukštas slėgis nudegintų jūsu odą,*

155. PE1 *tad geriau atsivežkite skafandrą.*

156. PE2 *Taip pat aukštas slėgis išvirtų jūsu odą.*

157. PE2 *tad geriau pasiimkite ir skafandrą.*

158. PE3 *Aukštas slėgis gali užvirinti žmogaus odą,*

159. PE3 *Todėl patariama dėvėti skafandrą.*

Linear view corresponds to MTPE versions:

č • č i u a • a • y r a • i • j i s • u s i d a r o • 16.406 • n e d u g • u d e g i n t ų • j ū s ų • p a s i i m k i t e • a t s i v e ž k i t e • N e a t s i ž v e l g i a n t • t a i • i • Č i •

Figure 74. Post-editor's 1 MTPE of the 1st register error

• i š v i r t ų • j ū s ų • p a s i i m k i t e • i r • a t s i v e ž k i t e • N e a t s i ž v e l g i a n t • t a i • i • Č i •

Figure 75. Post-editor's 2 MTPE of the 1st register error

[Delete][Delete][Delete][Delete][Delete][Delete][End] • a s • 14.844 • g a l i • ž m o g a u s • o d • o d • e l • p a t a r i a m a • d • e v • e t i • 12.625 • y r a • t i k r a i • j d o m i •

Figure 76. Post-editor's 3 MTPE of the 1st register error

Post-editors spent 24, 26 seconds, and 1.10 minutes on the above presented subtitles. In this case, it could be quite difficult to evaluate, what part of the total temporal efforts was dedicated specifically for the register, since words *boil* and *bring* were post-edited in different ways and could have caused issues and consequently, more time was required. Summarizing, all post-editors changed the register to a more formal, while maintaining distance; therefore, it is evident feature of our culture, which may not have been perceived by MT engine.

Register, although not very apparent in the selected subtitles, is a significant part of it. It defines the character of an audiovisual product and can increase the target audience trust, or, conversely, reduce it. The formality for the target text was chosen incorrectly; for this reason, the MT engine, equally as with other types, comprehended the source document literally; therefore, the output could appear alienized.

2.2.14. Style

Type of awkward style errors could create an impression of vagueness and inexactitude; although it is plainly explained as superfluous use of wordiness or embedded clauses, since MT engine recurrently transfer the original directly in the target text. Awkward style errors comprise three percent of total amount of error and although it is not a considerably crucial amount of errors, it is worth to examine, whether they change the original meaning.

In the first example *provides an explanation* could be the object of awkward style error.

160. OR *and its concentric distribution provides an explanation to its inception.*

161. MT *ir jo koncentrinis pasiskirstymas pateikia paaiškinimą jo atsiradimui.*

In Lithuanian it is translated quite verbatim and while in English it is appropriate, in Lithuanian it could be stated as a redundant information. The phrase could be conveyed in one word, a verb *explain*, which would render the information creating possibly an equal effect as the former, for instance, as *o jų koncentracinis pasiskirstymas paaiškina jo atsiradimą*. It would be beneficial in terms of spatial and time constraints of subtitles to avoid additional information, which could be compressed or omitted.

The analysed error is edited by post-editor's like this:

162. PE1 *jų koncentrinis pasiskirstymas pagrindžia jų atsiradimą.*

163. PE2 *kurių koncentrinis pasiskirstymas pateikia paaiškinimą jo atsiradimui.*

164. PE3 *o jo koncentrinis pasiskirstymas paaiškina jo atsiradimą.*

Linear view presents the visual material of the MTPE process:



Figure 77. Post-editor's 1 MTPE of the 1st awkward style error



Figure 78. Post-editor's 2 MTPE of the 1st awkward style error



Figure 79. Post-editor's 3 MTPE of the 1st awkward style error

Post-editors for the above presented subtitle dedicated 12, 28, and 35 seconds. One of the post-editors omitted the verb *provide*, the other one changed it to *justify* (*base*), while post-editor 2 post-edited

only with the previous subtitle related part of the subtitle. This choice could be due to inattentiveness and the time verifies the efforts, since she post-edited the subtitle in 12 seconds.

Pronoun *our* is analysed in the second example.

165. OR *In my time, our advance NOMAD rovers*

166. MT *Mano laikais mūsų pažangūs NOMAD roveriai*

The MT engine translated both presented pronouns correctly, though the style is stated to be not exactly appropriate, as it is possible. Since the introductory phrase *in my time* defines a period of time and participants, or at least one, which is a narrator, the following pronoun *our* is to some degree redundant. It is self-evident that narrator is discussing the topic of the whole space team behalf; therefore, *NOMAD rovers* are not his property, though the teams'. Taken into account such presumptions, the second pronoun could be omitted, since the audience intuitively perceives the meaning and possession of rovers, and the final version would be *mano laikais pažangūs NOMAD roveriai*. Moreover, additional efforts might not be necessary for the viewers in order to comprehend it.

MTPE of this subtitle is presented below:

167. PE1 *Mano laikais mūsų pažangūs „Nomad“ robotai buvo visur.*

168. PE2 *Mano laikais, pažangūs NOMAD roveriai yra išsidėstę*

Linear view of this subtitle is presented as follows:

Figure 80. Post-editor's 1 MTPE of a term *our*

Figure 81. Post-editor's 2 MTPE of a term *our*

The first post-editor edited the subtitle in 25 seconds, while changing *NOMAD* name typographically, which could be considered as a redundant choice, though importantly, she did not omitted none of the pronouns. The second post-editor post-edited the subtitle in 62 seconds; it is possible that the larger amount of time influenced the cognitive efforts of the post-editor and prompted to analyse the subtitle in more detail; thus perceiving unnaturalness and awkward usage of pronouns.

Another type of stylistic issues is unidiomatic style, which generally refers to the output, which is grammatically correct, though unnatural by its appearance; the reason for it might be repeatedly verbatim adoption of the source text. Unidiomatic style errors, equally as awkward style errors, comprise of three percent of the total error count. Hereinafter, examples representing this type of error are presented.

The first example is an introductory sentence to the explanation, which is lively presented in the form of a question.

169. OR *You may be asking how this cosmic chain reaction begun in the first place?*

various types of number are conveyed regarding linguistic conventions of Lithuanian. According to these regulations, in cohesive texts, numbers are grouped by digits with a non-breaking space; therefore, a correct version would be *ji tęsiasi daugiau nei 2 500 mylių* (Skaičiai, 2002). Accordingly, although a comma was omitted correctly in the target translation, the task was not fully completed complying according to Lithuanian specifications.

What is striking here is that none of the post-editors noticed this type of error and corrected it. By all means, this could have been caused by many unspecified factors, for instance, time constraints, inattentiveness to the subtitle. Notwithstanding, post-editors could have not edited the passage due to not knowing this peculiar convention and acknowledged the MT output as correct, which could be ascertained as a prevailing occurrence.

In summary, mistakes of number format are present in the MT output, which violate specific linguistic conventions of the target language. Notwithstanding, the number format could be altered comparing to the source text; therefore, MT engine is gradually learning how to avoid literal translation. Hopefully, in the future results could be of a higher degree regarding quality and post-editors could be instructed about language conventions in terms of number format.

From the analytical part of the thesis it could be summarized that although the highest amount of errors belong to language conventions and accuracy, the other errors are of no less importance and should be taken into account in order to provide impeccable results and satisfy the audience needs. As it is presented in the analysis, many errors in subtitles would not stand alone, i.e., they are grammatically and semantically related to other, in this way forming the general meaning. Performed MTPE by three post-editors demonstrated that the most issues causing and time requiring errors are literal translation, word order, and over-translation, they all belong to accuracy branch; therefore, it is assumed that semantic mistakes require more efforts and are more complex than others. The MTPE results of this study reveal that post-editors' performance fluctuates in terms of temporal, and accordingly, technical efforts. They may depend on different factors, for, example, time constraints, environment, experience, motivation, confidence; therefore, it could be beneficial to interview post-editors in order to analyse internal and external factors, which may influence MTPE results. Another recommendations would be to perform an experiment with more participants in order to obtain a more accurate results and/or employ different MT engines and perhaps compare outputs.

Conclusions

1. Audiovisual translation is a type of multimodal translation, encompassing acoustic and visual channels, which should be taken into account while translating in order to create synergy and provide the utmost results; the translation should be in synchrony with the original and characters' actions as well. Subtitling comprises of a dynamic multimedia environment and could be considered one of the most complex types, since it is stated as the only type in AVT, in which translation of speech is conveyed in writing; moreover, spatial and temporal constraints prevail. MT is widely incorporated in everyday practices, in this way information gathering in unknown language becomes possible and MT engines could exempt linguists from mechanical work. However, MT engine encounter domain and genre constraints and lacks visual and general context. In order to evaluate results, various metrics were established that consist of identification of various error types. MTPE is considered as a gaining popularity practice of editing MT output by human post-editors and is divided into light and full MTPE. Since it is binary and could be perceived biasedly, it is essential to define clear guidelines. In addition, MTPE is measured for research purposes regarding temporal, technical, and cognitive results to analyse this practice in more detail and reveal more efficient ways to provide MTPE.
2. From MT output evaluation according to MQM metrics it is analysed that grammar and punctuation from language conventions branch constitute half of the total errors, while literal translation and word order constitute more than one-fifth of the total errors. Stylistic and terminology issues are common as well, although of a lower amount. Results could be justified based on a complex nature of AVT, i.e., that the MT engine was deficient in context and its insufficient incorporation in the MT engine; subtitles could be a challenging task for MT, since it translated segment by segment, not corresponding to the former or upcoming text. These findings demonstrate MT has not yet reached a quality of the output, which could be unmonitored by human editors. Nevertheless, it is mentionable that almost one-third of selected subtitles were identified as correct, which are prosperous results for the future research and AVT employing MT engines.
3. MT output was post-edited, and results reveal that in terms of temporal efforts, post-editors spent more than hour to MTPE selected subtitles. It was observed that the duration of MTPE process does not correspond to temporal efforts, since temporal efforts could be of a lower amount. It is confirmed that temporal efforts are related to technical efforts, while an increase of one number conditions increment of the other. Total user events, text production, and text elimination, which comprise technical efforts could be stated to be proportional to one another: the more text post-editor eliminates, the more produces afterwards in order to compensate the void of information. Furthermore, the number of alterations could reflect the quality of the MTPE, on the basis that the performance of a lower amount of technical efforts demonstrated results of relatively higher quality.
4. From error allocation according to MQM metrics, language convention and accuracy errors predominate in the analysis; therefore, post-editors are required to spend more time due to a great amount of mistakes. MTPE temporal efforts were evaluated according to error types in order to verify the statement. Errors of the highest temporal efforts were literal translation, word order, and over-translation, they all belong to an accuracy branch; hence, it partially corroborates results of MT output evaluation. The quality of MT output is stated to be unsatisfactory referring to measured MTPE technical and temporal efforts. Results signify

that errors of language conventions could be post-edited in a shorter time, while accuracy errors are related to the meaning of subtitles and, due to which, more efforts are required to provide high quality results.

These results provide a significant novel step towards MT and MTPE research in AVT field for English-Lithuanian language pair. Research in Lithuania is carried out in audiovisual field in terms of AVT process, product, and acceptance for the target audience; however, there is a lack of research on technologies implementation and/or post-editing in this specific field. In this era, technologies are developing rapidly, and researchers adopt innovation for the benefit of further improvements and to identify best practices. This master thesis makes the first contribution to the field of AVT from the technological view, since MT is becoming a common practice and tool for linguists, and it is believed for subtitlers as well. The most important limitation of this research lies might be the scope of selected subtitles, since there is a possibility that the amount is inadequate in order to represent a meticulous analysis of MT and MTPE processes in subtitling. Moreover, the present study has only examined three post-editors and one MT engine was employed. Therefore, the research could be expanded by conducting a larger scale research.

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Appendices

Appendix 1. Classification of MT output errors

Source text (English)	Target text (Lithuanian)	Error type
Ah, we have visitors.	Ak, turime lankytojų.	-
Welcome to the International Space Station in the year 2057.	Sveiki atvykę į Tarptautinę kosminę stotį 2057 metais.	-
I'm Matt Saberneck, and I'm talking to you from the not-too-distant future	Aš esu Mattas Saberneckas ir kalbu su tavimi iš ne per tolimos ateities	Register, punctuation
to give you a better insight into the workings of our solar system.	kad geriau suprastumėte į mūsų saulės sistemos veikimą.	Literal translation
As you probably know, even in your time	Kaip tikriausiai žinote, net savo laiku	-
mankind has undertaken numerous unmanned missions to our neighbouring planets.	žmonija ėmėsi daugybės nepilotuojamų veiksnių misijos į mūsų kaimynines planetas.	Wrong term, addition, grammar
We've even succeeded in landing a remote-controlled vehicle on Mars,	Mums net pavyko nusileisti nuotoliniu būdu valdoma transporto priemonė Marse,	Grammar *2
and these took photos of their surroundings,	ir šie fotografavosi jų aplinkos,	Grammar *2
photos just like the ones you would take outside your front door.	nuotraukas, kaip ir tas, kurias darytumėte už jūsų lauko durų.	Literal translation, awkward style
Looking at real snapshots from faraway worlds is pretty exciting,	Žiūrint į tikras akimirkas iš tolimų pasaulių yra gana įdomu,	Grammar, inconsistent with terminology resource
and I have good news for you.	ir turiu tau gerų naujienų.	Register
In my time, our advanced NOMAD rovers are out there everywhere,	Mano laikais mūsų pažangūs NOMAD roveriai yra visur,	Awkward style
stationed throughout our solar system and beyond.	išsidėstę visoje mūsų saulės sistemoje ir už jos ribų.	Grammar
So let me take you on a little tour to have a closer look	Taigi leiskite man pakviesti jus į nedidelę ekskursiją kad atidžiau pažiūrėčiau	Awkward style, grammar
at the eight major planets of our solar system,	aštuoniose pagrindinėse eplanetose mūsų saulės sistemos,	Grammar *2
their biggest moons,	jų didžiausi mėnuliai,	Grammar
and of course some of the most breathtaking views	ir, žinoma, kai kurie iš daugelio kvapą gniaužiantys vaizdai	Grammar
our galaxy has to offer.	mūsų galaktika turi pasiūlyti.	Literal translation
And while we're at it,	Ir kol mes ties tuo,	Literal translation
we'll look for extraterrestrial life, of course,	mes mes, žinoma, ieškosime nežemiškos gyvybės, žinoma,	Word order
a possibility which has fuelled	galimybė, kuri paskatino	Grammar

mankind's imagination for centuries.	žmonijos vaizduotė šimtmečius.	
The question of how our Earth, and even our Sun, were created originally,	Klausimas, kaip mūsų Žemė, ir net mūsų Saulė buvo sukurti iš pradžių,	Grammar
and developed into their current forms will also be answered along the ride.	ir išsivystė į dabartines formas taip pat bus atsakyta važiuojant.	Grammar
The main focus of our mission is the planets of our solar system:	Pagrindinis mūsų misijos akcentas yra mūsų saulės sistemos planetos:	Grammar
Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.	Merkurijus, Venera, Žemė, Marsas, Jupiteris, Saturnas, Uranas ir Neptūnas.	-
First of all, you may wonder where these planets have come from originally.	Visų pirma, jums gali kilti klausimas, kur tai planetos atsirado iš pradžių.	Literal translation
They haven't been there forever; they emerged billions of years ago.	Jie ten nebuvo amžinai; jie atsirado prieš milijardus metų.	Grammar, punctuation, Awkward style
We cannot look into this distant past,	Negalime žvelgti į šią tolimą praeitį,	-
but in the almost infinite depths of space that surrounds us,	bet beveik begalinėse erdvės gelmėse kuris mus supa,	Punctuation, grammar
new suns and planets are born virtually all the time.	naujos saulės ir planetos gimsta praktiškai visą laiką.	Word order, unidiomatic style
Nebulae like this one are interstellar clouds of dust and gas.	Tokie ūkai kaip šis yra tarpžvaigždiniai dulkių ir dujų debesys.	-
The area we're looking at is spread over 200 light years.	Teritorija, į kurią žiūrime yra pasklidęs per 200 šviesmečių.	Punctuation, grammar
That means, if we could travel at the speed of light,	Tai reiškia, jei galėtume keliauti šviesos greičiu,	-
it would take us 200 years to travel	mums pakeliauti prireiktų 200 metų	-
from the left border of the screen to the right.	nuo kairiojo ekrano krašto į dešinę.	Under-translation
The "star dust" consists of crystals, amorphous substances and molecular chains.	„Žvaigždžių dulkės“ susideda iš kristalų, amorfinės medžiagos ir molekulinės grandinės.	-
When this diverse matter is exposed to massive pressure,	Kai atskleidžiama ši įvairi medžiaga dideliam spaudimui,	Mistranslation
a chain reaction is set into motion	pradedama grandininė reakcija,	-
that leads to the creation of new suns and planets.	kuris veda į kūrybą naujų saulių ir planetų.	Grammar, literal translation
In this case here, the gigantic star Eta Carinae,	Šiuo atveju čia gigantiška žvaigždė Eta Carinae,	Inconsistent with terminology resource
is the father of numerous baby stars, in a manner of speaking.	yra daugelio kūdikių žvaigždžių tėvas, kalbėjimo maniera.	Unidiomatic style, word order, literal translation
Eta Carinae has a mass a hundred times greater than our sun.	Eta Carinae masė šimtą kartų didesnė už mūsų saulę.	Inconsistent with terminological resource, grammar
It's so big, it can hardly keep itself together.	Tai labai didelis, vargu ar gali išsilaikyti kartu.	Grammar, literal translation

Some experts believe that Eta Carinae could even explode within a hundred years.	Kai kurie ekspertai mano, kad Eta Carinae gali net sprogti per šimtą metų.	Inconsistent with terminological resource, word order
Hardly a bat of an eye when thinking in cosmic timelines.	Vargu ar nė akies kai mąstoma kosminėmis laiko juostomis.	Literal translation
Here we have the "Southern Pillars" of the Carina Nebula.	Čia mes turime „pietinius ramsčius“ iš Carina ūko.	Inconsistent with terminological resource
The dust clouds here are so dense, that no light can pass through,	Dulkių debesys čia tokie tankūs, kad jokia šviesa nepraeitų,	Word order
but with our infrared cameras depicting heat sources,	bet su mūsų infraraudonųjų spindulių kameromis vaizduojantys šilumos šaltinius,	Grammar, punctuation
we can lift that veil and have a look inside.	galime pakelti tą šydą ir pažiūrėti į vidų.	Grammar
Now, the future baby stars are visible as yellow or white dots.	Dabar būsimos kūdikio žvaigždės matomi kaip geltoni arba balti taškai.	Literal translation, grammar
They are cocooned in finger-like tubes, shown in pink.	Jie supilami į pirštus primenančius vamzdelius, parodyta rožine spalva.	Grammar, mistranslation
The star Eta Carinae is just outside the top of the frame.	Žvaigždė Eta Carinae yra visai šalia rėmo viršuje.	Inconsistent with terminological resource, punctuation
Like all suns, it doesn't only emit light,	Kaip ir visos saulės, ji ne tik skleidžia šviesą,	-
but also strong radiation and energy-charged particles.	bet ir stiprią spinduliuotę ir energija įkrautos dalelės.	Grammar
These "stellar winds" have blown the stardust in front of them,	Papūtė šie „žvaigždžių vėjai“ žvaigždžių dulkės prieš juos,	Word order, grammar, punctuation
and chaotic shapes of veins and pillars have formed.	ir chaotiškos venų formos ir susiformavo stulpai.	Word order
Over a time period of millions of years, new solar systems will develop here.	Per milijonų metų laikotarpį, čia kursis naujos saulės sistemos.	Punctuation
Just like our own sun,	Kaip mūsų saulė	Awkward style
most of these small, bright dots will have their own planets that circle around them.	dauguma šių mažų, ryškių taškų turės savo planetas, kurios sukasi aplink juos.	Grammar
But as long as mankind hasn't developed any hyper-light-speed drives,	Bet tol, kol žmonija nesivysto bet kokio didelio greičio važiavimai,	Mistranslation
we better have a closer look at our neighbouring planets instead.	geriau pažiūrėkime atidžiau mūsų kaimyninėse planetose.	Grammar
Let's start with Mars.	Pradėkime nuo Marso.	-
As you probably know,	Kaip tikriausiai žinote,	-
the Red Planet has been the destination of a handful of artificial visitors:	Raudonoji planeta buvo tikslas iš kelių dirbtinių lankytojų:	Literal translation
probes, landers and rovers.	zondai, tūptuvai ir roveriai.	Grammar
Even the early models were equipped with digital cameras,	Net ankstyvieji modeliai buvo įrengti su skaitmeniniais fotoaparatais,	-
some even capable of creating	kai kurie netgi gali sukurti	Grammar *2

three-dimensional images.	trimačiai vaizdai.	
That way, mankind became witness	Tokiu būdu žmonija tapo liudytoju	Word order
to the wide plains and rugged chasms of Mars.	į plačias lygumas ir atšiaurios Marso bedugnės.	Grammar
With the current technology, this whole experience gets even more impressive.	Su dabartinėmis technologijomis visa tai patirtis darosi dar įspūdingesnė.	Literal translation
Mars is a rocky body, just like Earth.	Marsas yra uolėtas kūnas, kaip ir Žemė.	Literal translation, punctuation
But it's only half the diameter of our home planet,	Bet tai tik pusė skersmens mūsų gimtosios planetos,	Word order
which makes it the second smallest planet of our solar system.	todėl ji yra antra pagal dydį planeta mūsų saulės sistemos.	Word order, grammar
Its red colour comes from vast amounts of iron oxide, also known as rust,	Jo raudona spalva gaunama iš didžiulių kiekių geležies oksido, dar žinomo kaip rūdys,	Grammar *2
that is spread throughout the planet and the atmosphere.	kuri pasklido po visą planetą ir atmosfera.	Grammar 2
Speaking of which, the atmosphere is rather thin, as opposed to Earth.	Kalbant apie atmosferą yra gana plonas, priešingai nei Žemė.	Punctuation, grammar *2
This results in Mars not being able to store much of the Sun's warmth.	Dėl to Marsas negali sukaupti didžiąją dalį Saulės šilumos.	Over-translation
Near the equator, temperatures are around 32 degrees Fahrenheit during daytime.	Prie pusiaujo oro temperatūra yra maždaug 32 laipsniai Farenheito dienos metu.	-
At night, it plummets to as cold as minus 121.	Naktimis krenta iki tokio pat šalčio kaip minus 121.	Addition
If you're looking to camp here, you should definitely pack warm clothes.	Jei ieškote stovyklos čia, būtinai turėtumėte supakuoti šiltus drabužius	Word order, literal translation, grammar
The air on Mars is very dusty and is mainly made of carbon dioxide,	Oras Marse labai dulkiškas ir daugiausia pagamintas iš anglies dioksido,	Literal translation
so humans cannot breathe here.	todėl žmonės čia negali kvėpuoti.	-
Also the high pressure would make your skin boil,	Taip pat aukštas slėgis užvirintų tavo odą	Literal translation, punctuation, register
so better bring a spacesuit.	tad geriau atsinešk skafandrą.	Register
Aside from these facts,	Be šių faktų,	Unidiomatic style
Mars would surely be an interesting holiday destination.	Marsas tikrai būtų įdomus atostogų kryptis.	Grammar
After all, it's got varying weather conditions and seasons,	Juk čia įvairus oras sąlygos ir sezonai,	Grammar, Inconsistent with terminological resource
just like back on Earth.	kaip ir Žemėje	Punctuation
The southern hemisphere of Mars is generally warmer	Pietinis Marso pusrutulis paprastai yra šilčiau	Grammar
than the northern counterpart.	nei šiaurinis atitikmuo.	Literal translation
Between them, temperatures can vary as much as 80 degrees.	Tarp jų temperatūra gali skirtis net 80 laipsnių.	-

In summer, the pole caps made of ice melt down,	Vasarą, ištirpsta ledo stulpai,	inconsistent with terminology resource
which allows for distinctive cirrus clouds to form.	kuri leidžia išskirti formuotis plunksniniai debesys.	Grammar *3
We can actually see these in the sky here.	Mes iš tikrųjų galime tai pamatyti čia danguje.	Under-translation
In spring, storms are common,	Pavasariį dažnos audros,	-
which whip up vast quantities of Martian dust.	kurios suplaka didžiulius kiekius Marso dulkių.	-
With wind speeds of up to 400 miles an hour,	Su vėjo greičiu iki 400 mylių per valandą,	Literal translation
a lot of the surface is cast under a dusty veil.	daug paviršiaus yra užmestas po dulkėtu šydu.	Unidiomatic style
Sometimes, even small cyclones called Dust Devils come up.	Kartais net nedideli ciklonai atsiranda vadinami Dulkių velniai.	Word order, punctuation, grammar
The extensive landscapes on Mars have quite a bit to offer.	Platus Marso kraštovaizdžiai turi ką pasiūlyti.	-
Again, here are major differences between the northern and southern regions.	Vėlgi, čia yra pagrindiniai skirtumai tarp šiaurinių ir pietinių regionų.	-
In the cooler north, we find the low plains,	Vėsesnėje šiaurėje, randame žemumas,	Punctuation
which are broad, dust-covered flatlands	kurios yra plačios, dulkėmis padengtos lygumos	-
with names like Utopia Planitia or Amazonis Planitia.	su tokiais pavadinimais kaip Utopia Planitia arba Amazonis Planitia.	Literal translation
Dark areas have been visible on the surface of Mars	Buvo matomos tamsios vietos Marso paviršiuje	Word order
since early telescopes were invented;	nuo ankstyvųjų teleskopų išradimo;	Literal translation
these were thought to be oceans.	buvo manoma, kad tai yra vandenynai.	-
However, the truth is that Mars is somewhat dry,	Tačiau tiesa ta, kad Marsas yra šiek tiek sausas,	-
with only tiny amounts of water.	tik su nedideliu kiekiu vandens.	-
The southern hemisphere has geologically older formations and more craters.	Pietinis pusrutulius turi geologiškai senesnių darinių ir daugiau kraterių.	-
For example, the highland region of Arabia Terra is densely cratered.	Pavyzdžiui, aukštumų regionas Arabia Terra yra tankiai nusėta krateriu.	Grammar *2
Among the numerous impact craters in the southern region	Tarp daugybės smūginių kraterių pietiniame regione	-
is the biggest Mars Crater, called Hellas Planitia.	yra didžiausias Marso krateris, vadinama Hellas Planitia.	Grammar
The basin has a diameter of 1,300 miles	Baseino skersmuo yra 1300 mylių	Number format
with a low point of five miles below the ground level of Mars,	su penkių mylių žemiausia tašku žemiau Marso žemės lygio,	Grammar

making it the lowest point on the entire planet.	todėl tai yra žemiausias taškas visoje planetoje.	-
Running parallel to the equator is the Valles Marineris.	Eina lygiagrečiai pusiaujui yra Valles Marineris.	Awkward style
These "Mariner Valleys" are the largest known rift system of our solar system.	Šie „Jūrininkų slėniai“ yra didžiausi žinoma mūsų saulės sistemos plyšių sistema.	-
It stretches out for over 2,500 miles,	Jis tęsiasi daugiau nei 2500 mylių,	Grammar, number format
and is up to 440 miles wide, and runs up to five miles deep.	120 ir yra iki 440 mylių pločio, ir bėga iki penkių mylių gylio.	Grammar, punctuation
It is a giant tectonic crack of unknown origin.	Tai milžiniškas tektoninis įtrūkimas neaiškios kilmės.	Word order
In the western part, called Noctis Labyrinthus,	Vakarinėje dalyje, vadinamas Noctis Labyrinthus,	Grammar
it develops into a chaotic entanglement of rifts and valleys	jis išsivysto į chaotišką susipynimą plyšių ir slėnių	Wrong term, word order, punctuation
which are up to 12 miles wide and up to three miles deep.	kurios yra iki 12 mylių pločio ir iki trijų mylių gylio.	Grammar
While on the topic of proportions, Mars holds at least two records.	Kalbant apie proporcijų temą, Marsui priklauso mažiausiai du rekordai.	-
One being the giant volcano Alba Patera,	Vienas iš jų yra milžiniškas ugnikalnis Alba Patera,	-
which covers the widest area of all volcanoes,	kuri apima plačiausią plotą visų ugnikalnių,	Grammar *2
with a diameter of 1,000 miles.	kurių skersmuo yra 1000 mylių.	Number format
With a height of around four miles, it's not as tall as Mount Everest.	Maždaug keturių mylių aukščio, jis nėra toks aukštas kaip Everestas.	-
However, Mars also has the Olympus Mons.	Tačiau Marse taip pat yra „Olympus Mons“.	Punctuation
Measuring an impressive height of 16 miles,	Matuojant an įspūdingas 16 mylių aukštis,	Literal translation
it dominates the surrounding plains,	jis dominuoja aplinkinėse lygumose,	Punctuation
and makes it the highest elevation in our whole solar system.	ir daro jį aukščiausiu aukščiu visoje mūsų saulės sistemoje.	Literal translation, wrong term, grammar
Apart from Earth,	Be Žemės,	Unidiomatic style
Mars is by far the planet most thoroughly explored	Marsas iki šiol yra planeta nuodugniausiai iširta	-
and researched by mankind.	ir tyrinėjo žmonija.	Grammar *2
We know that Mars must have had a much denser atmosphere millions of years ago,	Žinome, kad Marse turėjo būti daug tankesnė atmosfera prieš milijonus metų,	Punctuation
and is likely to have had lots	ir tikriausiai turėjo daug	Wrong term
of liquid water on its surface.	skysto vandens ant jo paviršiaus.	-
Back then, it offered much better conditions for the creation of life.	Tada jis siūlė daug geriau sąlygos gyvybei kurti.	Literal translation, grammar
That changed when its atmosphere	Tai pasikeitė, kai jos atmosfera	Grammar

was thinned out by solar winds.	buvo išretintas saulės vėjų.	
Still, in the ice of its polar caps,	Vis dėlto savo poliarinių kepurių lede,	Punctuation
there could be primitive life in the form of bacteria or microbes.	ten galėjo būti primityvi gyvybė bakterijų ar mikrobu pavidalu.	Wrong term
After all, such life has been found in the perpetual ice of our own poles.	Juk toks gyvenimas rastas amžiname mūsų pačių polių lede.	Inconsistent with terminology resource
As you can see, there's a lot going on out there in space,	Kaip matote, vyksta daug dalykų ten kosmose,	Word order
even if we haven't encountered any aliens yet.	net jei nesame susidūrę dar ateivių.	Word order, literal translation
But, let's start at the beginning.	Bet, pradėkime nuo pradžių.	Punctuation
Seven thousand light years away, in the star constellation of the serpent,	Už septynių tūkstančių šviesmečių, žalčio žvaigždyne,	Over-translation, punctuation
lies the Eagle Nebula.	slypi Erelio ūkas.	-
It's 95 light years high, which equals about 55 trillion miles.	Jis yra 95 šviesmečių aukščio, kuris lygus maždaug 55 trilijonams mylių.	-
As a comparison, our solar system is a mere 10 billion miles long.	Palyginimui – mūsų saulės sistema yra tik 10 milijardų mylių ilgio.	-
Or in short, the Eagle Nebula is kind of large.	Arba trumpai tariant, Erelio ūkas yra savotiškas didelis.	Mistranslation
In the Eagle Nebula, stars are born from clouds of cold hydrogen.	Erelio ūke gimsta žvaigždės iš šalto vandenilio debesų.	Word order
These clouds are blown apart by the emissions	Šie debesys yra išsklaidyti pagal emisijas	Literal translation, grammar
from the already active suns,	nuo jau aktyvių saulių,	-
creating chaotic shapes of incredible beauty.	chaotiškų formų kūrimas neįtikėtino grožio.	Grammar, word order
Sitting above the top of this structure įdėti vaizdą, kodėl netinka	Sėdi virš šios konstrukcijos viršaus	Word order, wrong term
are gigantic, hot suns that illuminate these shapes,	yra milžiniškos, karštos saulės kurie apšviečia šias formas,	Punctuation *2, grammar
and thereby render their three-dimensional shape visible.	ir tuo perteikti matoma jų trimatė forma.	Literal translation,
At the same time, their solar winds are thinning out this gigantic object.	Tuo pačiu metu jų saulės vėjai retina šį milžinišką objektą.	-
This star factory must have been formed	Ši žvaigždžių gamykla turėjo būti suformuota	-
in a particularly dense hydrogen nebula that eventually collapsed.	ypač tankiame vandenilio ūke kad galiausiai žlugo.	Grammar
It became denser and denser until the high pressure triggered an explosion,	Jis tapo tankesnis ir tankesnis, kol aukštas slėgis sukėlė sproginimą,	Unidiomatic style
like in an atomic bomb.	kaip atominėje bomboje.	-
It heated up other cold dust clouds, eventually driving them to an ignition.	Jis įkaitino kitus šaltus dulkių debesis, galiausiai privedė juos prie uždegimo.	Grammar *2

This caused shock waves	Tai sukėlė smūgines bangas	Punctuation
that swept through the formation.	kad praplaukė per darinį.	Grammar, wrong term
The edge of one such shock wave is visible in the brighter contour	Vienos tokios smūginės bangos kraštas matomas ryškesniame kontūre	Punctuation
that defines the upper left corner of the nebula.	kuris apibrėžia viršutinį kairįjį kampą ūko.	Word order
The heated gas has the effect of a battering ram	Šildomos dujos turi poveikį mušančio avino	Literal translation
on denser clouds of cold gas.	ant tankesnių šaltų dujų debesų.	Grammar
It compresses and eventually ignites them, and the cycle continues.	Jis juos suspaudžia ir galiausiai uždega, ir ciklas tęsiasi.	Grammar
You may be asking how this cosmic chain reaction begun in the first place?	Galbūt klausiate, kaip tai kosminis grandininė reakcija prasidėjo pirmiausia?	Literal translation, under-translation, grammar, unidiomatic style
The infrared spectrum of the nebula provides the answer.	Ūko infraraudonųjų spindulių spektras pateikia atsakymą.	-
Here, we see the cold accumulations of hydrogen in a greenish tone.	Čia matome šalčio sanaujas vandenilio žalsvu tonu.	Word order, grammar
The red hues show the hot dust,	Raudoni atspalviai rodo karštas dulkes,	-
and its concentric distribution provides an explanation to its inception.	ir jo koncentrinis pasiskirstymas pateikia paaiškinimą jo atsiradimui.	Grammar *2, awkward style
About 8,000 years ago,	Maždaug prieš 8 tūkst.	Untranslated
a gigantic star exploded right in that centre,	sprogo milžiniška žvaigždė pačiame centre,	Word order, punctuation
and the energy from this explosion triggered the chain reaction.	ir šio sprogo energija sukėlė grandininę reakciją.	-
At the same time,	Tuo pačiu metu,	Punctuation
the shockwave generated by the explosion also drove the cloud apart,	sprogimo sukelta smūgio banga taip pat išsklaidė debesį,	-
which in effect caused the most dense region to move slowest.	kuris iš tikrųjų sukėlė daugiausia tankus regionas judėti lėčiausiai.	Wrong term, awkward style, grammar
The dense gas clouds have become the birth grounds of new stars.	Tapo tankūs dujų debesys naujų žvaigždžių gimimo vieta.	Word order
Among them are the famous "Pillars of Creation."	Tarp jų yra žinomi „Kūrybos stulpai“.	-
This sensational photograph was taken	Ši sensacinga nuotrauka buvo padaryta	-
by the Hubble Space Telescope in the year 1995.	Hablo kosminiu teleskopu 1995 metais.	Inconsistent with terminology resource
Now, this is a relatively recent picture by human standards.	Dabar tai palyginti nesenas vaizdas pagal žmogiškuosius standartus.	Wrong term
These pillars crumbled thousands of years ago,	Šie stulpai subyrėjo prieš tūkstančius metų,	-
driven apart by the cosmic radiation	išvaryta kosminės spinduliuotės	Word order, wrong term

of the suns.	saulių.	
How is this possible?	Kaip tai įmanoma?	-
Well, it takes light 7,000 years to travel from there to here.	Na, tam reikia šviesos 7000 metų keliauti iš ten į čia.	-
That means, when these light rays finally arrive	Tai reiškia, kad kai šie šviesos spinduliai pagaliau atvyksta	Literal translation
at the sensors of our cameras, they show a very distant past.	prie mūsų fotoaparatus jutiklių, jie rodo labai tolimą praeitį.	-
To get a better feeling for dimensions	Norėdami geriau pajusti matmenis	Punctuation
as incredibly vast as these,	tokie neįtikėtinai dideli kaip šie,	Grammar
let's consider the composition of our own solar system.	panagrinėkime kompoziciją mūsų pačių saulės sistemos.	Word order, grammar
As we can see here, Mercury, Venus, Earth and Mars are,	Kaip čia matome, Merkurijus, Venera, Žemė ir Marsas yra	-
relatively speaking, close to one another.	santykinai kalbant, arti vienas kito.	Unidiomatic style
If you look at the entire composition, you could almost say they're cuddling.	Jei pažvelgsite į visą kompoziciją, beveik galima sakyti, kad jie glaudosi.	-
Mars is followed by an asteroid belt,	Po Marso seka asteroidų diržas,	-
after which the distances between the planets grow larger and larger.	po kurio atstumai tarp planetos auga ir didėja.	Grammar *2, over-translation
Last in line is Neptune.	Paskutinis eilėje yra Neptūnas.	-
Neptune is 2.7 billion miles away from the Earth,	Neptūnas yra 2,7 milijardo mylių toliau nuo Žemės,	Wrong term
which doesn't even amount to a light year in distance.	kurios net nesuskaičiuoja iki šviesmečių atstumu.	Literal translation, grammar
In fact, this distance is equivalent to a mere four light hours.	Tiesą sakant, šis atstumas yra lygiavertis iki vos keturių šviesos valandų.	Literal translation
To put that into context, if someone flashed a gigantic light on Neptune,	Į kontekstą, jei kas nors blykstelėjo milžiniška šviesa Neptūne,	Unidiomatic style
we would be able to see it on Earth four hours later.	galėtume tai pamatyti Žemėje po keturių valandų.	-
From a distance, Neptune appears to be a blue sphere,	Iš tolo, Atrodo, kad Neptūnas yra mėlyna sfera,	Punctuation, grammar
a colour which is reminiscent of planet Earth's oceans.	spalva, kuri primena planetos Žemės vandenynų.	Grammar, word order, grammar
This is why Neptune was named after the Roman god of the seas.	Štai kodėl Neptūnas buvo pavadintas romėnų jūrų dievas.	Under-translation
Actually, the colour is due to the fact	Tiesą sakant, spalva yra dėl to	Punctuation
that Neptune's atmosphere is made up mostly of methane.	kad Neptūno atmosfera yra sudaryta daugiausia metano.	Grammar
Because of its properties, methane absorbs red light.	Dėl savo savybių, metanas sugeria raudoną šviesą.	Punctuation
In the upper layers of the atmosphere,	Viršutiniuose atmosferos sluoksniuose,	Punctuation

we see gigantic clouds several thousand miles long.	matome milžiniškus debesis kelių tūkstančių mylių ilgio.	Word order
They form in stripes because of the high rotation speed of the planet.	Jie susidaro juostelėmis, nes dėl didelio planetos sukimosi greičio	Literal translation
At the poles, we have Auroras,	Ties ašigaliais turime Auroras,	-
northern lights that look much more complex than those we have on Earth.	šiaurės pašvaistė, kuri atrodo daug labiau sudėtingesni nei tie, kuriuos turime Žemėje.	Grammar, literal translation
This phenomenon occurs	Šis reiškinys atsiranda	Punctuation
when charged particles of the solar winds enter the atmosphere.	kai įkrautos saulės vėjų dalelės patekti į atmosferą.	Wrong term, grammar *2
Besides its 17 moons, Neptune is also accompanied by its rings.	Be 17 mėnulių, Neptūną taip pat lydi jo žiedai.	Punctuation
These rings are changeable in size and shape.	Šie žiedai yra keičiami pagal dydį ir formą.	Grammar
The biggest one of them, called the Adams Ring,	Didžiausias iš jų, vadinamas Adamso žiedu,	-
has a slightly red hue.	turi šiek tiek raudoną atspalvį.	-
The majority of the rings appear rather dark though,	Didžioji dalis žiedų nors atrodo gana tamsi,	Literal translation
rendering them difficult to see.	todėl juos sunku pamatyti.	-
They're mostly made up of dust	Jie daugiausia sudaryti iš dulkių	-
and small particles the size of grains of sand.	ir smulkios dalelės smėlio grūdelių dydžio.	Grammar, word order
Neptune is a so-called Gas Giant,	Neptūnas yra vadinamasis dujų milžinas,	-
meaning that the planet is almost exclusively made up by its atmosphere.	reiškia, kad planeta beveik sudarytas tik iš jos atmosferos.	Under-translation, grammar, word order
In this thick soup, we have wind speeds of up to 1,200 miles per hour.	Šioje tirštoje sriuboje turime vėjo greitį iki 1200 mylių per valandą.	Literal translation, number format, literal translation
On the way to the stony core,	Pakeliui į akmenuotą šerdį,	-
which is almost as large as the entire planet Earth,	kuris yra beveik toks pat didelis kaip visa Žemės planeta,	Grammar
the pressure grows massively.	spaudimas masiškai auga.	Inconsistent with terminology resource, word order
Our NOMAD would be squashed in a matter of seconds if it went any lower.	Mūsų NOMAD būtų sutraiškytas sekundžių reikalas, jei jis sumažėjo.	Literal translation, mistranslation
In fact, there isn't even a defined surface due to the pressure.	Tiesą sakant, net nėra apibrėžtas paviršius dėl slėgio.	Word order, wrong term, grammar
The atmosphere gets liquefied without transition,	Atmosfera suskystėja be perėjimo,	Wrong term
which results in there not being much to see on the way down,	dėl to nėra daug pamatyti pakeliui žemyn,	Word order, under-translation
just a wild spray of methane,	tik laukinis metano purslas,	Grammar *2

ammonia and water.	amoniakas ir vanduo.	
I guess it's safe to say Neptune is not the nicest place to visit.	Manau, saugu pasakyti Neptūnas nėra pati maloniausia vieta aplankyti.	Unidiomatic style *2, under-translation
Its biggest moon, Triton, is definitely more welcoming.	Didžiausias jo mėnulis Tritonas, tikrai yra sveikintinas.	Punctuation, wrong term
This "Son of Poseidon" is a bit smaller than our Earth moon.	Šis „Poseidono sūnus“ yra kiek mažesnis nei mūsų Žemės mėnulis.	-
Despite its small mass,	Nepaisant mažos masės,	-
it has an atmosphere which is less than one percent as dense as ours.	jo atmosfera yra mažesnė nei vienas procentas toks pat tankus kaip mūsų.	Grammar, mistranslation
Triton's surface is covered by a thick crust of ice.	Tritono paviršius padengtas stora ledo pluta.	-
Cracks and deformations on the surface make up a network of disturbances,	Įtrūkimai ir deformacijos ant paviršiaus sudaryti trikdžių tinklą,	Grammar
which is a sign of geological activity.	kuris yra geologinės veiklos požymis.	-
And really, there are geysers on Triton.	Ir tikrai, Tritone yra geizerių.	-
They shoot up through the surface ice forming fountains into the atmosphere,	Jie šaudo per paviršinį ledą formuoti fontanus į atmosferą,	Literal translation, wrong term, punctuation
some as high as five miles.	kai kurie net penkių mylių aukščio.	Grammar
Atmospheric winds spread the icy dust over great distances,	Atmosferos vėjai paskleidė ledines dulkes dideliais atstumais,	Grammar
until it settles back down on the side facing away from the Sun.	kol vėl atsistos ant šono nukreiptas nuo saulės.	Mistranslation, grammar *2
The half of Triton that is in the shade has temperatures down to -394 degrees.	Pusė Tritono, kuri yra šešėlyje temperatūra nukrenta iki -394 laipsnių.	Grammar, punctuation
This is the lowest temperature ever measured in our solar system.	Tai žemiausia temperatūra kada nors buvo matuojamas mūsų saulės sistemoje.	Word order, grammar, literal style
Such a winter lasts for 40 years on Triton.	Tokia žiema trunka 40 metų ant Tritono.	Grammar, literal translation
Another fascinating peculiarity is that it moves in the opposite direction	Kitas žavus ypatumas yra tas jis juda priešinga kryptimi	Grammar *2, punctuation
to Neptune's rotation.	į Neptūno sukimąsi.	Literal translation
At the same time, it's fairly close to Neptune,	Tuo pačiu metu, tai gana arti Neptūno,	Grammar
so incredible tidal forces are created due to gravitation.	taip sukuriamos neįtikėtinos potvynio jėgos dėl gravitacijos.	-
These forces are believed to be responsible	Tikima šiomis jėgomis būti atsakingam	Mistranslation, grammar
for the "cold volcanism" of the geysers.	už geizerių „šaltąjį vulkanizmą“.	-
In the long run, Triton isn't going to remain in this position.	Ilgainiui Tritonas nesiruošia likti šioje pozicijoje.	Over-translation
It is forced closer and closer to Neptune.	Jis priverstas vis arčiau Neptūno.	Under-translation

In a few hundred million years,	Per kelis šimtus milijonų metų	-
it will collide with Neptune, which will cause it to be ripped apart.	jis susidurs su Neptūnu, dėl ko jis bus suplėšytas.	-
The debris will form a much denser ring system around Neptune,	Nuolaužos susidarys daug tankesnės žiedų sistema aplink Neptūną,	Grammar *2
resulting in a look similar to Saturn.	dėl to atrodo panašus į Saturną.	Under-translation, grammar
Until then, there is plenty of time to take in	Iki tol yra daug laiko priimti	Literál translation
the breathtaking view of Neptune.	kvapą gniaužiantis Neptūno vaizdas.	Grammar
From here, we can also see its second biggest moon, Proteus.	Iš čia taip pat matome antras pagal dydį mėnulis Proteus.	Grammar
Well, again, we haven't had much success with our search for alien life out there.	Na, vėlgi, mums nelabai pasisekė su mūsų svetimos gyvybės paieškomis ten.	-
This begs the question of why so many people believe in extraterrestrial beings?	Tai kelia klausimą, kodėl tiek daug žmonės tiki nežemiškėmis būtybėmis?	Grammar
A statistical explanation might be given by the laws of probability.	Gali būti pateiktas statistinis paaiškinimas tikimybių dėsniais.	Under-translation
Out there in space,	Ten, erdvėje,	Inconsistent with terminology resource
there are more stars than grains of sand on the entire planet Earth.	yra daugiau žvaigždžių nei smėlio grūdelių visoje Žemės planetoje.	-
With that in mind,	Turint tai omenyje,	-
how could we be the only star system with intelligent life?	kaip mes galime būti vienintelė žvaigždžių sistema su protingu gyvenimu?	Wrong term
The probability of there not being life anywhere else in the universe	Tikimybė, kad gyvybės nebus bet kur kitur visatoje	Word order
seems about as likely as a single person winning a lottery jackpot	atrodo taip pat tikėtina, kaip vienam žmogui laimėti loterijos jackpotą	- Wrong term/untranslated
100 times in a row.	100 kartų iš eilės	Punctuation
Humans tend to see familiar shapes in astral objects,	Žmonės linkę matyti pažįstamas formas astraliniuose objektuose,	Word order
like the face of the moon or the shapes of the constellations.	kaip mėnulio veidas arba žvaigždynų formos.	Grammar
Even experts in astronomy typically name their findings on that basis.	Paprastai net astronomijos ekspertai remdamiesi tuo įvardija savo išvadas.	
That's why, for example, the Omega Nebula, in the sign of Sagittarius,	Štai kodėl, pavyzdžiui, Omegos ūkas, Šaulio ženkle,	Punctuation
hasn't solely been ascribed a scientific name such as M17 or NGC 6618.	buvo priskirtas ne tik moksliniu pavadinimas, pvz., M17 arba NGC 6618.	Grammar, mistranslation
This phenomena has also been given more poetic names,	Šiam reiškiniui taip pat duota daugiau poetiniai vardai,	Wrong term, grammar
like Horseshoe Nebula or Swan Nebula.	kaip Pasagos ūkas ar Gulbės ūkas.	

And we will now embark on a little excursion to find the Hidden Dragon there.	Ir dabar mes šiek tiek pradėsime Ekskursija, skirta ten rasti Paslėptą drakoną.	Awkward style, grammar *2, punctuation
The Omega Nebula is so bright that it is visible to the naked eye from Earth.	Omegos ūkas yra toks ryškus, kad jis matomas plika akimi iš Žemės.	
You can only see it as a grey lump, though.	Jūs galite tik tai pamatyti vis dėlto kaip pilkas gumulas.	Under-translation, word order, grammar
You'd have to use the right equipment in order to reveal its true beauty.	Turėtumėte naudoti tinkamą įrangą kad atskleistų tikrąjį savo grožį.	Punctuation, mistranslation, grammar
With images taken using visible light,	Kai vaizdai buvo padaryti naudojant matomą šviesą,	
the first thing you notice is the very bright region at the bottom left.	pirmas dalykas, kurį pastebite, yra labai šviesi sritis apačioje kairėje.	
This is lit by O-stars.	Tai apšviečia O žvaigždutės.	Under-translation, inconsistent use of terminology, awkward style
Stars are categorised into different classes,	Žvaigždės skirstomos į kategorijas į skirtingas klases,	Over-translation
with O-Stars being the heaviest and hottest.	O žvaigždės yra sunkiausios ir karščiausios.	Wrong term, grammar
They emit blue light.	Jie skleidžia mėlyną šviesą.	Grammar
When we switch over to the infrared camera,	Kai persijungiame prie infraraudonųjų spindulių kameros,	Grammar, literal translation
we reveal the shape of a fantastic fire-drake	atskleidžiame formą apie fantastišką ugnikalnį	Word order, grammar, punctuation, mistranslation
spreading its wings to take flight, which was previously hidden.	Išskleidęs sparnus, kad pakiltų, kuris anksčiau buvo paslėptas.	Grammar *3
This is a cloud of matter so dense,	Tai toks tankus materijos debesis,	Grammar
it cannot even be penetrated by infrared light which reveals this formation.	Jo net negali prasiskverbti infraraudonieji spinduliai šviesa, kuri atskleidžia šį darinį.	Under-translated, grammar