



## The MT Priming Effect – Paper

## Table of Contents

1	Introduction.....	1
2	Post-editing .....	2
3	MT priming.....	2
	3.1 Translationese .....	3
	3.2 Machine translationese and post-editese .....	4
4	Data Collection and Evaluation – video tutorial.....	4
5	Analysis results – examples.....	5
	5.1 Differences in part of speech and style – part one .....	5
	5.2 Differences in part of speech and style – part two .....	6
	5.3 Normalisation/Explicitation .....	7
6	Conclusion .....	8
7	References.....	9
	7.1 Introduction & 2 Post-editing.....	9
	7.2 MT priming .....	10
	7.3 Data Collection and Evaluation & Video.....	10

# 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 hadn't looked 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. From these corpora, the systems derive statistical translation models, meaning that high-frequency expressions are generally favoured. The systems can then refer to what they've "learned" to generate an output (target text).

Before analysing how MT can influence the translation process, let's have a look at the following illustration, which shows translation scenarios with varying degrees of translation automation (and MT integration):

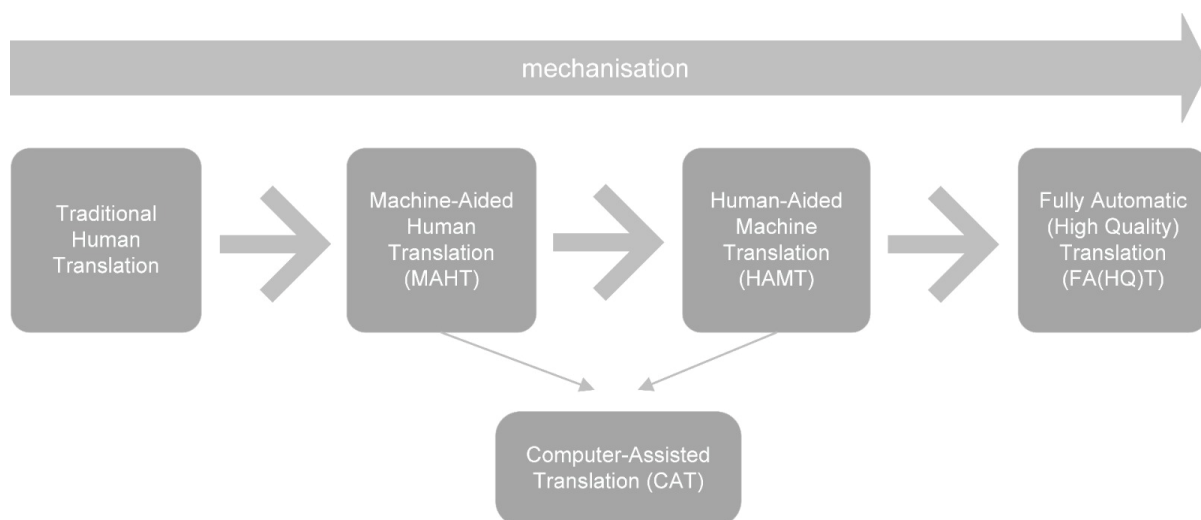


Fig. 1: own illustration adapted from Hutchins/Somers 1992

This scale shows two extremes. On the left, in the scenario of traditional human translation, translators translated a printed version of the source text only using printed dictionaries, pen and paper. Due to mechanisation and the advancement of technology, different types of supporting tools and MT have developed. In the current level of development, 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 independently but uses tools like terminology databases and spell-check. In HAMT the translator runs the text in an MT system and edits and corrects the output afterwards.

As you'll probably know by now, NMT has become state of the art in recent years. Consequently, NMT systems are increasingly employed in the professional translation process to increase translation productivity. Translations produced by NMT systems are often grammatically acceptable and sound idiomatic, which makes it harder for us (future professional translators) to discover mistakes such as critical shifts in content (e.g. omissions, additions or inverted negations) or expressions and terms that might be inappropriate for the text type or incomprehensible to our target audience. NMT systems therefore often tempt us to adopt their suggestions when post-editing their outputs (see chapter 3), even more so than systems based on earlier MT architectures.

## 2 Post-editing

Correcting and editing a machine-translated output as a human translator 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. This results in a certain amount of work, which 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 edit the MT output so that it is coherent and correct, with no grammatical errors. This means that FPE should bring the quality of an MT output close to that of a human translation.

Depending on the desired level of quality, the post-editor is responsible for checking grammar, spelling and punctuation, the correct and consistent use of terminology and the standardisation of language 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 often 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 rules of the target language. Although NMT systems rarely make syntactic mistakes, they do tend to reproduce the syntax of the source text.

## 3 MT priming

Priming can be understood as an unconscious mechanism that influences the way we perform a task based on something we've experienced before. In the context of MT, priming occurs when a post-editor is unconsciously influenced by an MT output, which means that the reception of the MT output affects their translation behaviour. In particular, the linguistic quality of an MT output frequently affects their choice of post-editing strategies.

MT-induced priming effects have been identified in various studies and are closely related to the following concepts: translationese, machine translationese and post-editese.

### 3.1 Translationese

Translationese means that human translations tend to show linguistic features that differentiate them from a target language original. These linguistic features 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 our 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 of the source text and insert additional words, such as cohesion markers. This encompasses the following ones:

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-editedese

Interestingly, MT outputs often display features of translationese, which could be described as Machine Translation Universals or machine translationese. Here's why: like all statistical MT systems, NMT systems are trained with large corpora containing translation data in both the source and target languages. These translation data are often created by professional translators and may, to some extent, display the Translation Universals described earlier. Therefore, NMT outputs may contain features of translationese. For example, if the translation data frequently displays explicitation strategies, the trained NMT system is likely to reproduce this.

It is important to note that priming has a stronger effect in post-editing than in human translation. Since an MT output is already written in the target language, post-editors are less likely to change it or come up with alternative translation solutions (e.g. regarding terminology or syntax). The result: starting from the same source text, post-edited MT outputs often show less variance than human translations from scratch. This can be described as post-editedese.

## 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): an NMT output, five post-edited NMT outputs (MTPE) and five human translations from scratch (HT). Please note that we use source and target texts from a case study in Rupcic (2021:143–204) here.

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 this journey and gain your first experience of analysing different types of translation data. So if you like, you can access the DataLit<sup>MT</sup> Repository on GitHub and download all relevant files. The folder "MT priming" contains the source and target texts (see "documents"), the paper in front of you, the video and the Excel file "lex\_variety\_density" (incl. solutions, more on that in the video):

- [https://github.com/ITMK/DataLitMT/tree/main/learning\\_resources/MT\\_priming](https://github.com/ITMK/DataLitMT/tree/main/learning_resources/MT_priming)
- <https://github.com/ITMK/DataLitMT> (home page of the repository)

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 (<http://www.laurenceanthony.net/software/antconc/> [13 July 2022])
- TagAnt (<http://www.laurenceanthony.net/software/tagant/> [13 July 2022])

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  
<https://www.youtube.com/watch?v=br3v9rQKpyo> [13 July 2022]

2. AntConc 4 – Tutorial 4 File tool basics  
<https://www.youtube.com/watch?v=kreOmM49z3c&list=PLiR-IDpYmiC0R3Vv5NncOuIqaUcyLLW7Ae&index=4> [13 July 2022]
3. AntConc 4 – Tutorial 8 Word list tool basics  
<https://www.youtube.com/watch?v=MSl4WjM9Mw4&t=99s> [13 July 2022]

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
<b>By using</b> this website you are agreeing to be bound by these terms and conditions ( <b>‘these Conditions’</b> ) and [...] subject to any additional terms and conditions that are <b>applicable</b> to that service.	<b>Durch die Nutzung</b> dieser Website erklären Sie sich damit einverstanden, an diese Geschäftsbedingungen ( <b>„diese Bedingungen“</b> ) und [...] unterliegen Sie den zusätzlichen Bedingungen, die auf diese Dienstleistung <b>anwendbar</b> sind.	<b>Mit der Nutzung</b> dieser Website stimmen Sie den folgenden allgemeinen Geschäftsbedingungen ( <b>folgend „Bedingungen“ genannt</b> ) sowie [...] stimmen Sie allen zusätzlichen Bedingungen zu, die für diese Dienste <b>Anwendung finden</b> .	<b>Durch die Nutzung</b> dieser Website akzeptieren Sie diese Geschäftsbedingungen ( <b>„diese Bedingungen“</b> ) und [...] unterliegen Sie den zusätzlichen Bedingungen, die auf diese Dienstleistung <b>anwendbar</b> 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 <b>to abide</b> by the following <b>rules</b> :	Sie <b>müssen sich an</b> die folgenden <b>Regeln halten</b> :	Sie <b>sind zur Einhaltung</b> der folgenden <b>Vorschriften verpflichtet</b> :	Sie <b>müssen</b> die folgenden <b>Regeln einhalten</b> :

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 post-editor was primed by 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 <b>promote</b> or <b>advertise</b> , or engage in any other form of marketing, [...].	[...] nicht für andere Formen des Marketings zu <b>werben</b> oder zu <b>werben</b> , [...].	<b>Werbeaktivitäten</b> [...] sind nicht zulässig, [...].	<b>keine Reklame, Werbung</b> oder andere Formen des Marketings zu <b>veröffentlichen</b> , [...].

This is a clear example of the human 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 <b>einverstanden</b> , [...].	stimmen Sie der <b>Anerkennung</b> [...] zu [...]
wenn Sie eine bestimmte Dienstleistung [...] <b>nutzen</b>	im Falle <b>einer Nutzung</b> unserer Dienstleistungen
Bitte lesen Sie diese Bedingungen; sie sind <b>wichtig</b> .	sie sind <b>von großer Wichtigkeit</b>
wenn wir von einem Gericht [...] dazu <b>aufgefordert oder angeordnet werden</b>	im Falle <b>einer Aufforderung oder Anweisung</b>



Sie <b>müssen sich an</b> die folgenden Regeln <b>halten</b>	Sie <b>sind zur Einhaltung</b> der folgenden Regeln <b>verpflichtet</b>
--	---

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 observe that the human translator, not primed by the NMT output, 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 Normalisation/Explicitation

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 are instances of translationese.

## Example 1:

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

## 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.

## 6 Conclusion

In conclusion, our data analysis and the discussion of various examples of the different translation scenarios mostly verified the claims and tendencies 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 human translators to translate more freely and use a wider variety of words because they are not primed by the target language suggestions of the NMT output. They therefore automatically draw on a larger vocabulary. 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 the domain-specific conventions, e.g. legal text 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 to resemble the source text and does therefore not consider context information such as text conventions, which can be generally categorised as interference. Machine translationese, therefore, tends towards interference and simplification, which might originate from tendencies in the training data, showing evidence of translationese.

Our assumptions regarding lexical density were partly verified. While lexical density tends to be lower in the NMT output and the post-edited texts than in human translations, it remains unclear whether this is a systematic difference between the different translation scenarios.

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. 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 will probably have to get used to a new way of working. They have to improve MT outputs, but not necessarily make them perfect (depending on the assignment). Since post-editing usually comes with a discount or similar methods to decrease the costs, the result must be made usable or understandable with as little effort as possible. To ensure this, professional translators should keep in mind that machine translationese often shows tendencies toward 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, however, 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 to take these factors into account when working with NMT systems.

## 7 References

### 7.1 Introduction & 2 Post-editing

- DIN ISO 18587 (2018): *Übersetzungsdienstleistungen – Posteditieren maschinell erstellter Übersetzungen – Anforderungen (ISO 18587:2017)*. Berlin: Beuth.
- ELIS Research (2022): European language industry survey 2022. <https://elis-survey.org/> (13 July 2022).
- Hansen-Schirra, Silvia/Schaeffer, Moritz/Nitzke, Jean (2017): Post-Editing: Strategien, Qualität, Effizienz. In: Porsiel, Jörg (Ed.): *Maschinelle Übersetzung. Grundlagen für den professionellen Einsatz*. Berlin: BDÜ Fachverlag, 176–191.
- Hutchins, William J./Somers, Harold L. (1992): *An Introduction to Machine Translation*. London: Academic Press.
- Jedamski, Derek (2020): Advanced NLP with Python for Machine Learning. Online course on *LinkedIn Learning*. <https://www.linkedin.com/learning/advanced-nlp-with-python-for-machine-learning/leveraging-the-power-of-messy-text-data?autoplay=true&u=79182202> (13 July 2022).
- Krings, Hans P. (2001): *Repairing Texts. Empirical Investigations of Machine Translation Post-Editing Processes*. Kent: The Kent State University Press.
- Lufkin, James M. (1989): Current trends in technical translation. In: *International Professional Communication Conference 'Communicating to the World.'*, 238–243. <https://doi.org/10.1109/IPCC.1989.102139>.
- Nitzke, J./Hansen-Schirra, Silvia (2021): *A short guide to post-editing*. Berlin: Language Science Press. <https://doi.org/10.5281/zenodo.5646896>.

- Nitzke, Jean/Hansen-Schirra, S./Canfora, Carmen (2019): Risk management and post-editing competence, In: *JOSTRANS* 31, 239–259. [https://jostrans.org/issue31/art\\_nitzke.php](https://jostrans.org/issue31/art_nitzke.php) (13 July 2022).
- O’Brien, Sharon (2011): Towards Predicting Post-Editing Productivity. In: *Machine Translation* 25(3), 197–215. <https://doi.org/10.1007/s10590-011-9096-7>.
- Rupcic, Kerstin (2021): *Einsatzpotenziale maschineller Übersetzung in der juristischen Fachübersetzung*. Berlin: Frank & Timme.
- Seewald-Heeg, Uta (2017): Ausbildung von Post-Editoren, In: Porsiel, Jörg (Ed.): *Maschinelle Übersetzung. Grundlagen für den professionellen Einsatz*. Berlin: BDÜ Fachverlag, 168–175.
- Žďárek, Dan (2021): Machines That Think: The Rise of Neural Machine Translation. *Memsources Blog*. <https://www.memsources.com/blog/neural-machine-translation/> (13 July 2022).

## 7.2 MT priming

- Blum-Kulka, Shoshana/Levenston, Edward A. (1987): Lexical-grammatical pragmatic indicators. In: *Studies in Second Language Acquisition* 9(2), 155–170. <https://doi.org/10.1017/S0272263100000450>.
- Carl, Michael/Schaeffer, Moritz (2017): Sketch of a noisy channel model for the translation process. In: Hansen-Schirra, Silvia/Czulo, Oliver/Hofmann, Sascha (Eds.): *Empirical modelling of translation and interpreting*. Berlin: Language Science Press, 71–116. <https://doi.org/10.5281/zenodo.1089335>.
- Carl, Michael/Schaeffer, Moritz (2019): Outline for a relevance theoretical model of Machine translation post-editing. In: Li, Defeng/Cheng Lei, Victoria L./He, Yuanjian (Eds.): *Researching cognitive processes of translation*. Cham, Switzerland: Springer, 49–67. [https://doi.org/10.1007/978-981-13-1984-6\\_3](https://doi.org/10.1007/978-981-13-1984-6_3).
- Dagut, Menachem. B. (1978): *Hebrew-English translation : a linguistic analysis of some semantic problems*. Haifa : University of Haifa.
- Laviosa-Braithwaite, Sara (2001): Universals of Translation, In: Baker, Mona (Ed.) (2001): *Routledge Encyclopaedia of Translation Studies*. London: Routledge, 288–291.
- Nunziatini, Mara/Marg, Lena (2020): Machine-translation post-editing levels: Breaking away from the tradition and delivering a tailored service. In: Martins, André et al. (Eds.): *Proceedings of the 22nd annual conference of the European Association for Machine Translation*. Lisbon: European Association for Machine Translation, 309–318. <https://aclanthology.org/2020.eamt-1.33/> (13 July 2022).
- O’Brien, Sharon/Ehrensberger-Dow, Maureen (2020): MT literacy—a cognitive view. In: *Translation, Cognition & Behaviour* 3(2), 145–164. <https://doi.org/10.1075/tcb.00038.obr>.
- Toral, Antonio (2019): Post-editeese: an Exarcerbated Translationese, In: *Proceedings of MT Summit XVII Volume 1: Research Track*. Dublin Machine Translation Summit 2019, 273–281. <https://aclanthology.org/W19-6600/> (13 July 2022).
- van der Auwera, Johan (1985): *Language and logic: a speculative and condition-theoretic study*. Amsterdam: John Benjamins Publishing Company.

## 7.3 Data Collection and Evaluation & Video

- Carl, Michael/Schaeffer, Moritz (2017): Sketch of a noisy channel model for the translation process. In: Hansen-Schirra, Silvia/Czulo, Oliver/Hofmann, Sascha (Eds.): *Empirical modelling of translation and interpreting*. Berlin: Language Science Press, 71–116. <https://doi.org/10.5281/zenodo.1089335>.

- Carl, Michael/Schaeffer, Moritz (2019): Outline for a relevance theoretical model of Machine translation post-editing. In: Li, Defeng/Cheng Lei, Victoria L./He, Yuanjian (Eds.): *Researching cognitive processes of translation*. Cham, Switzerland: Springer, 49–67. [https://doi.org/10.1007/978-981-13-1984-6\\_3](https://doi.org/10.1007/978-981-13-1984-6_3).
- Rupcic, Kerstin (2021): *Einsatzpotenziale maschineller Übersetzung in der juristischen Fachübersetzung*. Berlin: Frank & Timme.
- Toral, Antonio (2019): Post-edited: an Exacerbated Translationese, In: *Proceedings of MT Summit XVII Volume 1: Research Track*. Dublin Machine Translation Summit 2019, 273–281. <https://aclanthology.org/W19-6600/> (13 July 2022).