The Impact of Artificial Intelligence on the Translation Profession. A Case study of Microsoft Translator

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Katarina Mandarić

Utjecaj umjetne inteligencije na prevoditeljsku profesiju. Studija slučaja *Microsoft Prevoditelj*

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Mentor: doc.dr.sc. Goran Schmidt

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Abstract

Artificial intelligence is commonly used in various fields and professions and has therefore impacted and reformed them. The fact that there is a tremendous impact on the translation profession is undisputable. Consequently, it is believed that artificial intelligence technology will eventually replace human translators. This thesis aims to show that artificial intelligence is rather an assistant to human translators than a threat. Based on artificial intelligence technology in the translation field, this paper gives an analysis of how artificial intelligence in computer-aided translation, using Microsoft translator, has impacted translators and the process of translating and how the impact has changed the role of translators. In order to introduce the topic and for contextual purpose the concept, development, and impact of artificial intelligence technology together with computer-aided translation tools and machine translation on the translation profession are introduced. Additionally, the relation between artificial intelligence and the translation profession is studied, followed by an analysis of post-editing. Furthermore, the participants' elaborations and observations of Microsoft Translator output and human translations are analysed on two diverse text types – technical and literary texts, and finally, the quality of human and Microsoft translations are collated and assessed.

Key words: artificial intelligence, translation technology, human translators, machine translation, Microsoft Translator

Sažetak

Umjetna inteligencija se obično koristi u različitim poljima i profesijama te je stoga utjecala na njih i njihovo oblikovanje. Činjenica da postoji ogroman utjecaj na prevoditeljsku profesiju je neosporna. U skladu s tim se vjeruje da će tehnologija umjetne inteligencije naposljetku zamijeniti ljudske prevoditelje. Cilj ovog rada je pokazati da je umjetna inteligencija prije svega pomoć ljudskim prevoditeljima, a ne prijetnja. Na temelju tehnologije umjetne inteligencije u području prevođenja ovaj rad proučava i daje analizira kako je umjetna inteligencija u računalno potpomognutom prevođenju, koristeći Microsoftov Prevoditelj, utjecala na prevoditelje i proces prevođenja te kako je utjecaj promijenio ulogu prevoditelja. U uvodne i u kontekstualne svrhe uvodi se koncept, razvoj i utjecaj tehnologije umjetne inteligencije zajedno s računalnim alatima i strojnim prevođenjem na prevoditeljsku profesiju. Zatim, proučava se odnos između umjetne inteligencije i prevoditeljske profesije, nakon čega slijedi analiza redakture. Nadalje, analiziraju se obrazloženja i opažanja sudionika prijevoda Microsoft Prevoditelja i ljudskih prijevoda pomoću dvije različite vrste teksta – tehnički i književni, te se na kraju uspoređuje i ocjenjuje kvaliteta ljudskih i Microsoftovih prijevoda.

Ključne riječi: *umjetna inteligencija, prijevodna tehnologija, ljudski prevoditelji, strojni prijevod, Microsoft Prevoditelj*

1. Introduction

Artificial intelligence (AI) has been widely spread and used in numerous fields and professions and its impact is ever-increasing as we can see from everyday life. As Zheng and Zhu state (2016: 1): "Artificial intelligence technology is one of the most advanced technologies in the 21st century." Considering that it has influenced and changed the role of translators, more and more people fear that AI technology will replace human workers. Translators are not excluded from this threat. It is a common thought that human translators will at some point be completely replaced by AI technology and that the role of human translators will gradually disappear. Zheng and Zhu (ibid.) state: "Under the influence of computer technology and the continuous progress of modern science and technology system, artificial intelligence and other modern science and technology have gradually realized the integration with many traditional technology fields".

AI is believed to be a threat to many professions including the translation profession because AI becomes more and more a part of various fields, and the impact sometimes seems to be immense. As a consequence of the significant influence of AI on so many fields, but specifically in the translation field, the role of the translator has changed. It is generally believed that a good translator nowadays must have sufficient technological knowledge. Considering all this, the performance of translators and the working process might have changed, but the question is whether the original purpose and function of translators will vanish with time and be replaced by technology. That being the case, translators are predicted to become at some point post-editors as a result of the impact of AI in the translation field. There is a widespread belief that translators in the future will only be needed for post-editing machine translations. Herbic (2019: 01) states: "Current advances in machine translation increase the need for translators to switch from traditional translation to post-editing of machine-translated text, a process that saves time and improves quality." The question is whether machine translation has reached a level of quality high enough in order to make post-editing sufficient and what percentage of all texts can be fairly well post-edited based on machine translation rather than on human translation.

This thesis aims to illustrate that the profession of translators and its role is impacted by AI and that it adapts in accordance with technological changes as all other professions do, but it will not be replaced by AI technology. From this point of view, AI is not a threat to human translators, but an aid that supports the human translators by making the translators faster and more resourceful in the process of translating. The thesis is supported by illustrations throughout the theoretical part, by an analysis of the collected data of the participants, and evaluation of the Microsoft Translator in the research part. The thesis will firstly address translation technology, describing and introducing AI, computer-aided translation tools, and machine translation. The second part analyses the connection and history between AI and the translation profession along with studying the role of translators and post-editing. Finally, the research is introduced, followed by the presentation of the collected data, and the analysis of the collected data. The last part of the research is grading of human and machine translation of selected technical and literary texts, whose quality is assessed and compared.

2. About translation technology and its impact

Translation technology has significantly impacted and shaped the job of translators considering that it has been a part of this profession for over 70 years. Considering that the translation profession is a rather old profession 70 years is not a long time, but the technology has steeply developed during these years. As Scheibengraf states: "In the 1950s the Georgetown University and IBM the world's very first machine translation system was introduced. The approach was rule-based and lexicographical, which means that it relied on pre-programmed rules and dictionaries, it was revolutionary, although the system was slow and unreliable"[1]. Today translation technology is a part of a typical workflow of professional translators regardless of the type of work; whether it is subtitling, legal, or commercial texts. It is possible, and in some cases necessary, to work and translate without translation technology (literary translation) but mostly technology alone cannot be avoided while producing the translation or when delivering it.

[1] https://www.memsource.com/blog/translation-technology/ (visited on 1 June 2022)

Nowadays translation technology includes in its broadest sense a large array of computers tools that assist translators, which includes word processors, spelling, style and grammar checkers, diverse corpus compilation and analysis tools, and tools that manage terminology and translation memory (O'Brien, 2020: 2). Basically, translation technology can help translators in every step of translating. Translators can create their own term bases without wasting too much time in future translation because the technology can suggest terms added by the translator, which can be very useful. Further, it suggests solutions and corrections that the translator might have overlooked, but the translator is the one deciding whether the suggestions should be accepted or declined. Translation technology is custom made and has a lot of options and settings, so translators can adjust them to their specific needs, which allows the translators to decide what features should be used and how they should be used. Doherty (2016: 16) states: "Technological developments in the early 1990s led to the widespread uptake of CAT tools, chiefly TMs, which have created an increase in productivity and consistency in translation but a decrease in remuneration, control, and risks to overall quality". Although technology has developed and improved remarkably, it still has flaws and some features are unreliable, but the translator must decide what assists him well and increases his productivity and what does not. As Doherty (2016: 17) describes: "…an important factor in moving toward the effective use of these technologies and in preparing for future changes is critical and informed approach in understanding what such tools can and cannot do and how users should use them to achieve the desired result". Translation technology is still a tool and assistant to the human translator and for it to be fully functional and helpful the user needs to know how to utilize it.

Although in the 1990s technological development led to an increase in productivity and consistency in translation by using computer-aided tools, it simultaneously led to a decrease in remuneration, control, and overall quality (Doherty, 2016: 16). Even though translation technology has improved notably since the 1990s and the risk of low quality has reduced, the technology is still not fully reliable and translators should always take this into account when translating in order for the translation to be of high quality. The growing use and impact of technology in translation is due to globalisation and the market requiring a high number of translations in less time. With the world being better connected there appears a higher demand for translations, since numerous languages collaborate on a world-wide level. Considering the constantly growing need for translations the time for the process becomes less, especially nowadays in the modern and fast-paced world, so it is no surprise that technology has such a major impact. As Doherty (2016: 8) describes: "Such workflows represent a shift to more automation in not only the translation technologies used to process linguistic data, but also in

the overall translation project management systems required to coordinate large numbers of translators, on- and off-site, multitudinous projects, and languages". Therefore, translation technology does not only help the translator during the process of translating, but also during the preparation, organization and delivery of the translation product. In fact, translation technology is not only a strict linguistic technology, but it assists the translator around time-consuming matters and in order to stay in the market it becomes unavoidable to use translation technology. Moreover, insufficient knowledge in handling (translation) technology nowadays can be an obstacle professionally and privately.

2.1. Machine translation

Machine translation was introduced approximately 70 years ago, and it is fully automated translation without human input. Initially machine translation could only provide word-to-word translation, which at that time was revolutionary and sufficient regarding the circumstances at that time. Since then, machine translation has improved in quality and has therefore a larger influence on the translation profession, but the use of machine translation has also grown in non-professional translation. Furthermore, machine translation is considered very useful and handy to non-professional translation and in a non-professional context because it can produce a translation sufficient in quality for particular cases when a translation is for an individual and only used in informational purposes. Also, many consider machine translation helpful both to professional and non-professional users, but the user should be aware of certain risks and disadvantages machine translation has. Peng (2018: 3) elaborates: "Using machine translations on all your content can be costly, and not just in a monetary sense. Things like online legal documents or instruction manuals need to be 100% accurate. Mistakes here can cost huge sums of money or cause lasting damage to your company's reputation". Moreover, individuals but also professional translators should not fully rely on machine translation because it can lead to misunderstanding and even disinformation. As Nitzke (2019: 3) explains: "While some mistakes, like spelling and typing errors, hardly ever occur in MT output, some mistakes, e.g. syntactical or lexical ones, would almost never occur in human translation". The user should be aware of the disadvantages and advantages of this tool because the user is the one controlling the machine translation. Nowadays users can adjust certain settings in order for the output to be adequate as much as possible. However, it is up to the user to decide how to use the machine translation and when to use it. Peng (2018: 2) additionally elaborates:

“Machine translation is ideal when you’ve got a large amount of content that requires fast translation but doesn’t need anything more than a general meaning”.

Machine translation is considered practical to professional translators because they do not have to bother with repetitive mistakes and technicalities as spelling and typing errors, which rarely occur in machine translation output. However, mistakes produced by machine translation output like syntactical or lexical almost never occur in human translation, which means that the human translator does not have to pay too much attention to spelling and typing errors, but the translator has to correct the machine translation. Translators should know when machine translation is helpful and when it is not because if the translator spends too much time on correcting the machine translation output, it would probably be the faster way to translate from scratch, than to spend time on correcting the machine’s output. Additionally, professional translators should not use machine translation without their client’s permission to do so especially if it is an online machine translation system because the data will probably be stored by the system (Nitzke and Hansa-Schirra, 2021: 55). Although, by translating texts via machine translation the system stores the text and creates a database, which allows the machine translation to become better by storing them and building a larger database. The risk that should be considered is the data security because it is not professional to machine translate sensitive and personal documents and data of clients if there is a possibility that this data could be stored.

Moré López (2015: 4) proposes: “We also said that translators just postedit the translation when the source and the target languages are very close, and the translation quality is quite acceptable”. The author elaborates that translators in some cases use machine translation output and post-edit it if the source and target language are compatible and if the given quality is acceptable for the specific context and the client. If a translator does not take this into consideration it can lead to misinterpretations and disinformation in the final product, which can cause great damage. Lee (2019: 1) proposes that: “Machine translation (MT) is not widely used in the academic context, mainly because of concerns about its reliability with regard to whether it can accurately render the source text in the target language”. Machine translation is a great assistant to the human translator, but only if the human translator knows when (not) and how (not) to use it. The translator has to estimate the quality a particular machine translation system can provide and if this quality is adequate for the particular client, context and final audience. As Lee (ibid.) concludes from an academic research, machine translation was more helpful to linguistic lower-level students, which again questions the reliability and quality of machine translation in specific circumstances and cases. Lee (ibid.) deducts: “The current

situation can be summarized as follows: the demand for MT is increasing in the learning context, but the reliability of MT has not yet been fully established".

2.2. Computer-aided translation and tools

Computer-aided translation is a computer-driven tool and assistant to the human translator. As Kronocki (2018: 100) proposes: "The first proto-CAT tool was the Translation Support System (TSS) developed by Automated Language Processing Systems (ALPS) in the mid-1980s". So, the first computer-aided translation tool was introduced around four decades ago, which is a long time for technology because technology is a phenomenon that is developing drastically. As Zheng and Zhu (2020: 2) elaborate: "Computer Aided Translation (CAT) is a new language translation tool with translator as the center, machine translation and computer translation as auxiliary". Computer-aided translation technology and computer-aided translation tools are still described as being auxiliary in relation to the human translator. As the authors (ibid.) explain further, the working form of this technology is low cost and high efficiency, which allowed computer-aided translation technology to become the main technology for cross language communication in everyday life, work, scientific research, and other fields.

Computer-aided translation technology was successfully developed at the end of the 20th century (Zheng and Zhu, ibid.) and since the first introduction of this technology to the translation profession the impact and use of this technology kept rising. Although the development of computer-aided translation has had a significant growth since the first introduction, the technology is still confronted with lacks that can disturb a human translator and his work. Moreover, the technology can provide the human translator with poor suggestions, but it is up to the human translator whether to accept them or decline. Zheng and Zhu (2020: 3) define: „It can provide real-time, accurate and fast synchronous translation services for various cross language communication scenarios such as outbound tourism, foreign language learning, daily work and life, to avoid the difficulties caused by language barrier, so that AI translation has become a reality in various types of situations." Although this technology can mislead the human translator, it can also provide multiple translation suggestions for different fields of translation; from daily work and life, tourism to foreign language learning.

In order to achieve full potential of computer-aided technology the users need to understand how to deal with the relation of human and machine and how to use this relation as a tool. As elaborated, computer-aided technology is not in the centre of the translating process and it is not the main source of producing the final translation as Peng (2018: 4) describes: "Human translators cannot totally depend on machine and computerized tools". Hence, human translators are the main producers of translation and with an adequate assistance of technology the process of translating itself can improve. Kornacki (2018: 103) confirms: "Yet, as CAT tools are ultimately practical tools, and designed through the cooperation of linguists, engineers, information experts and computer scientists, their architecture needs to be adapted to provide a translator with a precise piece of information, to be used in a very particular context". The translator is the main producer in translation and computer-aided technology is a tool the translator must know how to operate. If the tool is prudently operated, it helps the translator and does not disturb the process of translation. As Kornacki (2018: 102) states, the power of this technology is the modality and ability to use various sources like term bases translation memory and machine translation. These are the principles of computer-aided technology tools that should be highlighted and combined with human translator principles, which cooperatively reach a high level of quality. The cooperation of computer-aided translation technology and human translators should be embraced, and it should not be perceived as a race between these two sides for the sake of the profession. As Kornacki (2018: 103, 104) adds: "No longer is it meant to replace human translators; instead, it is to support their knowledge and skills in producing high-quality translations". The aim of this technology is to support the knowledge and work of human translators rather than building an opponent for the human translator.

2.3. Artificial intelligence in translation

AI is the simulation of human intelligence and unsurprisingly AI in translation has improved because language is the base of every culture and a tool of everyday life whether it is privately or professionally. Language and the ability to speak is what marks human beings therefore language and translation are an important part of society. Zheng and Zhu (2020: 1) describe: "Artificial intelligence (AI) mainly refers to the technology that artificial machines can be endowed with intelligence similar to human beings. In general, artificial intelligence technology refers to the process of how to realize human intelligence through computer programs". Stressing that AI mainly refers to artificial machines with intelligence that is similar to human beings, meaning similar to intelligence of humans. AI already has some human-like

features like learning, but of course, this process of learning in AI technology is limited. It is challenging for AI to reach a level that high like human intelligence when it comes to translating because language is alive and constantly changing. What is more important language is a part of humans in every aspect; from political to family matters language is the main tool for expression. On the one hand, when it comes to political matters in cases when there are no emotions included and there is no creativity needed, but rather professional expression, AI indeed can assist the human translators very well. On the other hand, humans use language as a tool to express emotions and feelings and humans do that in accordance with how they feel at the moment; how they estimate a particular situation and how they estimate their audience or participants in a conversation. In a human-to-human conversation, the participants choose their words and the way they want to express by how they perceive themselves and how they perceive their participant at this very moment. Considering that translation is closely linked to language it is a feature that artificial technology cannot develop. Taking into account that artificial technology and technology, in general, is developing and improving drastically the technology will expectedly reach a high level of quality. The question is if AI can develop and stimulate features as real emotions and feelings that are in some cases needed in language and hence needed for translating such face-to-face cases.

Further, Zheng and Zhu (ibid.) state: „The core problems of artificial intelligence include the ability of reasoning, planning, learning, perception, tool application, limb control, industrial control and so on“. Although AI in aspects of translation lack this features, it can still help translators during their process of planning, learning, and producing. Considering that these are creative and cognitive processes it is very challenging for AI to reach that level or even to reach a level almost as high as that. As already mentioned above, creativity is a phenomenon that is demanding to improve in AI at a high level that can be equal to humans' creativity and cognitive thinking. AI developed in accordance with the development of humans, but also in accordance with the demands for translation. As the demand for translation was growing the impact of technology in translation was growing too. It is a coexisting appearance because if the demand for translation had not grown, there would not have been an impact that immense. Moreover, if there had not been the impact of technology, the demand of translation would not have grown. It is inconceivable to believe that society will never change and just stay the way it is. Kornacki (2018: 11) explains: "One reason to explain the widespread idea that early translation was word-for-word is that initially, the demand for translation was rather low due to localised trade and political life". Before the world has become a global village the technology that provided word for word translation was sufficient and there was no need for

improvement and development, but as that changed alongside with technology, so has technology changed too. Nowadays, AI technology can help and assist translators with preparational work and consecutive interpretation in a medical conference. Zheng and Zhu (2020: 3) elaborate: „In consecutive interpretation, artificial intelligence technology can help translators to organize notes or translate professional words. For example, when translating a large number of professional words in medical conferences, it can provide the results of machine translation for reference".

Moreover, AI allows humans to communicate with other humans although they do not speak each other's language, although the participants cannot rely fully on AI translation since it can lead to misunderstanding during the conversation. When the quality of AI translation is high enough (for a particular situation) there are advantages because when there is a need of unprofessional translation for leisure and pleasure there is no necessity for a professional translation and the translation tools are available for everyone, some even for free. As it is described by Microsoft: "Since the early 2010s, a new artificial intelligence technology, deep neural networks (aka deep learning), has allowed the technology of speech recognition to reach a quality level that allowed the Microsoft Translator team to combine speech recognition with its core text translation technology to launch a new speech translation technology"[2]. In 2022 the MT is free of cost and available for everyone to download providing text, speech, image and multi-device conversation translation.

3. Artificial intelligence and the translation profession

Kirov and Malamin (2022: 01) state that artificial intelligence has become the main technology and is therefore expected to cause job losses in different fields, especially in professions dealing with routine activities and subsequent creativity. Technology has become an indestructible part of everyday life. The interference of technology in general, but especially AI, grows from day to day. For that being so, there are many self-services available that are supported by AI. People can use various devices and tell them what they should do for them; from ordering food, buying groceries to checking the weather forecast. There is even the possibility to chat and have a conversation with these devices. There are many self-services and self-checkout points, such as self-checkout in stores, but also self-checkouts at airport borders,

[2] https://www.microsoft.com/en-us/translator/business/machine-translation/ (visited on 30 June 2022)

and robot waiters and waitresses at restaurants and bars. Moreover, the translation profession is not excluded from this impact; computer-aided translation tools are standard programmes translators use in their workflow. In general, translators must be competent with technology to be able to complete different tasks, such as localising, subtitling, editing, and formatting.

Hence, AI already has a significant role in many professions, including the translation profession. Further, Kirov and Malamin (ibid.) state: "Creativity is one of the human abilities considered most difficult for AI to emulate. Creative professions rely on creative thinking and require a non-standard approach to tasks. Creative professionals are people such as fashion designers, photographers, directors, writers, journalists, and translators". Texts translators' work can indeed require a low level of creativity and it can seem that human intervention is minimal or not at all needed. Nevertheless, depending on the type of text artificial translation technology is of no use to the translation process if the text requires creativity and adaption. In cases of commercial texts that often need to be partially translated and partially adapted to the audience, AI can translate the text itself in grammatical matters right, but it will maybe not have the same function as the original, since it cannot always estimate the context. The reason for that being so is that human translators are able to draw cultural and emotional parallels between languages, whereas AI lacks this ability. The human translator also has more options to choose from and selects the one that suits the target audience the best. For instance, AI may translate a commercial slogan properly, but it cannot estimate if there are other linguistic solutions and whether another one would fulfil the wanted function better.

As Zheng and Zhu (2020: 3) explain, there are useful features based on AI translators utilise, for instance, to make their preparatory work easier. AI technology can in consecutive interpretation help translators to organize their notes or translate technical words. It seems that at this point (AI) technology has more advantages than disadvantages when it comes to the translation profession and the translators' function, although the forecast proposes that this could change in the future. Further, Zheng and Zhu (ibid.) explain that when translators have to work with plentiful technical words in medical conferences, the technology can provide the results of machine translation for reference, and some have the ability of live voice search. The fact that there will be more translators working than at any other period in human history as R. Lommel and A. DePalma (2016: 4, 21) state, proposes that in the near future the demand for translators is not vanishing. Additionally, they state that there is a forecast of translation volumes increasing by 67% over the next 3 years. This suggests that AI is still perceived as a tool to translators and that translators are the main operators. As Herbig et al. (2019: 1) confirm

the suggestion: „The combination of AI and human intelligence leads to faster translation of higher quality", which results with a higher productivity rate, but only when combined, which shows that the combination is successful, and that the human translator is much needed even with the technology developing and growing.

3.1. The impact on the role of translators

Translation has been present since the very beginning of history and language, which has later turned into a profession. Moreover, the role of translators, whether unprofessional or professional, has been ever since crucial. Taking into consideration the growing demand on human translators and translations the importance of the role has not faded yet. Woodsworth (2012: 3) states: "Archaeologists have uncovered Sumerian-Eblaite vocabularies inscribed in clay tablets that are 4,500 years old. These bilingual lists attest to the existence of translation even in remotest history". The act of translating managed to stay inevitable during human history, in fact it brought a magnificent contribution to history being accessible to people today. Taking this into consideration it is arduous to think that translating was needed and endured for 4500 years but will in a few decades be replaced. Moreover, translating has because of its importance become a growing profession. Tomasello (2019: 110) expresses that: "In such a view where translators are more likely to creatively engage with MT systems, it is inevitable that they will have to develop new skills, as their role is being completely revolutionized". The role of translators being described as revolutionized explicates that the role will change and that translators have to adjust, although the role itself will not be replaced as the author (ibid.) describes: „The notion of the job of translators being fully replaced by machines is considerably less plausible than the emergence of translators as 'translational cyborgs' " meaning that the interaction of translators and technology will become more extensive and the author stresses the fact that it will take optimal collaboration. Hence, it can be concluded that the exigency is mutual; it will be (and already is) burdensome to complete tasks as a translator without using any type of technology.

However, technology, and even AI technology will not give adequate translation results without cooperation with human translators. Herbig et al. (2019: 3) state: "When comparing traditional translation to PE using all of the above support tools, one notices that the task changes considerably from mostly text production to comparing and adapting MT and TM proposals with the help of AI-powered support tools", which supports the statement that the role of translators has already changed, but as explained above it is a mutual phenomenon

because the profession changes together with the technology. Herbig et al. (ibid.) state in her quote that the task of translators mostly changed to analysing proposals of artificial intelligence-based tools, and translators do not produce that many texts. This statement, of course, does not apply for any field of translation, but rather for texts that require less human linguistic skills and are therefore manageable by technology alone. As Kirov and Malamin (2022: 1) described, artificial intelligence will be mainly used in routine translations belonging to the same type. Additionally, they (2022: 8) elaborate: "According to respondents, AI will mostly affect technical, document, and legal translations (translations with the highest degree of routine work), while it will have the least effect on screenplays and works of fiction in translation, as well as simultaneous and consecutive interpretation, where creativity is at its highest". Taking this into consideration, AI would have to reach a very high level of creativity to even compete with human translators. A factor that should also be taken into deliberation is that language is a vivid and constantly changing phenomenon, and when there is a misunderstanding, difficulty in understanding or another problem it can always be additionally discussed and explained, which makes the cooperation with the client or audience easier. A potential problem that arises with AI technology providing linguistic services is that there is a lack of this kind of live communication between two parties that cannot be neither predicted nor programmed. Doherty (2016: 11) explains that the product of translation has changed, and the range of content has expanded. Furthermore, he (ibid.) explains that initial translations were basically technical, political, religious, or literary texts, but the variety of content kept increasing. As he (ibid.) illustrates: "These well-defined genres have expanded to include commercial content (e.g., marketing, product descriptions, patents, support documentation, and business communications) as well as a wider range of technical genres such as scientific research, medical and pharmaceutical documentation, and patient information". It is not surprising that the translation profession has always been much needed, since the demand for translations in various fields kept rising and the range of fields kept growing. Language always adapts to how society alternates and culture reforms and translators are the one operating with language. Doherty (ibid.) explains that: "Although these areas have traditionally enjoyed continuous growth, since the 1990s, an unprecedented need has arisen to translate digital content such as websites, computer software, technical documentation, video games, and subtitles". As some tasks and products of initial translators may have vanished, the gap was filled with results of change and adaption from human society. Additionally, the author (ibid.) explains that with globalisation there arises the need for localisation within translations because of the necessity of particular audiences in geographic and linguistic locales. Considering all of this it is clear

why there are expectations that the role of translators will transfer, especially to post-editors, believing that translators will maybe not completely vanish, but their function and involvement will differ from what they are and do at this present moment.

3.2. Post-editing — the future role of translators?

With technology impacting the translation profession more and more and artificial technology improving from day to day one can predict that AI will threaten to replace translators. Moreover, if machine translation powered by improved AI manages to bring translations output to a very high quality, translators would not even be needed or they would take the role of post-editors and just work on the output rather than translate from scratch. Herbig et al. (2019: 1) define post-editing as followed: "The process of using a pre-translated text as a basis and improving it to the final translation is called post-editing." Further, the authors explain that it is a combination of artificial and human intelligence. While AI proposes draft translations of high quality very quickly, human intelligence ensures the semantical and lexical aspects are correct. Human intelligence also identifies and analyses the target audience and cultural background (Herbig et al., 2019: 1). Taking this definition into account it is evident that post-editing requires both human and machine. Excluding the time needed for the process of translating, the difference is that human translators are able to translate without drafts given by AI powered technology, while machine translator output mostly need additional work of human translators to achieve that quality. The question is whether translations that are faster done with help of technology achieve the same quality as plain human translation. It is important to estimate the situation well before deciding which option to choose because human translators can indeed be a lot faster with diverse technology tools, but it is crucial that the quality does not decrease because of using tools. As Nitzke and Hansa-Schirra (2021: 52) state: "Basically, the client should consider whether the benefits outweigh the risks before using MT and PE. Or, in other words, the client has to decide whether the risks are tolerable in a given situation". This decision also depends on the text type and target audience, which are pivotal when translating and deciding how the process of translating should be done.

Herbig et al. (2019: 01) propose that machine translation can provide a translator with intelligent adaption: "Instead of only providing the best translation, MT can also be used to dynamically provide the human with alternatives for the remainder of the sentence when clicking on a word". This means that the machine translation cannot judge by itself which

alternative would fit best but, it can supply the human translators with appropriate and useful alternatives, from which the human translator can choose from. Nonetheless, another factor is that the system has to be fed so that there is sufficient material for the system and by doing so the quality of the output improves. Nitzke and Hansa-Schirra (2021: 26) elaborate that if there is not enough training material for the machine translation, the result is that the translation output quality will be rather poor. Moreover, this is in many cases a problem for not widely spoken languages and for rare language combinations because they are often underrepresented and have low resources (2021: 26).

Further, the authors (2021: 3) explain that the better the neural machine translation becomes there is a particular paradox formed as the neural machine translation output improves, the more challenging it becomes to spot errors. This is why the neural machine translation appears to be more fluent but less error-oriented. As a result of this adaption there is again more work for the translator, since one aspect improved, but another one deteriorated, and the machine output has to be revised by a human translator. It should be estimated whether and in which situation such an approach and translating process is adequate and when it only lengthens the duration of translating. If translating from scratch is slightly longer, but all required elements for the target audience and client are fulfilled it is more effective, economical, and practical to do the translation from scratch rather than post-editing. Nitzke and Hansa -Schirra (2021: 27) explain: "This makes, on the one hand, the PE process even more demanding and leads to more cognitive effort for the post-editor. Hence, post-editors need a lot of training and awareness for the error types to be able to correct the texts efficiently". If the post-editors require a lot of training to compensate the lack of neural machine translation, it should be considered if the more effortless option would be to train translators to translate faster supported by technology, or rather from scratch than post-edit. Of course, as already elaborated, it depends on the text type and target audience, and if the text is mostly technical, repetitive, and low in requiring creativity a combination of post-editing and translating from scratch is acceptable.

Additionally, Nitzke and Hansa-Schirra (ibid.) add that the aim of post-editing is to create a translation that cannot be differentiated from a human translation, but if that process demands a much longer duration than human translators translating from scratch, it seems futile to focus, now and in the future, on translating rather than on post-editing. If a translation is needed for only informative purposes and if there is no need for linguistic professionality the output can be of use even without revision. Additionally, the authors (2021: 52) explain that the quality of post-edited texts might not be adequate for the purposes of a specific client or target

audience. The question is whether it is more profitable to translate a particular text or to use a combination of post-editing and translating rather than just post-edit as the deficiency of translation tools require in some cases additional work of human translators. The role of translators appears to be of more importance than post-editing when it comes to professional translation, so it is unlikely that the role of translators will be completely replaced by it, although a growing demand for a combination of those two roles is not excluded.

4. Research on the quality of Microsoft Translator

Language is pivotal to humans, and it is what makes humans and their communication unique, therefore the significance of language has not faded. Of course, language has immensely changed, and it is changing constantly, which results also in a constant change of the translation profession. Because of the boom of technology, the translation profession has never been questioned like at this point in history. Translators have been crucial in many situations and simply irreplaceable because of their ability. Nowadays, more and more people believe that AI will replace human translators. It is impossible to translate in today's modern world without technology due to globalization and market changes, which result in conditions that, in the vast majority of cases, require the use of some technology whether it is basic electronic devices or translation technology. Hence, the question often arises whether translators are being gradually replaced by AI-powered technology.

This research aims to evaluate the quality of MT output. The Raw output is firstly compared and analysed by participants of the research and then evaluated with regards to the official human translation by the participants and by the BLEU score. Participants of different linguistic background, skill level and knowledge were chosen for the analysis in order to show whether only participants with more linguistic knowledge can differentiate machine translation from human. The aim of this research is to evaluate the quality of MT by machine and human in order to show that human translators are needed. In order to show that technology and human in the translation profession work very well together and that the main producer of translation is still the human translator, this paper analyses official human translations and MT's raw output. The analysis is based on participants of different linguistic levels and backgrounds and on two different text types in order to see if machine translation is more acceptable to one pattern of participants.

The MT is powered by AI technology and has several functions: text-to-text translation, speech-to-speech translation, speech-to-text translation, image-to-text translation, and live-conversation translation. The program can translate texts right away into any other supported language and even dialects. With the speech translation there is an option to split-screen a conversation or to speak into the microphone and this option provides a quick translation and offers the ability to dictate a text, which is transcribed into a written form. Moreover, the text-to-speech feature enables one to hear the translation in its native accent. The feature called

multi-device conversation is a feature where up to 250 people can use their own device at the same time for a carry-on translated conversation. The image recognition feature can translate texts from an image. Microsoft Translator (MT) provides different kinds of translating in many languages, but not all features are provided in all languages.[3]

4.1. Research design

4.1.1. The questionnaire

Five participants took part in this research. Two participants out of five are second year language/translation students of a double major MA study programme and they have academic knowledge in German, English, and Croatian (marked as participants number one and three). They are fluent in all three languages. Three participants have no academic knowledge in languages and have acquired their linguistic knowledge informally and through primary and secondary education. One of those participants has a high level of English knowledge (participant number five), while the other two participants have average English knowledge (participants number two and four). All participants are native Croatian speakers. Considering the different levels of knowledge and linguistic background, the elaborations and observations of the participants are analysed for each text pair in order to compare their choices.

The five participants were asked to firstly, carefully read eight texts. Of these eight texts, four are human translations and other four are MT outputs. Both the human translations and the MT outputs are translations of the same two source texts. The participants had to guess which four out of these eight texts are human translations. Secondly, they had to elaborate their answer considering the choice of words, style, grammar, syntax, overall impression, and other observations. Thirdly, the participants had to evaluate the MT outputs in comparison with the human translation, similar in principle to the BLEU score, which is another method used in this research. The participants graded the MT translations with a grade from one to ten considering the similarity of the outputs with the human translation in reference to overall quality; syntax, style grammar and other observations. The analysis of the participants' examination of the texts is the base on which the participants graded the translations.

[3] https://www.microsoft.com/en-us/translator/languages/ (visited on 1 August 2022)

The participants' elaborations of MT raw output and official human translation are analysed. I also wanted to establish whether there is a connection between their choices and their evaluation of the acceptability of MT output and their linguistic knowledge/language proficiency. Furthermore, this part of the research aims to test if professional human translation is recognizable only to linguists. By using the text-to-text translation of Microsoft Translator the texts have been translated from the German language into English and Croatian. Although Microsoft Translator like other MT-apps supports plenty of languages, the quality of translation is not always the same because of the resources provided for each language (pair). The resources are based on the accessibility and availability of parallel and monolingual corpora for target and source languages. This is why translation between some language pairs is of higher quality than between others. In order to assess a wider range and possibilities of the MT, considering the differences between language pairs, texts were chosen that have been translated from German into English and Croatian using MT. The official Croatian and English translations of the German texts and the Microsoft translations are comparatively listed with the original German text on the left of the table, the official human translation in the middle, and the MT output on the right.

4.1.2. BLEU score

In the second part of the research, the texts are again evaluated but this time by the BLEU score, which is a machine-powered evaluation system for assessing the similarity of machine-translated text in comparison with human translations. The evaluation results of the participants are presented. The purpose of both human and machine evaluation is elaborated. Finally, the grading results done by humans and machine are stated, compared, and analysed.

4.2. Analysis and discussion

This part of the paper presents and analyses the data collected from the participants. Machine and human translation analysed by participants of different language proficiency levels are represented. The texts have been translated from the German language in order to test the language pairs in MT's outputs – German to English and German to Croatian. The research has been done on technical and literary texts because they require different approaches, and the process of translating is divergent. Technical texts require low creativity, while literary texts

require a high level of creativity and more focus on adaption to the audience. Unlike literary translation, technical translation is formulaic, repetitive and needs consistent terminology. The source text in German and the technical translations in English and Croatian have been taken from a Bosch manual for vacuum cleaners for the types *BGB1…/BGL1…/BGN1…/BGB2…BGL2…/BGN2…* . The literary source text in German has been taken from Thomas Mann's *Der Tod in Venedig*. The English translation of this novella has been taken from *Death in Venice* translated by Lowe-Porter and the Croatian translation has been taken from *Smrt u Veneciji* translated by Zlatko Crnković. The official human translation of the technical texts in English is marked with the number 1 and the accompanied MT output with the number 2. Number 1 and 2 together are marked as the text pair A. The official human translation of the technical texts in Croatian is marked with the number 3 and the accompanied MT output with 4. Translation 3 and 4 build the text pair B. The original technical text in German for the text pairs A and B is marked with 0. The literary text pair in English is marked with C, which consists of the official human translation number 5 and the adequate MT number 6. The literary text pair in Croatian is marked with D, which consists of the official human translation number 7 and the adequate MT output number 8. The original literary text in German for the text pairs C and D is marked with 00.

4.2.1. Technical texts

German to English (text pair A)

0	**1**	**2**
Original text	**Official human translation**	**Microsoft Translator output**
Sachgemäßer Gebrauch ▪ Staubsauger nur gemäß Typenschild anschließen und in Betrieb nehmen.	**Proper use** ▪ Only connect and use the vacuum cleaner in accordance with the specifications on the rating plate.	**Proper use** ▪ Connect the vacuum cleaner only according to the type plate and put it into operation.

▪ Niemals ohne Staubbeutel bzw. Staubbehälter, Motorschutz- und Ausblasfilter saugen. => Gerät kann beschädigt werden!	▪ Never vacuum without the dust bag or dust container, motor protection or exhaust filter. => This may damage the device.	▪ Never vacuum without dust bags or dust containers, engine protection and blow-out filters. => device may be damaged!
▪ Niemals mit Düse und Rohr in Kopfnähe saugen. => Es besteht Verletzungsgefahr!	▪ Always keep the device away from your head when using the nozzles and tubes. => This could cause injury!	▪ Never vacuum with nozzle and tube near the head. => There is a risk of injury!
▪ Beim Saugen auf Treppen muss das Gerät immer unterhalb des Benutzers stehen.	▪ When vacuuming stairs, the device must always be positioned below the user	▪ When vacuuming on stairs, the device must always be below the user.
▪ Das Netzanschlusskabel und den Schlauch nicht zum Tragen / Transportieren des Staubsaugers benutzen.	▪ Do not use the power cord or the hose to carry or transport the device.	▪ Do not use the power cord and hose to carry/transport the vacuum cleaner.
▪ Wenn die Netzanschlussleitung dieses Gerätes beschädigt ist, muss sie durch den Hersteller oder seinen Kundendienst oder eine ähnlich qualifizierte Person ersetzt werden,	▪ For safety reasons, if this appliance's mains power cable becomes damaged, it must be replaced by the manufacturer, their after-sales service department or a	▪ If the mains connection line of this device is damaged, it must be replaced by the manufacturer or his customer service or a similarly qualified person to avoid hazards.

um Gefährdungen zu vermeiden.	similarly qualified person.	
▪ Bei einer Betriebsdauer von mehr als 30 Minuten Netzvollständig ausziehen.	▪ If using the device for longer than 30 minutes, pull out the power cord completely.	▪ With an operating time of more than 30 minutes, fully extend the network.
▪ Nicht am Anschlusskabel, sondern am Stecker ziehen, um das Gerät vom Netz zu trennen.	▪ When disconnecting the appliance from the mains, pull on the plug itself to remove it; do not pull on the power cord.	▪ Do not pull on the connection cable, but on the plug to disconnect the device from the mains.
▪ Das Netzanschlusskabel nicht über scharfe Kanten ziehen und nicht einquetschen.	▪ Do not pull the power cord over sharp edges or allow it to become trapped.	▪ Do not pull the power cord over sharp edges and do not squeeze in.
▪ Achten Sie darauf, dass der Netzstecker beim automatischen Kabeleinzug nicht gegen Personen, Körperteile, Tiere oder Gegenstände geschleudert wird.	▪ When the cable is being automatically rewound, ensure that the mains plug is not thrown towards persons, body parts, animals or objects.	▪ Make sure that the power plug is not thrown against people, body parts, animals or objects during the automatic cable retraction.
▪ Netzanschlusskabel mit Hilfe des Netzsteckers führen.	▪ Use the main plug to guide the power cord.	▪ Run the power cord using the power plug.
▪ Vor allen Arbeiten am Staubsauger Netzstecker ziehen.	▪ Pull out the mains plug before carrying out any work on the vacuum cleaner.	▪ Before all work on the vacuum cleaner, pull the power plug.

▪ Beschädigten Staubsauger nicht in Betrieb nehmen. Beim Vorliegen einer Störung Netzstecker ziehen.	▪ Do not operate the device if it is damaged. Unplug the device from the mains if a fault is detected.	▪ Do not put the damaged vacuum cleaner into operation. In the event of a fault, unplug the power supply.
▪ Um Gefährdungen zu vermeiden, dürfen Reparaturen und Ersatzteileaustausch am Staubsauger nur vom autorisierten Kundendienst durchgeführt werden.	▪ For safety reasons, only authorised service personnel are permitted to carry out repairs and fit replacement parts to the vacuum cleaner.	▪ In order to avoid hazards, repairs and replacement of spare parts on the vacuum cleaner may only be carried out by authorized customer service.
▪ Staubsauger vor Witterungseinflüssen, Feuchtigkeit und Hitzequellen schützen.	▪ Protect the vacuum cleaner from weather, moisture and heat sources.	▪ Protect vacuum cleaners from weather, moisture and heat sources.
▪ Keine brennbaren oder alkoholhaltigen Stoffe auf die Filter (Staubbeutel, Motorschutzfilter, Ausblasfilter etc.) geben.	▪ Do not pour flammable substances or substances containing alcohol onto the filters (dust bag, motor protection filter, exhaust filter, etc.).	▪ Do not put flammable or alcohol-containing substances on the filters (dust bags, engine protection filters, blow-out filters, etc.).
▪ Staubsauger ist für den Baustellenbetrieb nicht geeignet. => Einsaugen von Bauschutt kann zur Beschädigung des Gerätes führen.	▪ The vacuum cleaner is not suitable for use on construction sites. => Vacuuming up building rubble could damage the appliance.	▪ Vacuum cleaner is not suitable for construction site operation. => suction of construction rubble can lead to damage of the device.

▪ Gerät ausschalten und Netzstecker ziehen, wenn nicht gesaugt wird.	▪ When not in use, switch off the device and pull out the mains plug.	▪ Turn off the device and unplug when not vacuuming.
▪ Ausgediente Geräte sofort unbrauchbar machen, danach das Gerät einer ordnungsgemäßen Entsorgung zuführen.	▪ At the end of its lifespan, the device should immediately be rendered unusable, then disposed of in an appropriate manner.	▪ Make disused devices unusable immediately, then dispose of the device properly.
! Bitte beachten Die Netzsteckdose muss über eine Sicherung von mindestens 16A abgesichert sein. Sollte die Sicherung beim Einschalten des Gerätes einmal ausgelöst werden, so kann dies daran liegen, dass gleichzeitig andere Elektrogeräte mit hohem Anschlusswert am gleichen Stromkreis angeschlossen sind. Das Auslösen der Sicherung ist vermeidbar, indem Sie vor dem Einschalten des Gerätes die niedrigste Leistungsstufe einstellen und erst danach eine höhere Leistungsstufe wählen.	**! Please note** The mains socket must be protected by at least a 16 amp circuit breaker. If a circuit breaker is tripped when you switch on the device, this may be because other electrical appliances which have a high current draw are connected to the same power circuit. To prevent the circuit breaker from tripping, select the lowest power setting before switching the device on, and increase the power only once it is running.	**! Please note** The mains socket must be protected by a fuse of at least 16A. If the fuse is triggered once when the device is switched on, this may be due to the fact that other electrical appliances with a high connection value are connected to the same circuit at the same time. Triggering the fuse can be avoided by setting the lowest power level before turning on the device and only then selecting a higher power level.

One language/translation student found *do not use the power cord to transport/carry* misleading because the participant believed that machine translators do not offer such solutions with a slash. Two students claim that this machine translation is of sufficient quality for personal use. It is questionable if *blow-out filters* would cause confusion, since the correct term is *exhaust filter* which is used in the human translation. Moreover, the human translation uses singular *filter* while the output uses plural, which could make the buyer believe that there is more than one filter. The participants elaborate that there are clear errors, but that the machine translation is rather useful.

Table 1 illustrates the number of participants marking the text as official human translation and the number of participants marking the text as official human translation accompanied with the number of the participant for both human and MT translations. The illustration of the texts is categorized by text, language, and translation type.

Table 1 The participants' marking of the texts as human or machine translation

	Language: English (EN) / Croatian (HR) Type: Human / MT output (MT)	Translation number	Number of participants marking the text as official human translation accompanied by the participant's assigned number	Number of participants marking the text as MT output accompanied by the number of the participant
Technical texts	Human, EN	Text 1	2 (four, five)	3 (one, two, three)
	MT, EN	Text 2	3 (one, two, three)	2 (four, five)
	Human, HR	Text 3	4 (one, three, four, five)	1 (two)
	MT, HR	Text 4	1 (two)	4 (one, three, four, five)
Literary texts	Human, EN	Text 5	3 (one, three, five)	2 (two, four)
	MT, EN	Text 6	2 (two, four)	3 (one, three, five)
	Human, HR	Text 7	4 (one, three, four, five)	1 (two)

	MT, HR	Text 8	1 (two)	4 (one, three, four, five)

As shown in table 1, two participants with an average linguistic knowledge believe that the human translation is the MT output. The argumentation for that being so is that the machine translation language feels more human-like because of the tenses used and syntax.

The MT output in this text pair is the most incorrectly guessed text, which shows that the MT for the language pair German to English for technical texts is of good quality since it was misleading and difficult to differentiate from the human translation. Four participants believe that the MT output is human translation. However, two of the participants with average language knowledge, recognized the machine translation immediately like the other two participants, language/translation students, did. Three participants find that formulations like *There is a risk of injury* are misleading because this formulation is more human-like than *This could cause injury* to them. As shown in table 1, two participants with average language knowledge elaborate that the machine's output has unusual syntax and word order. As table 2 illustrates, one participant with a high level of language knowledge and one student explained that the context was not considered at all. Semantically, participants elaborate that formulations such as *Run the power cord using the power plug* do not make sense to them. Although consistency is a feature of manuals two participants found that overusing the same word and not using synonyms appears non-professional. As shown in table 1, for this translation both language/translation students and both participants with an average knowledge found this text pair challenging and did not guessed right. The participant with a high level of (non-academic) language knowledge found it the most challenging text pair but guessed it right.

German to Croatian (text pair B)

0	**3**	**4**
Original text	**Official human translation**	**Microsoft Translator output**
Sachgemäßer Gebrauch	**Pravilno korištenje** ▪ Uređaj spojite i koristite u skladu sa	**Proper use**

▪ Staubsauger nur gemäß Typenschild anschließen und in Betrieb nehmen.	specifikacijama na natpisnoj pločici.	▪ Spojite usisavač samo prema pločici tipa i stavite ga u pogon.
▪ Niemals ohne Staubbeutel bzw. Staubbehälter, Motorschutz- und Ausblasfilter saugen. => Gerät kann beschädigt werden!	▪ Nikada ne usisavajte bez vrećice ili spremnika za prašinu, zaštite motora i ispušnog filtra. => Može oštetiti usisavač.	▪ Nikada ne usisavajte bez vrećica za prašinu ili spremnika za prašinu, zaštite motora i filtera za ispuhivanje. => uređaj može biti oštećen!
▪ Niemals mit Düse und Rohr in Kopfnähe saugen. => Es besteht Verletzungsgefahr!	▪ Uvijek kada koristite mlaznice i crijeva usisavač držite podalje od glave. => Može uzrokovati ozljede!	▪ Nikada ne usisavajte mlaznicom i cijevi u blizini glave. => Postoji opasnost od ozljeda!
▪ Beim Saugen auf Treppen muss das Gerät immer unterhalb des Benutzers stehen.	▪ Kod usisavanja stepenica uređaj mora biti postavljen niže od osobe koja usisava.	▪ Prilikom usisavanja na stepenicama, uređaj uvijek mora biti ispod korisnika.
▪ Das Netzanschlusskabel und den Schlauch nicht zum Tragen / Transportieren des Staubsaugers benutzen.	▪ Kabel za napajanje ili crijevo nemojte koristiti za nošenje ili pomicanje usisavača.	▪ Ne koristite kabel za napajanje i crijevo za nošenje/transport usisavača.
▪ Wenn die Netzanschlussleitung dieses Gerätes beschädigt ist, muss sie durch den Hersteller oder seinen Kundendienst oder eine	▪ Ako se kabel za napajanje aparata ošteti, oštećeni kabel smije i sigurnosnih razloga mijenjati samo proizvođač, služba za	▪ Ako je mrežni priključni vod ovog uređaja oštećen, mora ga zamijeniti proizvođač ili njegova korisnička služba ili slično kvalificirana osoba

ähnlich qualifizierte Person ersetzt werden, um Gefährdungen zu vermeiden.	korisnike ili osoba sa sličnim kvalifikacijama.	kako bi se izbjegle opasnosti.
▪ Bei einer Betriebsdauer von mehr als 30 Minuten Netzvollständig ausziehen.	▪ Ako aparat koristite više od 30 minuta u potpunosti izvucite kabel za napajanje.	▪ S vremenom rada duljim od 30 minuta, potpuno proširite mrežu.
▪ Nicht am Anschlusskabel, sondern am Stecker ziehen, um das Gerät vom Netz zu trennen.	▪ Kada uređaj odspajate od električne mreže, izvucite utikač, a ne kabel za napajanje.	▪ Ne povlačite priključni kabel, već na utikaču da biste isključili uređaj iz mreže.
▪ Das Netzanschlusskabel nicht über scharfe Kanten ziehen und nicht einquetschen.	▪ Kabel za napajanje ne vucite po oštrim rubovima i ne dopustite da se zaplete.	▪ Ne povlačite kabel za napajanje preko oštrih rubova i nemojte se ugurati.
▪ Achten Sie darauf, dass der Netzstecker beim automatischen Kabeleinzug nicht gegen Personen, Körperteile, Tiere oder Gegenstände geschleudert wird.	▪ Kada se kabel za napajanje automatski namotava osigurajte da utikač ne leti prema osobama, dijelovima tijela, životinjama ili predmetima.	▪ Pazite da se utikač ne baca na ljude, dijelove tijela, životinje ili predmete tijekom automatskog povlačenja kabela.
▪ Vor allen Arbeiten am Staubsauger Netzstecker ziehen.	▪ Prije izvođenja radova na usisavaču odspojite mrežni priključak.	▪ Prije svih radova na usisavaču povucite utikač.
▪ Beschädigten Staubsauger nicht in Betrieb nehmen.	▪ Nemojte rukovati uređajem ako je oštećen.	▪ Ne stavljajte oštećeni usisavač u pogon.

▪ Um Gefährdungen zu vermeiden, dürfen Reparaturen und Ersatzteileaustausch am Staubsauger nur vom autorisierten Kundendienst durchgeführt werden.	▪ Zbog sigurnosnih razloga samo osoblje ovlaštene službe za održavanje može izvoditi popravke i ugrađivati zamjenske dijelove u uređaj.	▪ Kako bi se izbjegle opasnosti, popravke i zamjenu rezervnih dijelova na usisavaču može obavljati samo ovlaštena služba za korisnike.
▪ Staubsauger vor Witterungseinflüssen, Feuchtigkeit und Hitzequellen schützen.	▪ Usisavač zaštitite od vremenskih prilika, vlage i izvora topline.	▪ Zaštitite usisavače od vremenskih uvjeta, vlage i izvora topline.
▪ Keine brennbaren oder alkoholhaltigen Stoffe auf die Filter (Staubbeutel, Motorschutzfilter, Ausblasfilter etc.) geben.	▪ U filtre (vrećice za prašinu, filtar zaštite motora, ispušni filtar itd.) ne ulijevajte zapaljive tvari ili tvari koje sadrže alkohol.	▪ Nemojte stavljati zapaljive tvari ili tvari koje sadrže alkohol na filtre (vrećice za prašinu, filtri za zaštitu motora, filtri za ispuhivanje itd.).
▪ Staubsauger ist für den Baustellenbetrieb nicht geeignet. => Einsaugen von Bauschutt kann zur Beschädigung des Gerätes führen.	▪ Usisavač nije prigodan za korištenje na gradilištima. => Usisivanje građevinskog otpada može oštetiti aparat.	▪ Usisavač nije prikladan za rad gradilišta. => usisavanje građevinskog ruševina može dovesti do oštećenja uređaja.
▪ Gerät ausschalten und Netzstecker ziehen, wenn nicht gesaugt wird.	▪ Kada se aparat ne koristi, isključite ga iz struje.	▪ Isključite uređaj i isključite se iz napajanja kada ne usisavate.
▪ Ausgediente Geräte sofort unbrauchbar machen, danach das	▪ Na kraju vijeka trajanja aparat treba odmah staviti izvan uporabe i	▪ Odmah učinite nekorištene uređaje

Gerät einer ordnungsgemäßen Entsorgung zuführen.	odložiti ga na pravilan način.	neupotrebljivima, a zatim pravilno odložite uređaj.

All participants detected some mistakes, whether grammatical, semantical or syntactical. As shown in Table 1, four participants out of five guessed this text correctly. Nevertheless, the MT output in Croatian was graded with a slightly higher score than the MT output in the technical text A in English. The reason for that being so could be because not all participants are fluent in English, but all participants are fluent in Croatian. This might indicate that a poor translation is more useful if the reader knows the language well and is able to figure out the meaning and intention despite the mistakes. The participants explained that formulations such as *Odmah učinite nekorištene uređaje neupotrebljivima* are a sign of machine translation because the appliance of direct translation from the source language is clearly visible. Formulations like these are neither common in the Croatian language nor correct. Additionally, the output used *rad gradilišta* instead of *rad na gradilištu* or as the human translation proposes *korišenje na gradilištu*, which also is an obvious mistake that confuses the reader of the manual. Manuals are created for a clear and proper utilisation and any possible confusion should be avoided. Four participants explained that the Microsoft Translator output's suggestion *Postoji opasnost od ozljeda!* seems more of a natural Croatian language than the solution *Može uzrokovati ozljede!*

Further, all participants except participant number two elaborate that formulations and terminological choices such as *korisnik* i *uređaj uvijek mora biti ispod korisnika* instead of *osobe* i *uređaj mora biti postavljen niže od osobe koja usisava* are disrupting the readers concentration. Even though the participants recognized a lot of mistakes of different types, four participants believe that the Microsoft translation output is rather useful than useless. The mistakes could lead to misunderstanding of the manual, but those mistakes are not immensely, so they would probably not lead to greater misutilizing of the device. It should be considered that all participants are native Croatian speakers, which makes it easier for them to understand in spite of the mistakes. This text pair was guessed right by all participants except participant number two, as shown in Table 1.

4.2.2. Literary texts

German to English (text pair C)

00	**5**	**6**
Original text	**Official human translation**	**Microsoft Translator output**
Er frühstückte ohne Eile, empfing aus der Hand des Portiers, der mit gezogener Tressenmütze in den Saal kam, einige nachgesandte Post und öffnete, eine Zigarette rauchend, ein paar Briefe. So geschah es, daß er dem Eintritt des Langschläfers noch beiwohnte, den man dort drüben erwartete.	He took a leisurely breakfast. The porter came up with his braided cap in his hand, to deliver some letters that had been sent on. Aschenbach lighted a cigarette and opened a few letters and thus was still seated to witness the arrival of the sluggard.	He had breakfast without haste, received from the hand of the doorman, who was with pulled tress cap came into the hall, some sent mail and opened a few letters, smoking a cigarette. So it happened that he Entry of the late riser was still attended, who was expected over there.
Er kam durch die Glastür und ging in der Stille schräg durch den Raum zum Tisch seiner Schwestern. Sein Gehen war sowohl in der Haltung des Oberkörpers wie in der Bewegung der Kniee, dem Aufsetzen des weißbeschuhten Fußes von außerordentlicher Anmut, sehr leicht, zugleich zart und stolz und verschönt noch durch die kindliche	He entered through the glass doors and passed diagonally across the room to his sisters at their table. He walked with extraordinary grace-the carriage of the body, the action of the knee, the way he set down his foot in its white shoe-it was all so light, it was at once dainty and proud, it wore an added charm in the childish shyness which made him	He came through the glass door and walked in silence diagonally through the room to his sisters' table. His walking was both in the posture of the upper body as well as in the movement of the knees, the putting on of the white-shoeed foot of extraordinary grace, very light, at the same time tender and proud and embellished by the childlike shame, in which

Verschämtheit, in welcher er zweimal unterwegs, mit einer Kopfwendung in den Saal, die Augen aufschlug und senkte.	twice turn his head as he crossed the room, made him give a quick glance and then drop his eyes.	he twice on the road, with a turn of the head into the hall, opened and lowered his eyes.
Lächelnd, mit einem halblauten Wort in seiner weich verschwommenen Sprache nahm er seinen Platz ein, und jetzt zumal, da er dem Schauenden sein genaues Profil zuwandte, erstaunte dieser aufs neue, ja erschrak über die wahrhaft gottähnliche Schönheit des Menschenkindes. Der Knabe trug heute einen leichten Blusenanzug aus blau und weiß gestreiftem Waschstoff mit rotseidener Masche auf der Brust und am Halse von einem einfachen weißen Stehkragen abgeschlossen. Auf diesem Kragen aber, der nicht einmal sonderlich elegant zum Charakter des Anzugs passen wollte, ruhte die Blüte des Hauptes in unvergleichlichem Liebreiz,—das Haupt des Eros, vom gelblichen Schmelze parischen Marmors, mit feinen und	He took his seat, with a smile and a murmured word in his soft and blurry tongue; and Aschenbach, sitting so that he could see him in profile, was astonished anew, yes, startled, at the godlike beauty of the human being. The lad had on a light sailor suit of blue and white striped cotton, with a red silk breast-knot and a simple white standing collar round the neck-a not very elegant effect-yet above this collar the head was poised like a flower, in incomparable loveliness. It was the head of Eros, with the yellowish bloom of Parian marble, with fine serious brows, and dusky clustering ringlets standing out in soft plenteousness over temples and ears.	Smiling, with a half-loud word in his softly blurred language, he took his place, and especially now that he was turning his exact profile to the viewer, he amazed anew, even frightened, at the truly god-like beauty of the human child. The boy today wore a light blouse suit made of blue and white striped wash fabric with a red silk stitch on the chest and on the neck completed by a simple white stand-up collar. On this collar, however, which did not even want to fit very elegantly to the character of the suit, the flower of the head rested in incomparable charm—the head of Eros, dark and soft covered by the yellowish melt of parilian marble, with fine and serious brows, temples and ear by the right-angled protruding ringlet of the hair.

ernsten Brauen, Schläfen und Ohr vom rechtwinklig einspringenden Geringel des Haares dunkel und weich bedeckt.		
Gut, gut, dachte Aschenbach mit jener fachmännisch kühlen Billigung, in welche Künstler zuweilen einem Meisterwerk gegenüber ihr Entzücken, ihre Hingerissenheit kleiden. Und weiter dachte er: Wahrhaftig, erwarteten mich nicht Meer und Strand, ich bliebe hier, so lange du bleibst!	"Good, oh, very good indeed!" thought Aschenbach, assuming the patronizing air of the connoisseur to hide, as artists will, their ravishment over a masterpiece. "Yes," he went on to himself, "if it were not that sea and beach were waiting for me, I should sit here as long as you do."	Good, good, Aschenbach thought with that expertly cool approval, in which artists sometimes dress up in the face of a masterpiece with their delight, their enrapturedness. And he went on to think: Truly, if the sea and the beach did not await me, I would stay here as long as you stay!
So aber ging er denn, ging unter den Aufmerksamkeiten des Personals durch die Halle, die große Terrasse hinab und gerade aus über den Brettersteg zum abgesperrten Strand der Hotelgäste. Er ließ sich von dem barfüßigen Alten, der sich in Leinwandhose, Matrosenbluse und Strohhut dort unten als Bademeister tätig zeigte, die gemietete Strandhütte zuweisen, ließ Tisch und Sessel hinaus auf die sandig bretterne	But he went out on that, passing through the hall, beneath the watchful eye of the functionaries, down the steps and directly across the board walk to the section of the beach reserved for the guests of the hotel. The bathing-master, a barefoot old man in linen trousers and sailor blouse, with a straw hat, showed him the cabin that had been rented for him, and Aschenbach had him set up table and chair on the sandy platform before it.	But so he went, went under the attention of the staff through the hall, down the large terrace and straight over the boardwalk to the cordoned-off beach of the hotel guests. He had the barefoot old man, who worked as a lifeguard down there in canvas trousers, sailor blouse and straw hat, assign himself the rented beach hut, had the table and armchair placed out on the sandy board platform and made himself comfortable in the deck chair,

Plattform stellen und machte sich's bequem in dem Liegestuhl, den er weiter zum Meere hin in den wachsgelben Sand gezogen hatte.	Then he dragged the recliningchair through the pale yellow sand, closer to the sea, sat down, and composed himself.	which he had pulled further towards the sea into the waxy sand.

The literary human text in English was very easy to identify because the overall quality of the Microsoft translation output is rather poor. Although the machine translation is not completely understandable, the reader might have guessed the meaning. For machine translation, it is very difficult to achieve a high quality because human translation requires a high level of creativity because it is a cognitive process. The flow of text cannot just be directly translated because in most cases to trigger the same emotions and provide a similar view in the target language the literary translator has to adapt the translation. Four participants stated that the whole first paragraph was very strange to read and that it was a hard read. Four participants considered the MT output to be using a very unnatural language, which is even more visible in literary texts, especially if they are over 100 years old. Formulations such as *Who was with pulled tress cap came into the hall* did not make sense and it is very challenging to understand what it means.

Furthermore, *So it happened that he Entry of the late riser was still attended, who was expected over there* is not at all related to the human translation *Aschenbach lighted a cigarette and opened a few letters and thus was still seated to witness the arrival of the sluggard.* Both language/translation students stated that this was a typical machine translation structure, and that this formulation is using a very unnatural language. Two participants with average knowledge described the formulations and syntax in the Microsoft outputs as unnatural, which made it very hard for them to read and understand the text. For one participant the human translation was unusual as well, although the participant did not recognize any grammatical, semantical, or syntactical mistakes. As mentioned, literary translation is more challenging for machine translation than technical texts, especially if the book is older and uses a complex style. Nowadays, machine translation would probably translate newer books slightly better than older books because the old use of language appears to be more complex to newer generations. Although new books can also be written in a more complex style, newer generations are not surrounded by that style and are therefore not used to it. Moreover, the choice of words in older

books is often not familiar to readers (especially younger readers) or they seem unusual, which explains why the choice of words misguided the participants in their evaluation, even with the grammar being correct. As shown in Table 1, the participants with average language knowledge did not manage to recognize the human translation.

German to Croatian (tex pair D)

00	**7**	**8**
Original text	**Official human translation**	**Microsoft Translator output**
Er frühstückte ohne Eile, empfing aus der Hand des Portiers, der mit gezogener Tressenmütze in den Saal kam, einige nachgesandte Post und öffnete, eine Zigarette rauchend, ein paar Briefe. So geschah es, daß er dem Eintritt des Langschläfers noch beiwohnte, den man dort drüben erwartete.	Doručkujući bez žurbe, ugledao je portira, koji je ušao u doručkovaonicu držeći u ruci kapu s rojtama i donio mu poštu naknadno poslanu za njim. Pušeći cigaretu, Aschenbach otvori nekoliko pisama. Tako se slučilo da je još vidio kako dolazi pospanac kojeg ondje prijeko čekaju.	Doručkovao je bez žurbe, primljen iz ruke vratara, koji je bio s povučenom kapom za trešu, ušao je u dvoranu, neki su poslali poštu i otvorili nekoliko pisama, pušeći cigaretu. Tako se dogodilo da je njegov ulazak pokojnika još uvijek bio posjećen, koji se tamo očekivao.
Er kam durch die Glastür und ging in der Stille schräg durch den Raum zum Tisch seiner Schwestern. Sein Gehen war sowohl in der Haltung des Oberkörpers wie in der Bewegung der Kniee, dem Aufsetzen des weißbeschuhten Fußes von außerordentlicher Anmut,	Ušao je na staklena vrata i zaputio se usred tišine ukoso kroz prostoriju do stola za kojim su mu sjedile sestre. Hod mu je bio, što se tiče držanja trupa, pregibanja koljena i stupanja stopala u bijelim cipelama, izvanredno dražestan, vrlo lagan, nježan i ponosit u isti mah, i još k tome uljepšan	Ušao je kroz staklena vrata i hodao u tišini dijagonalno kroz sobu do stola svojih sestara. Njegovo hodanje bilo je i u držanju gornjeg dijela tijela, kao iu kretanju koljena, stavljajući bijelo-potkovano stopalo izvanredne milosti, vrlo lagane, istovremeno nježne i ponosne i ukrašene djetinjastom sramotom, u kojoj

sehr leicht, zugleich zart und stolz und verschönt noch durch die kindliche Verschämtheit, in welcher er zweimal unterwegs, mit einer Kopfwendung in den Saal, die Augen aufschlug und senkte.	djetinjom sramežljivošću s kojom je usput dva puta okrenuo glavu prema prostoriji, podigao pogled i oborio ga.	je dva puta na cesti, s okretom glave u dvoranu, otvorio i spustio oči.
Lächelnd, mit einem halblauten Wort in seiner weich verschwommenen Sprache nahm er seinen Platz ein, und jetzt zumal, da er dem Schauenden sein genaues Profil zuwandte, erstaunte dieser aufs neue, ja erschrak über die wahrhaft gottähnliche Schönheit des Menschenkindes. Der Knabe trug heute einen leichten Blusenanzug aus blau und weiß gestreiftem Waschstoff mit rotseidener Masche auf der Brust und am Halse von einem einfachen weißen Stehkragen abgeschlossen. Auf diesem Kragen aber, der nicht einmal sonderlich elegant zum Charakter des Anzugs passen wollte, ruhte die Blüte des Hauptes	Nasmiješen, sjeo je na svoje mjesto i poluglasno rekao nešto na svom mekom i žitkom jeziku. Posebice sad kad je promatraču bio okrenut profilom, ovaj se iznova začudi, pa čak i uplaši od uistinu božanstvene ljepote tog ljudskog bića. Dječak je danas imao na sebi lagano odijelo od tkanine s plavim i bijelim prugama, s vrpcom od crvene svile na prsima uokvirenom jednostavnim, bijelim uspravnim ovratnikom. Ali na tom ovratniku, koji baš i nije najbolje pristajao tom odijelu, počivala je glava nalik na cvijet s neprispodobivom ljupkošću — glava Erosa sa žućkastom caklinom parskog mramora, tankih i ozbiljnih obrva, sljepoočnica i ušiju obraslih	Smiješeći se, s poluglasnom riječju na svom nježno zamagljenom jeziku, zauzeo je svoje mjesto, a pogotovo sada kada je svoj točan profil okretao gledatelju, iznova je zadivio, čak i uplašen, doista bogom sličnom ljepotom ljudskog djeteta. Dječak je danas odjenuo lagano bluzovo odijelo od plavo-bijele prugaste tkanine za pranje s crvenim svilenim bodom na prsima i na vratu upotpunjeno jednostavnim bijelim stand-up ovratnikom. Na ovom ovratniku, međutim, koji se nije ni želio vrlo elegantno uklopiti u karakter odijela, cvijet glave počivao je u neusporedivom šarmu - glava Erosa, tamna i meka prekrivena žućkastim topljenjem parilijskog mramora, s finim i ozbiljnim obrvama, sljepoočnicama i

in unvergleichlichem Liebreiz,—das Haupt des Eros, vom gelblichen Schmelze parischen Marmors, mit feinen und ernsten Brauen, Schläfen und Ohr vom rechtwinklig einspringenden Geringel des Haares dunkel und weich bedeckt.	tamnom i mekom kovrčavom kosom što je pod pravim kutom padala na njih.	uhom pored desnog kuta izbočenog prstena kose.
Gut, gut, dachte Aschenbach mit jener fachmännisch kühlen Billigung, in welche Künstler zuweilen einem Meisterwerk gegenüber ihr Entzücken, ihre Hingerissenheit kleiden. Und weiter dachte er: Wahrhaftig, erwarteten mich nicht Meer und Strand, ich bliebe hier, so lange du bleibst!	Dobro, dobro! pomislio je Aschenbach s onim hladnim profesionalnim odobravanjem kojim umjetnici gdjekad zaodijevaju svoj ushit i zanos pred remek-djelom. I doda u sebi: »Zaista, da me ne čekaju more i plaža, ostao bih ovdje dok god si i ti ovdje!«	Dobro, dobro, Aschenbach je razmišljao s tim stručno cool odobravanjem, u kojem se umjetnici ponekad oblače u lice remek-djelu sa svojim oduševljenjem, svojom zanosnošću. I nastavio je razmišljati: Iskreno, da me more i plaža ne čekaju, ostao bih ovdje sve dok ti ostaneš!
So aber ging er denn, ging unter den Aufmerksamkeiten des Personals durch die Halle, die große Terrasse hinab und gerade aus über den Brettersteg zum abgesperrten Strand der Hotelgäste. Er ließ sich von dem barfüßigen Alten, der	Ali ovako je ustao i pošao pod budnim okom posluge, sišao niz veliku terasu i produžio ravno drvenim mostom do ograđene plaže za hotelske goste. Bosonogi starac u platnenim hlačama, mornarskoj bluzi i slamnatom šeširu nadzirao je kupalište i odveo ga do	Ali tako je otišao, otišao pod pažnju osoblja kroz dvoranu, niz veliku terasu i ravno preko šetnice do ograđene plaže gostiju hotela. Bosonogog starca, koji je dolje radio kao spasilac u platnenim hlačama, mornarskoj bluzi i slamnatom šeširu, dodijelio si je iznajmljenu kolibu na plaži,

sich in Leinwandhose, Matrosenbluse und Strohhut dort unten als Bademeister tätig zeigte, die gemietete Strandhütte zuweisen, ließ Tisch und Sessel hinaus auf die sandig bretterne Plattform stellen und machte sich's bequem in dem Liegestuhl, den er weiter zum Meere hin in den wachsgelben Sand gezogen hatte.	njegove rezervirane kućice, izvukao iz nje stol i stolicu i postavio ih na drvenu platformu pokrivenu pijeskom. Aschenbach je odvukao ležaljku dalje prema moru, na voštano žuti pijesak, i udobno se zavalio na nju.	stavio stol i fotelju na platformu pješčane ploče i udobno se smjestio u ležaljku, koju je povukao dalje prema moru u voštani pijesak.

As native Croatian speakers, the participants rated the Croatian Microsoft output with the same score as the English one. The Croatian translation has the same problem as the English text – some formulations appear unusual and unnatural such as *Aschenbach je razmišljao s tim stručno cool odobravanjem*, whereas the human translation is *pomislio je Aschenbach s onim hladnim profesionalnim odobravanjem.* It is easily recognizable that formulations and term choices like this are results of machine translation. Moreover, it is challenging for the reader to understand formulations like this, and it is even more challenging to connect the text and put it in context. Terms such as *doručkovaonica* confused all participants because they were not sure if such a term exists in the Croatian language and if a human translator would use it.

Participants state that word choices like *stand-up* in *jednostavnim bijelim stand-up ovratnikom* instead of using *uspravnim ovratnikom* are intensely bothering the reader. This is why four out of five participants recognized the human translation easily, as shown in table 1. They explain that the reader is unable to concentrate and enjoy the text due to such mistakes. Instead of *odijelo od tkanine* the MT output uses *bluzovo odijelo*, which is not only incorrect, but such an expression does not exist in the Croatian language. Such direct translation errors can lead to great confusion, and it becomes hard to fully experience and understand the text because they cause constant interruptions during reading. However, the participants elaborate that due to the language that is used the human translation appears at a few points strange. Nevertheless, they estate that the whole text was pleasant to read and there were no interruptions

because of mistakes like in the Microsoft Translation output, so four out of five participants guessed the text right.

4.2.3. Conclusion of the analysis of the data collected from the participants

Table 2 shows that five participants have taken part in the research. The level of their linguistic knowledge is listed for each participant. The table illustrates the scores each participant has given for the MT outputs and provides the number of correct selections for each participant.

Table 2 The participants and their evaluation of the MT output

Participant	Level of linguistic knowledge	Score from 1 to 10				Number of correct selections (max. 4)
		Technical texts		Literary texts		
		Text 2 English	Text 4 Croatian	Text 6 English	Text 8 Croatian	
One	Language/translation student	**5.5**	**8**	**2**	**5**	4
Two	Average (non-academic) knowledge	**6**	**7**	**7**	**6.5**	0
Three	Language/translation student	**7**	**7**	**5**	**3**	3
Four	Average (non-academic) knowledge	**6.5**	**8**	**6**	**3.5**	2
Five	High level of (non-academic) knowledge	**6**	**2**	**3**	**5**	4

As shown in Table 2, the language student, number one, and participant number five, with a high level of non-academic knowledge, recognized the human translation in all text pairs. Although both participants have four out of four correct selections their evaluation is for the text pair B very different. The language student scored the MT output with an eight, while participant number five scored it with only a two. Although participant number one and five differ in language knowledge they scored text pairs A, C, and D very similarly. Participant number three, a language student, follows participants one and five considering the number of correct selections. They are followed by participant number four with two correct selections and participant number two with zero correct selections. Participant number four had two correct selections and scored the highest with the grade eight and the lowest with the grade 3.5. Although participant number two had no correct selections the highest grade is seven and lowest is six. This indicates that although some participants with average language knowledge had only two or zero correct selections, they still did not grade the raw output with a grade higher than 8. It appears that participant number two did not recognize any of the human translations but still did not score the MT translation higher than with a seven. This indicates that MT translation, in this case, is useful but needs human interference to achieve a higher grade. The analysis has shown that participants of different language proficiency found that the chosen official human translations are not flawless, but that they are better than the raw MT output and that there still is an immense difference between human and machine translation. Regardless of the proficiency level, the human translation was mostly recognizable to the participants.

4.3. BLEU score

For each text pairs, the BLEU score and the participants' score is displayed. For the BLEU score, the website https://www.letsmt.eu/Bleu.aspx is used. Brownlee (2017) explains: "BLEU, or bilingual evaluation understudy, is a score for comparing a candidate translation of text to one or more reference translations" and adds that it is "…a metric for evaluating a generated sentence to a reference sentence". The BLEU Score evaluates translation and the quality of translations in comparison to the chosen human translation as a reference. This means that a 100% BLEU score does not necessarily mean that the translation is excellent because the reference for measuring the quality is a human translation, which can also be of low quality. Further, the author (2017) adds: "The approach works by counting matching n-grams in the candidate translation to n-grams in the reference text, where 1-gram or unigram would be each

token and a bigram comparison would be each word pair. The comparison is made regardless of word order."

It is a system that uses an algorithm for evaluating the quality of machine translations from one language to another. Vashee (2021) evaluates: "Firstly, we should understand that a fundamental problem with BLEU is that it DOES NOT EVEN TRY to measure translation quality, but rather focuses on STRING SIMILARITY (usually to a single human reference)". Although the program is made for measuring the translation quality of (only) machine translations one should consider that the system measures the quality of a translation by analysing the correspondence between a machines output and a human translation.[4] It is clear that the machine evaluation differs from the human evaluation. The machine evaluation does not consider overall quality. The machine uses algorithms and references for evaluating, while the human uses linguistic skills. Vashee (2021) additionally elaborates that there can be many correct translations but that BLEU evaluations rely on testing sets with only one correct translation reference, which means that it is often possible that the metrics score a perfectly good translation very poorly. If the exact same words are not used as in the human reference the score will be low, probably zero. For instance, the BLEU score does not give credit at all if *wander* is used instead of *stroll*, or *couch* instead of *sofa*. Donaj and Sepesy Maučec (2019: 7) state: „It means, with the exception of human (i.e. manual) evaluation, that it is defined as an algorithm that can be coded into a programme and run by a computer that calculates the evaluation score, which tells the user how good a translation is". Therefore, the BLEU score evaluates only machine translation outputs based on human reference(s). The authors (ibid.) further elaborate: „Translation evaluation methods count word- and/or sentence-based errors that can be detected automatically, while general text-level aspects are not taken into account." This illustrates the difference in scores between automated and manual evaluation. Donaj and Sepesy Maučec (2019: 17) state: „Human translators are worried to be replaced by machines. Machine translation, no matter how sophisticated, cannot match the accuracy of people". Machine translation cannot match the accuracy of human translation, which applies also to machine and human evaluation. The authors (2019: 9) explain that professional manual evaluation is expensive and time-consuming, so metrics like BLEU are used because they are cheaper, quicker, and close to human judgement. Donaj and Sepesy Maučec (2019: 8) state: „They are used commonly during the development of MT systems to estimate improvement. They are also applicable to compare different MT systems." Metrics like BLEU are used for

[4] https://support.lilt.com/kb/calculating-bleu-scores-with-the-api (visited on 1 August 2022)

evaluating new machine translation systems and for comparing them. New metrics like BLEU are developed yearly, so human intervention is only considered when necessary because of the lower processing periods and financial costs that automated evaluation provides. Table 3, taken from the research of Vincelj (2021: 31), shows this difference – a human would grade the second sentence with a high score, unlike BLEU. Humans consider more factors for their evaluation of similarity, whereas the BLEU score considers only the strict similarity.

Table 3 Example of the BLEU score principle for evaluation based on similarity (Vincelj 2021: 31)

Raw MT output	**Translation from scratch**	**BLEU Score**
Ugodno središte grada za uživanje.	Ugodan centar grada u kojem možete uživati.	8.46

Unlike the metrics evaluation, humans are able to grade translations considering more than one correct translation, which means that the human evaluation has more references than the metrics. BLEU uses a grading scale from 0 to 100 representing a higher number to be a better (closer to the human reference) translation.

The participants were asked to score the translations with a grade from 1 to 10. For easier comparison and analysis reasons the grades of the participants are converted into a grade from 1 to 100 like the BLEU score range. For instance, the grade 1/10 is converted to 10/100, and the grade 10/10 to 100/100.

4.3.1. Comparison of the BLEU score and the participants' score

Table 4 Scores of the text pairs – evaluation of the Microsoft Translator output

Text pair	BLEU score	Participant's average score
Text pair A (Technical text, English)	8.17/100	60.2/100
Text pair B (Technical text, Croatian)	8.37/100	60.4/100
Text pair C (Literary text, English)	25.61/100	40.6/100

Text pair D (Literary text, Croatian)	9.25/100	40.6/100

Although the BLEU score and participants' evaluation differ it does not mean that one is more correct than the other because both scores are utilized in different fields of research. While BLEU can be used for system development, it would be irrational for these metrics to grade (human) translations.

The texts were ordered by technical and literary texts. While the BLEU score shows for both technical text pairs a very similar score, the BLEU score for the literary texts differ, while the participants' score shows a similar score for technical texts and the exact same score for the literary texts. The BLEU score for the technical text in English is slightly lower than the score for the technical text in Croatian and the same applies to the participants' scores. However, the scores of the participants are in general higher than the BLEU score because those metrics have only one correct translation reference. As mentioned above, a metrics evaluation system can score a good translation very poorly because it has only one correct reference, while humans recognize more than just one correct option. BLEU scores translations by comparing single signs of words, while humans score translations on a linguistic level considering a wider linguistic spectrum. A score of 60.2 and 60.4 out of 100 is considered an acceptable translation while 8.17 and 8.37 out of 100 mean that the basics are understandable, but there are significant errors, and the overall quality is poor. The research showed that the human evaluation rate, for both literary text pairs – English and Croatian, is the same score 40.6, which is lower than the score for the technical texts. The result for the participants' scores is not surprising because machine translators, even AI-powered machine translators, are believed to be less reliable when it comes to a higher level of creativity, which literary texts require. The BLEU score indicates the exact opposite of the participants' score – both literary text pairs are rated higher than the technical texts in both languages. Technical texts require consistency, which makes it easier for the machine to translate, and this explains why both English and Croatian technical texts have a similar score. The main reason why the scores are that different is that the participants, regardless of the level of language proficiency, were able to evaluate the machine translation in comparison to the human translation but still taking into account the overall quality. Since the BLEU score is an automated evaluation system it is not able to evaluate by considering the overall quality, but rather by comparing the machine translation with the human reference(s).

In many cases, it appears that text pairs with the Croatian language, especially in comparison with English and German, are of lower quality because of less data and fewer references available for the Croatian language than for English and German. Considering the data and references available and taking into account that literary texts are more demanding for machine translators it is expected that the literary text pair in English has a higher BLEU score than the literary text pair in Croatian. Considering all of this, it is unexpected that the literary texts have a higher BLEU score than both technical texts. The BLEU strictly scores the similarity with having only one reference, while in the human evaluation the score will not be lower if a synonym is used instead of the exact same word if the context is correct. This indicates and shows that the BLEU metrics use an algorithm and analyses letters and signs of a text rather than style, grammar, and syntax like humans, which explains the difference in the results.

4.3.2. Final comparison and conclusion

The table shows again all scores of the participants for the MT outputs in order to illustrate the overall score for each text and the overall score of all texts of each participant.

Table 4 The participants' evaluation overview of the MT outputs

Participant	Text 2	Text 4	Text 6	Text 8	**Each participant's overall score of all texts**
One	50.5	80	20	50	**50.1**
Two	60	70	70	60.5	**60.6**
Three	70	70	50	30	**50.5**
Four	60.5	80	60	30.5	**60**
Five	60	20	30	50	**40**
Overall score for each text	**60.2**	**60.4**	**40.6**	**40.6**	

The BLEU score method for evaluating machine translation showed that the BLEU scores are rather low; as shown in Table 4, texts 2, 4, and 8 have low scores, while the highest score by BLEU metrics was given to text 6 (literary text in English). The results of the participants' evaluation are completely different from the BLEU score. The participants' scores showed that the technical texts in both languages have a similar score and a higher score than the literary texts. Considering that literary texts in English and in Croatian received the exact same score and that the score for the technical text differs only by 0.2, it appears that there is almost no difference between the machine translations of the chosen technical texts considering the two target languages, English and Croatian. The Croatian language is considered to have fewer references than the English language, which might result in machine translation outputs in English to be of higher quality than machine translations in Croatian. As shown in Table 4, this consideration is not applicable to these texts. The automated evaluation BLEU score and manual evaluation done by the five participants are not compatible. BLEU score evaluates the quality of machine translation by comparing it to human reference(s), while the manual evaluation shows a higher score because humans have more references available (knowledge). Humans are able to evaluate both human and machine translations, while the BLEU score is designed to evaluate only machine translation; humans evaluate the overall quality too, whereas automated translation does not. As shown in Table 4, there is no recognizable pattern that the BLEU score shows, whereas the participants' score shows a pattern and categorization of the texts. Even though the participants have different proficiency levels, from average English knowledge to language/translation students, they do not differ too much in scores. The highest average score is 60.6 and the lowest is 40. Interestingly, the language/translation students have a similar average score of the texts. Participant number two and four, both with average language knowledge, have a similar average score of the texts. Participant number five that is not a language/translation student but has a high level of language knowledge gave the lowest score. The idea of BLEU score is to approach human quality to achieve a more reliable BLEU score. More human references should be available for one MT output because the more human references the automated evaluation system has, the more reliable the results are, and it becomes nearer to manual evaluation. The scores showed that machine translation has improved during history, especially considering that translation into Croatian has improved. The participants' analysis and scores showed that although machine translation has improved, it cannot keep up with human translation.

5. Conclusion

Translation is over 4000 years old and has during all this time grown and has had great influence in creating human history. The importance of translators has never faded during this time and has grown into a profession. Nowadays the significance of this profession does not seem to weaken, although the impact of artificial intelligence technology on this profession is immense. With the rapid change over the last 70 years, it is no surprise that this prompt growth of (translation) technology causes fear. It is the human nature to fear the unknown, but it is also in human nature to challenge it. Diverse translation technologies such as computer-aided translation tools, machine translations and the growing AI-powered technology were created with the idea of simulating human intelligence and human abilities. From the beginning, those technologies were not created to cause fear and to represent a threat to the translation profession but rather to be an additional help to the human translator. Considering all the argumentation from the theoretical part, it is clear that technology has affected this profession and that the typical workflow of professional translators is connected with a daily usage of (translation) technology, but it is clear that the main producer of translation still is the human and not the machine. Those technologies help the human translator to be faster and to be more resourceful at the same time. However, the human translator is the one utilizing those tools and the human translator is the one controlling the machine. Although technology represents a considerable part of a human translator's routine, which is due to the market requirements and the professional environment that have changed, this does not mean that modern human translators are less competent in their jobs because of utilizing technology more.

The study found that AI-powered machine translation technology can be of great use when it comes to technical texts. It is likely that such texts will be post-edited by professional translators because the output represents a sufficient base for post-editing the text. The question is whether the time for post-editing is longer than translating from scratch with technological help. This is a matter translators have to consider when utilizing different technologies. If they are utilized when it is not necessary, it appears that the translation technology is useless and it is interrupting the translator in his job, as the participants state. The research showed that when it comes to native speakers, machine translation appears even less acceptable. The Croatian text pairs, regardless of the text type, have a higher correctly guessed rate than the English pairs. The MT provides different features that are free of cost, easy to use, and available to everyone. Considering that it is a free translation service, the quality offered is more than fair. Individuals using such technology should always be aware that it is not a professional translation provider,

and that the translation quality is not guaranteed. Taking into account that it is free of cost it is advantageous for its users for informational purposes, but for professional purposes, it should be avoided if there is no professional interference because it can cause harm.

The research showed that participants of different backgrounds and of different language and proficiency levels mostly could differentiate between a human translation and a machine translation. Hence, the quality of human translations is not only important and visible to linguistically skilled and trained participants, but also to those that are not. Although the participants could recognize machine translation in technical texts, they still found the texts useful and informative in both languages, whereas the machine translation of literary texts in English and Croatian received a lower score. The participants state that the literary translations are not nugatory, but serious mistakes were detected, which interrupted them as readers. The human translation in both literary texts has a flow and it is enjoyable to read. Four out of five participants at least once described the machine translation as unnatural. Students elaborated the appearance of unnatural language through syntax, semantics, and grammar. Participants that do not have adequate linguistic knowledge did not know how to explain what appears unnatural to them, but they did use the term unnatural for machine translation and natural for human translation. It appears that four out of five participants, although with different proficiency levels, believe that machine translation is acceptable but not without human intervention.

Considering the translation profession, technology, in general, should not be perceived as a threat to the human translator but should rather be a welcomed change. It appears that this fear is unfounded because human translators are able to create translations of good quality even without the use of technology, but AI-powered machine translation is not able to create translations of the same quality without the impact of human translators. Moreover, the growing use of translation technology by human translators is not because human translators are incompetent and insecure without it, but the reason for that being so is that the social and economic environment in most cases does not leave another choice. Translators mostly use machine translation because it enables them to translate faster, and by doing so translators can keep up with other translators, the market, and the expected duration for delivering the final product. With the phenomena of globalization, technology has an immense impact on every aspect of modern life whether it is professional or private. The translation profession, as any other profession, needs to follow up on new requirements to be of service to people.

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