



MT Priming & Post-Editese – Paper

How MT integration affects the target texts we produce

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1 Introduction

Nowadays, using MT (machine translation) systems such as DeepL often seems indispensable. Not only are they fast, but they also deliver excellent results. At least, that's what you'd probably think if you didn't look into the subject more closely.

MT in general means that a computer system translates a text automatically by using artificial intelligence (AI) and without any direct human involvement. DeepL is a neural machine translation (NMT) system. This means that neural networks (loosely based on connected neurons in the brain) are trained with large corpora of translation data, containing both source and target texts. In NMT, individual words are represented as bundles of information that map the context of the word (in the complete sentence) and other grammatical properties. NMT systems then draw on this information to generate an output (target text).

Before analysing how MT can influence the target texts we produce, let's have a look at figure 1, which shows translation scenarios with varying degrees of translation automation (and MT integration):

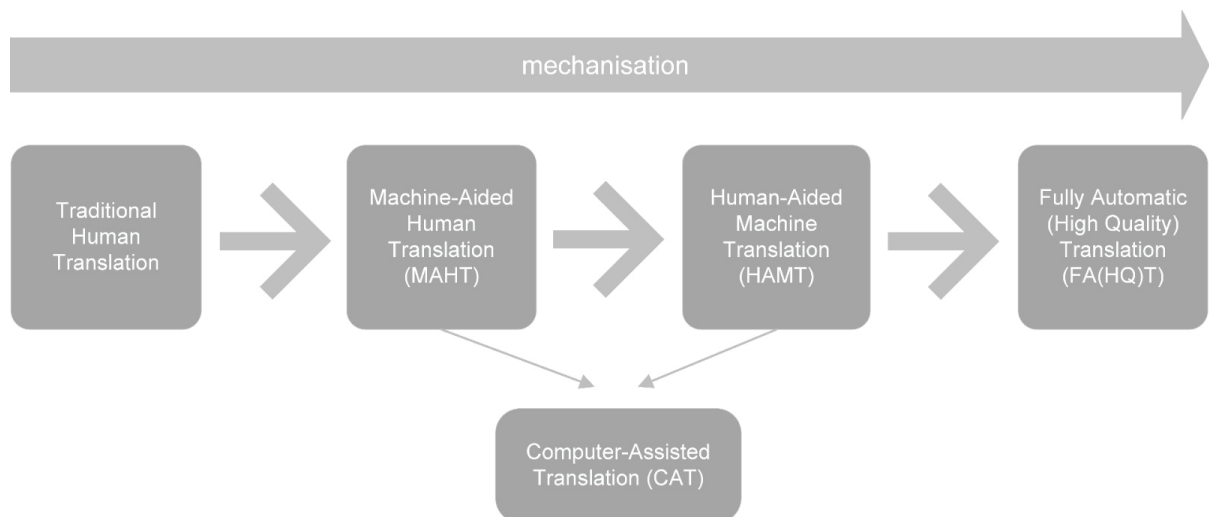


Fig. 1: own illustration adapted from Hutchins/Somers 1992

This scale shows two extremes. On the left, in the scenario of traditional human translation, translators translated a printed version of the source text using only printed dictionaries, pen and paper. But the digital transformation has also taken hold in the translation industry, resulting in the use of increasingly complex tools to support translators. Today, we're situated in computer-assisted translation (CAT), which includes machine-aided human translation (MAHT) and human-aided machine translation (HAMT). In MAHT the translator translates from scratch but uses tools such as terminology databases, translation memories and spell-check. In HAMT the translator runs the text in an MT system and edits the output afterwards, using the tools mentioned. Fully Automatic (High Quality) Translation isn't a thing yet (and perhaps never will be).

As you'll probably know, NMT has become state-of-the-art in recent years. Consequently, NMT systems are increasingly employed in the professional translation process to increase productivity. NMT outputs are often grammatically correct and sound idiomatic, which makes it harder for us (future professional translators) to discover typical mistakes such as critical shifts in content (e.g. omissions, additions or inverted negations) or expressions and terms that are inappropriate for the text type or unfamiliar to our target audience. NMT systems therefore often tempt us to adopt their suggestions when post-editing their outputs (see chapters 2 & 3),

even more so than systems based on earlier MT architectures. So in this paper and the accompanying video, we'd like to show you how MT integration affects the target text we produce and how (post-edited) MT outputs can differ from human translations.

2 Post-Editing

Correcting and editing an MT output is called post-editing (PE). Following specific quality criteria, the MT output is checked for understandability and accuracy, readability is enhanced and mistakes are corrected. The resulting amount of work covers three dimensions:

1. Temporal dimension: the duration required to fix flaws in the MT output;
2. Cognitive dimension: the type and degree of cognitive processes that need to be engaged to fix a specific machine translation flaw;
3. Technical dimension: the number of words that need to be deleted, inserted and rearranged (or a combination of these actions) until the text meets the quality criteria.

There are two types of PE: light post-editing (LPE) and full post-editing (FPE). LPE often only serves to make the MT output understandable. Although style, terminology and/or grammar may not be flawless, the output should express the same meaning as the source text. In FPE, however, the post-editor aims to bring the quality of the MT output close to that of a human translation. Depending on the desired level of quality, the post-editor should check grammar, spelling and punctuation, ensure the correct and consistent use of terminology and the standardisation of style and register, among other things. There are four key problem areas that, while rarely a problem in human translation, are regularly present in MT outputs and hence require special attention during post-editing.

1. Unidiomatic expressions: When MT systems aren't trained frequently enough with adequate training data, they may not be able to translate typical source language expressions satisfactorily.
2. Lexical disambiguation: Due to their lack of contextual awareness and world knowledge, MT systems fail to appropriately distinguish between multiple meanings of a word, which sometimes results in the incorrect translation of polysemes.
3. Semantic disambiguation: MT systems refer to the most frequently used translation solution in their training material, which might not be the correct one in the respective context.
4. Syntactic disambiguation: MT systems ignore the syntactic conventions of the target language. Although NMT systems rarely make syntactic mistakes, they do tend to reproduce the syntax of the source text.

3 Target Text Characteristics

To understand how MT integration affects the production of target texts, we need to take a look at the characteristics of target texts that have been produced in different translation scenarios.

3.1 Translationese

In human translation, professional translators look at the source text and any relevant references before and while translating the text to the best of their abilities. Previous research has proven

the existence of *translationese*, which means that human translations tend to show linguistic characteristics that differentiate them from target language originals. These characteristics are also referred to as *laws of translation* or *Translation Universals*, which include the following tendencies: simplification, normalisation/homogenisation, explicitation and interference.

Three types of simplification have been identified in human translations: lexical, syntactic, and stylistic. Lexical simplification derives from the semantic competence in our native language and comprises six principles:

1. Using superordinate terms when no equivalent subordinate term can be found in the target language;
2. Using target language terms that come close to the meaning of source language terms;
3. Using common-level synonyms (or synonyms that the target audience is familiar with);
4. Transferring the functions of a source language term to its target language equivalent;
5. Using circumlocutions instead of finding conceptual matches for high-level words or expressions;
6. Paraphrasing where cultural gaps between the source and the target languages exist.

Syntactic simplification takes place when the complex syntax of a sentence is simplified by human translators to make the text easier to understand. In a nutshell, translators tend to break up long sentences and include a variety of strategies, such as the following:

1. Replacing non-finite clauses with finite ones;
2. Substituting elaborate phraseology with shorter collocations;
3. Reducing or omitting repetitions and redundant words;
4. Excluding modifying phrases and words.

Normalisation, also referred to as homogeneisation, consists of adjusting the target text to the expectations of the target audience. This includes changes in vocabulary, syntactic structure, or style to make the text more accessible and familiar to the intended readership.

Explicitation takes place when translators apply their interpretation to ambiguous source text passages and commit to one possible reading. This encompasses the following strategies:

1. Using interjections to better express the characters' thoughts or to put emphasis on a given interpretation;
2. Adding modifiers, qualifiers, and conjunctions to achieve greater transparency;
3. Adding information and explanations as well as repeating previously mentioned details to achieve more clarity;
4. Using precise renderings of implicit or vague data;
5. Providing more accurate descriptions;
6. Adding names to geographical locations;
7. Using clear pronouns when they are ambiguous to clarify references.

Interference is the tendency to translate the source text literally instead of employing the linguistic knowledge of the target language. The extent of interference depends on the professional experience of the translator and the sociocultural conditions. For example, translators may adopt language patterns from the source text (e.g. adopting verbal style when translating from English into German).

3.2 Machine Translationese and Post-Editese

Interestingly, MT outputs often show characteristics of translationese, which could be described as *Machine Translation Universals* or *machine translationese*. Here's why: as with the models of all *statistical* MT systems, the models of NMT systems are trained with large corpora containing translation data, i.e. both source and target texts. The target texts are often produced by professional translators and may, to some extent, display examples of the Translation Universals mentioned earlier. Therefore, NMT outputs may contain examples of translationese. For example, if the target texts in the training data frequently display simplification strategies, the NMT system is likely to reproduce this.

Post-edited MT outputs have been found to be simpler and show a higher degree of interference than human translations. However, these tendencies seem to originate from the MT outputs rather than from post-editing them. The tendencies are also slightly weaker in post-edited outputs than in raw MT outputs. Starting from the same source text, post-edited MT outputs therefore show less variance than human translations, which could be described as *post-editese*.

3.3 Priming

Many researchers have conducted studies on priming effects in translation. *Priming* is a psychological effect that unconsciously influences the way we perform a task based on something we've experienced before. This may cause us to reproduce what we've experienced or to perform the task faster, perhaps putting less cognitive effort into it.

Priming effects have been identified in both human translations from scratch (priming by the source text) and in post-edited MT outputs. It is important to note, however, that these effects are stronger in post-editing than in human translation. MT outputs are already written in the target language and have a generally high linguistic quality (NMT outputs), which makes it harder for us to come up with alternative translation solutions (e.g. regarding syntax). As the output proves to be an earworm that we can't seem to get rid of sometimes, it can unconsciously affect our choice of post-editing strategies. In a nutshell, post-editors are generally less likely to drastically change the MT output.

Please note, however, that not all instances of translationese and post-editese are necessarily caused by priming.

4 Data Collection and Evaluation – Video Tutorial

Putting theory into practice, we're now moving on to analysing different translation scenarios of one source text (from English into German) to see how the target texts differ. The texts we're analysing are an NMT output, five post-edited NMT outputs (MTPE or PEMT) and five human translations from scratch (HT). They were kindly provided by Kerstin Rupcic and produced during a case study included in her publication on the potential of MT in legal translation (Rupcic 2021). Go check it out if you're interested.

In the accompanying video, we show you how to assess the differences and guide you through the analysis. You're more than welcome to join us on and gain your first experience of analysing different types of translation data. So if you like, you can access the DataLit^{MT} Repository on GitHub and download all relevant files: the source and target texts, the video and the Excel file "lex_variety_density" (incl. solutions, more on that in the video):

- [DataLit^{MT} Repository](#) (home page)

To analyse the target texts, we use simple freeware tools that help us collect and evaluate data and draw conclusions from our findings. To follow the different steps, you need these tools:

- Microsoft Excel
- [AntConc](#)
- [TagAnt](#)

In the video, we explain the tools and how to best use them for analysing the different texts. However, if you are unfamiliar with AntConc, we recommend that you watch the following tutorials before watching the video.

1. AntConc 4 – [Tutorial 1 Getting started](#)
2. AntConc 4 – [Tutorial 4 File tool basics](#)
3. AntConc 4 – [Tutorial 8 Word list tool basics](#)

That's it. Now you can start the video and come back later to look at some examples of the analysis results if you like.

5 Analysis Results – Examples

In this chapter, we'd like to show you some examples of how our target texts differ. We explain the differences between the translation scenarios (NMT, MTPE, HT) and add interpretations to make our analysis results more tangible.

On average, the human translations in our example show slightly higher lexical density values (the difference ranges from 0.486 to 0.522) than the post-edited texts (0.447 to 0.477). The NMT output has the lowest lexical density (0.443).

5.1 Differences in Part of Speech and Style – Part one

Example 1:

Source text	NMT	HT_B7	MTPE_A3
By using this website you are agreeing to be bound by these terms and conditions (these Conditions') and [...] subject to any additional terms and conditions that are applicable to that service.	Durch die Nutzung dieser Website erklären Sie sich damit einverstanden, an diese Geschäftsbedingungen („diese Bedingungen“) und [...] unterliegen Sie den zusätzlichen Bedingungen, die auf diese Dienstleistung anwendbar sind.	Mit der Nutzung dieser Website stimmen Sie den folgenden allgemeinen Geschäftsbedingungen (folgend „Bedingungen“ genannt) sowie [...] stimmen Sie allen zusätzlichen Bedingungen zu, die für diese Dienste Anwendung finden .	Durch die Nutzung dieser Website akzeptieren Sie diese Geschäftsbedingungen („diese Bedingungen“) und [...] unterliegen Sie den zusätzlichen Bedingungen, die auf diese Dienstleistung anwendbar sind.

In this example, we can see several interesting text passages. For example, the source sentence starts with “By using”. The NMT output and the post-edited output show an obvious translation (*Durch die Nutzung*), while the human translation shows the in this context preferable translation (*Mit der Nutzung*). The translator probably wanted to consider the text conventions of legal German here. However, the transformation of the gerund into a nominal construction, which is common in legal texts, can be found in all texts.

Another interesting observation is that the NMT output and the post-edited text closely resemble the source text at the end of their respective sentences. The word “applicable” was translated literally (*anwendbar*) by retaining the adjective. However, in the HT, this construction was transformed into a nominal one (*Anwendung finden*), which again is the preferable choice in a legal context (it is also more formal).

We can find another literal translation in the parenthesis. The source text passage reads “these Conditions”, which was translated literally in all translation scenarios but the HT. In the HT, the translator added two words so that the translation reads *folgend Bedingungen genannt*. This is also an example of increasing lexical density. The post-edited text just retained the determiner and the noun, while the human translation added two content words (*folgend, genannt*).

Example 1 shows that the HT used context-appropriate translations, while the NMT output and the post-edited text closely resemble the source text. Consequently, text conventions were often not adhered to.

Example 2:

Source text	NMT	HT_B6	MTPE_A3
You are to abide by the following rules :	Sie müssen sich an die folgenden Regeln halten :	Sie sind zur Einhaltung der folgenden Vorschriften verpflichtet :	Sie müssen die folgenden Regeln einhalten :

Here, two interesting text passages show how closely the NMT and MTPE resemble the source text. Firstly, the NMT and MTPE translated “to abide” with *müssen*, so the verbal construction was retained, while we can find a nominal and more appropriate translation in the HT (*sind zur Einhaltung verpflichtet*), which also has a higher register. Lexical density is also increased by adding the content words *Einhaltung* and *verpflichtet*.

Secondly, NMT and MTPE used *Regeln* for “rules”, which is inappropriate in this context. In the HT, however, we find the more context-appropriate translation *Vorschriften*. Again, we can see that the MTPE is very similar to the NMT output, while the translator tried to find an appropriate translation and adhere to the text conventions.

Example 3:

Source text	NMT	HT_B7	MTPE_A5
[...] not to promote or advertise , or engage in any other form of marketing, [...].	[...] nicht für andere Formen des Marketings zu werben oder zu werben , [...].	Werbeaktivitäten [...] sind nicht zulässig, [...].	keine Reklame, Werbung oder andere Formen des Marketings zu veröffentlichen , [...].

This is a clear example of the translator translating more freely. Instead of retaining the verbal construction and translating literally (which would also lead to quite a long and complicated sentence), the human translator only used the noun “Werbeaktivitäten”, which exactly describes the content of the source sentence. This leads to a shorter sentence with a nominal construction. Interestingly, the post-editor also translated somewhat more freely (or nominal) by translating the verbs “promote” and “advertise” with the nouns *Reklame* and *Werbung*.

5.2 Differences in Part of Speech and Style – Part two

Example 1:

MTPE_A5	HT_B9
erklären Sie sich damit einverstanden , [...].	stimmen Sie der Anerkennung [...] zu [...]
wenn Sie eine bestimmte Dienstleistung [...] nutzen	im Falle einer Nutzung unserer Dienstleistungen
Bitte lesen Sie diese Bedingungen; sie sind wichtig .	sie sind von großer Wichtigkeit
wenn wir von einem Gericht [...] dazu aufgefordert oder angeordnet werden	im Falle einer Aufforderung oder Anweisung
Sie müssen sich an die folgenden Regeln halten	Sie sind zur Einhaltung der folgenden Regeln verpflichtet

These text passages show different numbers of nouns between a post-edited text (MTPE_A5: 75 nouns) and a human translation (HT_B9: 91 nouns). Compared to the post-editor, the translator uses the nominal style more frequently. This is characteristic of legal German and thus adheres to the text conventions.

Example 2:

Source text	HT_B7	NMT	MTPE_A5
If you purchase or acquire goods or services from any third parties	Beim Kauf oder bei der Nutzung von Waren oder Diensten von Drittanbietern bestehen jegliche Verträge	Wenn Sie Waren oder Dienstleistungen von Dritten kaufen oder erwerben	Wenn Sie Waren oder Dienstleistungen von Dritten kaufen oder erwerben

Similarly, the lower number of verbs in this human translation (HT_B7: 19), compared to the post-edited output (MTPE_A5: 27), is also worth examining further. Often, one of the reasons for a lower number of verbs in human translations (into German) is a preference for nominal constructions, which can be related to the use of an impersonal style (outlined below).

Example 3:

HT_B7	NMT	MTPE_A5
Beim Kauf oder bei Nutzung von Waren oder Diensten von Drittanbietern [...]	Wenn Sie Waren oder Dienstleistungen von Dritten kaufen oder erwerben [...]	Wenn Sie Waren oder Dienstleistungen von Dritten kaufen oder erwerben [...]
Persönliche Angriffe auf andere sind untersagt;	Sie dürfen niemanden persönlich angreifen	niemanden persönlich anzugreifen;
Folgende Regeln müssen eingehalten werden	Sie müssen sich an die folgenden Regeln halten	Sie müssen sich an die folgenden Regeln halten
es dürfen keine beleidigenden oder obszöne Inhalte veröffentlicht werden	Sie dürfen keine Schimpfwörter oder Obszönitäten vorbringen	keine Schimpfwörter oder Obszönitäten zu veröffentlichen

With the insights from the previous examples, we can look at instances of impersonal style in this HT compared to the NMT output and this post-edited text. Interestingly, the NMT output and the post-edited text are relatively similar. The post-editor only made a few changes to the NMT output as they rated it acceptable. In contrast, we can see that the human translator prefers

to use impersonal constructions (e.g. *es dürfen* instead of *Sie dürfen*, or *Angriffe sind untersagt* instead of *Sie dürfen niemanden angreifen*), which is also characteristic of legal German.

5.3 Explicitation/normalisation

We'd also like to show you how human translation can add value to the final translation result. The following examples illustrate how HT adheres to the text conventions of legal German by translating more freely. At the same time, they show examples of translationese.

Example 1:

Source text	HT_B6
If you purchase or acquire goods or services from any third parties , even if you have been directed from this website to them , any contract you enter into with those third parties and any use you make of their website is a matter between you and them .	Im Falle eines Kaufs oder Erwerbs von Waren oder Dienstleistungen von Drittparteien erfolgt jeglicher Vertrag, den Sie mit der Drittpartei schließen, und jegliche Nutzung der Website der Drittpartei zwischen Ihnen und der Drittpartei , selbst wenn Sie von dieser Website an die jeweilige Drittpartei weitergeleitet wurden.

In this translation, we can see an example of both normalisation and explicitation. On the one hand, repeating the noun *Drittpartei* instead of using pronouns (“them”, “their”) makes the translation more explicit and precise. On the other hand, it also adapts the text to another characteristic of legal German: phrasing as unambiguous as possible (explicitation).

Example 2:

Source text	NMT	HT_B7	MTPE_A5
We do not endorse, and we are not responsible for [...].	Wir befürworten nicht [...] und sind nicht dafür verantwortlich.	Macmillan Publishing Limited übernimmt keine Haftung für [...].	Wir sind nicht für [...] verantwortlich und befürworten diese nicht.

This is an example of explicitation and it shows that the NMT and MTPE closely resemble the source text. They translated “we” literally, while the human translator changed the personal pronoun into the name of the company (*Macmillan Publishing Limited*). This is not only more appropriate in legal texts but also clearer and more formal (normalisation).

6 Conclusion

In conclusion, our data analysis and the discussion of various examples of the different translation scenarios mostly verified the claims we covered in chapter 3 and at the beginning of our video.

In human translation, lexical variety tends to be higher than in NMT outputs and post-edited texts. This seems logical: it's easier for translators to translate more freely and draw on a larger vocabulary because they do not have the target language suggestions of the NMT output as a reference. Additionally, adhering to text conventions is characteristic of HT. Professional translators tend to use nominal constructions when translating into (legal) German (while English often prefers verbal constructions). They are also more likely to adhere to domain-specific conventions (more formal, impersonal style etc.).

As NMT systems favour translation solutions that are most frequently used in the training data, lexical variety is reduced. This can be described as a form of simplification. The NMT output also tends towards interference from the source text and does not consider context information. Machine translationese, therefore, tends towards interference and simplification, which might originate from tendencies in the training data, showing evidence of translationese.

Our assumptions about lexical density were also generally verified. It tends to be lowest in NMT, higher in MTPE and highest in HT. However, Toral (2019), for example, is unsure whether the degree of lexical density is a systematic difference between the different translation scenarios or not.

Post-editing counteracts the tendencies of machine translationese only to a certain extent, as we were able to find evidence for interference and simplification (lexical variety and density) in the post-edited texts as well. We can therefore say that there seems to be a close interdependence between the concepts of translationese, machine translationese and post-editese.

But what does that mean for us as future translators? Since post-editing is increasingly implemented in the professional translation process, professional translators more and more find themselves in the role of post-editors. Depending on the assignment, they have to improve MT outputs but not necessarily make them perfect (light PE) or ensure quality comparable to human translations (full PE). Since post-editing usually comes with a discount or similar methods to decrease costs, the output must be made usable with as little effort as possible. To ensure this, professional translators should keep in mind that machine translationese often tends towards interference and simplification. With this knowledge, the respective passages can be spotted and adapted more efficiently to attain the desired level of quality.

In addition, NMT systems are not yet capable of adequately and reliably considering all context information and situational factors in a communication scenario (expectations and knowledge of the audience, text function, text conventions etc.). Professional translators only need a few minutes to access this knowledge by looking at the assignment or asking the client. For the foreseeable future, it will therefore be primarily up to professional translators and post-editors to take these factors into account when working with NMT systems.

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