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AN ANALYSIS OF DUTCH TO ENGLISH LEGAL MACHINE TRANSLATION

MA THESIS

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1. Introduction

Machine translation has been in development ever since the twentieth century and it has gone through many iterations (see e.g Hutchins, 1992; 1995; Chéragui, 2012; Castilho et al., 2017). It began as a rule-based process. Humans entered a set of rules into a machine, and with those rules, the machine produced a translation (Hutchins, 1992; 1995). This evolved into example-based machine translation, in which the machine was given a bilingual corpus made up of sentence pairs (Nagao, 1984; Carl & Way, 2003). The machine could compare input to the corpus and see if it contained a translation for the input. This process was further developed into statistical machine translation (Koehn, 2010). When using example-based machine translation, the machine could only give outputs which were present in the corpus. With statistical machine translation, the machine could formulate entirely new translations by applying mathematical equations to calculate the probability of the correctness of any possible translation (Koehn, 2010). The last development of machine translation was the use of neural networks (Brownlee, 2017; Castilho et al. 2017). As with statistical machine translations, neural machine translation allows the machine to fabricate original translations not present in its corpus. Rather than maths and statistics, however, the machine functions with a neural network which does not regard each word as completely different ('*cat*' and '*cats*' were regarded as unrelated segments by statistical machine translation, for instance), but attributes vector values to every word (Kalchbrenner & Blunsom, 2013; Macken, 2020). It uses these vectors to predict a translation based on the context of the sentence and the already translated text (Kalchbrenner & Blunsom, 2013).

The ultimate goal is to create a system which can translate like a human translator. According to some professional translators, this goal is still far off (Läubli & Orrego-Carmona, 2017). They base their claims on the grammatical or syntactic errors found in machine translations (Läubli & Orrego-Carmona, 2017). Other people present a more elaborate argument for their dislike of machine translation. Literal translation, for instance, is

said to be impossible to be replaced by a computer, since there is information on which translators can base their choices which is not explicit in the text, like the voice of the author or cultural knowledge (Taivalkoski-Shilov, 2019). A machine will produce a translation that lacks distinctiveness and will be similar to other machine translations, while a human translator can be creative and produce a text which stands out from other texts (Taivalkoski-Shilov, 2019).

Legal translation is, too, a process that does not rely solely on the understanding of a text. It involves the understanding and comparison of two (or more) different legal systems and legalese (Harvey, 2002; De Groot, 2012). To find a suitable translation for a specific term, one can employ one of many different translation techniques (De Groot, 2012). Rarely can one term simply be replaced by another. Producing a translation that stays true to the source text, or, which produces simple linguistic equivalence (Hammond, 1995), is all the more important for legal translation, since an erroneous translation bears legal consequences. Can we trust a machine for such translation? A machine does not employ translation techniques like humans do and they do not conduct a comparative analysis before producing a translation. It has been shown that a machine translation of a legal text is of lesser quality than that of a human translation (Kit & Wong, 2008). Such judgement, however, is based on an automatic evaluation process, BLUE (Papineni et al., 2002), which does not judge the translation based on its legal accuracy, but based on similarities between a machine translation and available human reference translations (Papineni et al,. 2002, Kit & Wong, 2008).

The aim of this thesis is to evaluate machine translations of Dutch legal texts based on their legal accuracy and implied legal consequences. The online translation tool DeepL is used to produce the translation. These texts are evaluated using relevant literature, legislation and dictionaries. The final product is an accurate in-depth assessment of legal machine

translation which goes beyond automatic evaluation by pointing out the flaws, the danger of solely relying on machine translation, as well as formulating a conclusion on the problematic functioning of machine translation systems within a legal system.

2. History of MT

2.1 The inception of the field

Machine translation (shortened as 'MT') refers to the process of translation performed entirely by a machine, with little to no human interference. Since the inception of the field, researchers have been developing the process, with the ideal of equalling the best man-made translation (Hutchins & Somers, 1992).

The idea of using machines to aid with overcoming language barriers far precedes the first computer. In the seventeenth century, both Descartes and Leibniz hypothesised the conception of dictionaries based on universal numerical codes (Hutchins & Somers, 1992). It was not until the middle of the twentieth century, however, that ideas were solidified and people made actual attempts at mechanising a translation process (Hutchins & Somers, 1992).

In the 1930's, the French-Armenian George Artsrouni and the Russian Petr Smirnov-Troyanskii both filed a patent for a machine purposed to aid with translating (Zarechnak 1979; Hutchins & Somers, 1992; Hutchins, 1995). Artsrouni envisioned a machine with paper tape which could find an equivalent of a term in any language. Troyanskii speculated on a three-step translation process. First, a human linguist would analyse the source material and transform it into a linguistically logical form: all nouns would be transformed to their nominative case ('*dog's*' becomes '*dog*') and all verbs to their infinitive ('*singing*' becomes '*sing*'), after which all the words would be labelled with their syntactic function (Zarechnak 1979; Hutchins & Somers, 1992; Hutchins, 1995). In the second step, a machine would take the transformed source material and translate it into a different language by looking at the syntactic labels. In the last step, a human linguist transforms the machine output (which is at this point a 'logicalised' text, consisting of nominatives and infinitives) into the normal form of the target language (Zarechnak 1979; Hutchins & Somers, 1992; Hutchins, 1995). While Troyanskii built a prototype in 1941, the project was not worked out in linguistic detail (the

question how to handle idioms and homonyms was only discussed very generally), and with the lack of technical support at that time, the machine failed to reach a level of practical application (Zarechnak, 1979).

Later that decade, in 1947, Warren Weaver, Director of Natural Sciences at the Rockefeller Foundation, discussed the idea of using the recently developed computer as a translation device with A. B. Booth, a British crystallographer (Hutchins & Somers, 1992; Hutchins, 1995; 2000). Booth returned to England and developed a punch-card system which could aid in the word-for-word translation of scientific abstracts (Richens & Booth, 1955).

A few years later, more people became interested in MT, and by 1949, Weaver's colleagues at the Rockefeller Foundation urged him to write down and distribute his ideas. The result was Weaver's 1949 Memorandum, which led to the appointment of Yehoshua Bar-Hillel, the first MT researcher at MIT in 1951 (Zarechnak, 1979; Hutchins & Somers, 1992; Hutchins, 1995; 2000). Not long after, Georgetown University had also set up an MT research team. In 1954, this team, in collaboration with Léon Dostert, presented an experiment in which a machine translated 49 selected Russian sentences into English. The researchers keypunched a Russian-English dictionary and syntactic rules and fed them to the machine memory (Zarechnak, 1979). With this data, the machine managed to produce translations of the Russian sentences (Zarechnak, 1979). Even though the choice of sentences was very restricted (no negations or questions) and the vocabulary was only 250 words, the demonstration showed that machine translation was possible and it prompted the US funding of MT research (Hutchins & Somers, 1992).

Research continued until the sponsors of MT research came together and formed the Automatic Language Processing Advisory Committee (ALPAC). The committee reviewed the progress of machine translation and published their findings in a report in 1966. In this report, the committee stated that human translation was faster, more accurate, and twice as

cheap as machine translation and that "'there is no immediate or predictable prospect of useful machine translation" (Hutchins & Somers, 1992; Hutchins, 1995). In retrospect, these findings should not have come as a surprise. MT research was at that point very much a field within computer and engineering studies, with little attention for the linguistic aspect. This had led to an underestimation of the linguistic problems (Somers, 2011). Before the ALPAC report was published, researchers such as Yehoshua Bar-Hillel already warned for the 'semantic barrier' of MT (Somers, 2011).

The report resulted in almost a halt of MT research in America (Hutchins, 1995). In Europe and Canada, the political need for translation was different (Europe is a multilingual community and Canada is an English-French country), so the ALPAC report did not have much impact there (Somers, 2011). In the next decade, many MT systems were developed, some of which are still in use today (Hutchins & Somers, 1992; Hutchins, 1995). Examples are Meteos and Systran. The University of Montréal developed Meteos, a system aimed at translating weather forecasts from French to English. This system could achieve a high accuracy by being restricted to a narrow sublanguage (the language of meteorological forecasts) (Hutchins & Somers, 1992; Hutchins, 1995). Petr Toma, originally part of the Georgetown University research team, developed Systran. This system was originally developed as a Russian-English system for the US Air Force. In 1976, an English-French version of the system was implemented by the Commission of European Communities, and it was soon expanded to include versions of almost all Community languages (Hutchins, 1995). Research continued on developing the technological architecture behind existing translation systems and on developing entirely new systems.

2.2 Machine translation approaches

The history of translation studies can be divided into three different approaches: 1) the direct approach; 2) the rule-based approach; and 3) the corpus-based approach (Quah, 2006). The rule-based approach can be subdivided into the intralingua and transfer approach, and the corpus-based approach can be subdivided into the example-based, the statistical and the neural approach (Quah, 2006; Koehn, 2010).

2.2.1 The direct approach

The earliest iterations of translation systems were built around the direct approach. Being the very first iteration of machine translation, the approach was simple compared to its successors (Quah, 2006). Because, at its infancy, machine translation was very much a matter of computer science and engineering, no linguists or translators were involved in the development of early systems and the translation mechanisms did not apply any translation theory and very little linguistic theory (Quah, 2006).

The direct approach is, in essence, a dictionary-based approach (Quah, 2006). The system has access to a bilingual dictionary and to some grammatical information of the target and source text. The system matches each source-language word to its target-text equivalent. Then, it looks up the available grammatical information of the target text and adapts the target text accordingly (for instance, for an English-French translation, the adjective-noun order would be changed to noun-adjective) (Quah, 2006).

A disadvantage of this approach is that the system has no way of dealing with ambiguities (for instance, distinguishing between '*lead'* (verb) and '*lead'* (noun)), or with idioms (for instance '*on the one hand…on the other'*).

Although this approach was considered unreliable and not powerful enough, it was implemented in almost all MT systems developed before 1966.

2.2.2 Rule-based approach

The rule-based approach uses morphological, syntactic and semantic rules as a basis for the translation process (Quah, 2006). Two main type of modules of a rule-based system are dictionaries and parsers. Dictionary modules will be discussed first.

Often, the system has access to two monolingual dictionaries (source and target text) and a bilingual dictionary (source to target text). The dictionary entries are extensive and go far beyond giving only a definition or translation (Quah, 2006). The entry for the word '*gajah'* in the KAMI-dictionary (Malay-English), for instance, consists of eight fields:

Field	**Field name**	**Example**	**Comment**
1	Malay Index Word	*gajah*	required
2	Malay Root Word	-	If index is a derivative
3	Part-of-speech	Noun	Required
4	Syntactic Features	Classifier = *ekor* [tail]	List of features
5	Semantic Features	Mammal	List of features
6	English Translation	*Elephant*	Translation equivalent
7	English Definition	A kind of animal	Translation description
8	Meta-Tags	-	List of relevant meta-tags

Table 1. Entry in the KAMI-dictionary (Quah, Bond & Yamazaki, 2001)

The index word (1) is the subject of the entry. If the index word is a derivation (a conjugated verb, for instance), field (2) contains the root word. Field (3) states whether the index word is a noun, verb, adjective or another part-of-speech. Syntactic features are labelled in field (4). Because this dictionary is concerned with the Malay language, this field

often specifies the classifier[1]. Field (5) states semantic features. This can be used to distinguish between homographs. For instance, '*perang'* can mean '*brown*' or '*war*'. *Perang* therefore has two entries in the dictionary with two different semantic features. Field (6) contains the English equivalent of the Malay term. Field (7) contains a brief English description of the term. Field (8) contains meta-tags like '*vulgar*', '*taboo*', or '*archaic*'.

With the information provided by such a dictionary, the system is able to make a more accurate translation, since it has access to more information on the terms and is able to handle homographs better.

'The instant hot air supplies the necessary heat to all laboratories.'

```
(*a-supplies
   (tense present)
   (mood declarative)
   (punctuation period)
   (source (*o-hot air
              (reference definite)
              (number singular)
              (attribute (*p-instant))))
   (theme (*u-heat
             (reference definite)
             (number singular)
             (attribute (*p-necessary))))
   (goal_to (*o-all laboratories
              (reference indefinite)
              (number plural)))
```

Figure 1. Parsing of a string of text (Quah, 2006)

The second main module of rule-based systems is the parser. When a string of text is entered into the system, the parser assigns a structure to the string based on the information available on the text (see Figure 1). This means that the system will try to recognise the relationship between the words in a sentence. For instance, if the system is fed the string '*The*

[1] In English, there would be no problem saying you have 'three apples'. In some other languages, like Malay, a numeral cannot directly precede the noun. Malay speakers insert a classifier when quantifying nouns. An English example would be 'one paper' and 'two pieces of paper'. In this sentence, 'pieces' is the classifier (Quah, Bond & Yamazaki, 2001).

instant hot air supplies the necessary heat to all laboratories', it would produce the structural representation as seen in Figure 1, based on the information from the dictionary module[2].

After the system has parsed the text, it is ready to be translated. What this translation process entails depends on the MT system in question. Rule-based systems can roughly be divided into two categories: interlingua and transfer systems.

Interlingua systems

An interlingua system is based on the philosophy that every language shares universal features (Quah, 2006). If one can determine what these features are, they can be used as an in-between step between the source and target language, a type of middle-langue (or: interlingua). The source language would be broken down into such universal features, and from these features, one can construct the target language.

An advantage of such a system is that once a set of universal features has been identified, they are applicable to every language pair and translation direction. This means that it is easier to add more language pairs to an MT system.

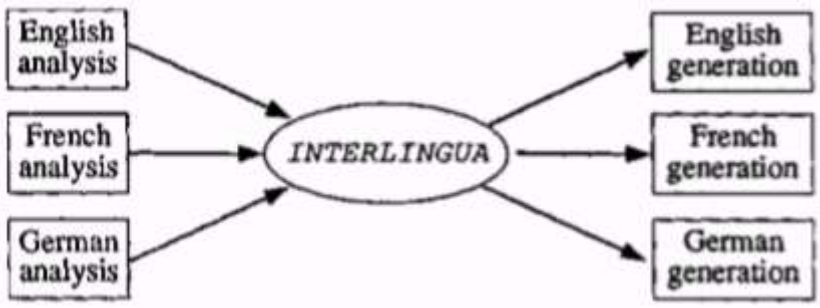

Figure 2. A model of an interlingua MT system (Hutchins & Somers, 1992)

Figure 2 is a representation of an interlingua MT system. In total, this system shown in Figure 2 consists of six modules of two different types: one module per source language to

[2] This is a basic and simplified overview of how a system produces a structural representation. Translation systems have their own way of handling a string of text and can be more, or less, complex. For an overview of how different prominent translation systems process a text, I refer to Hutchins & Somers (1992).

analyse the language and break it down into the interlingua (the universal features), and one module per target language to generate the target language from the interlingua. If one were to add a new language to the system, only two new models need to be created: one for the analysis and one for the generation. After this is done, the language is fully integrated into the system and can be part of any language pair (Hutchins & Somers, 1992; Quah, 2006). This makes the interlingua system less complicated than the transfer system, which will be discussed in the following section.

While the idea of an interlingua which can be used as a bridge from and to any language sounds as a gateway to the perfect MT system, a functioning interlingua MT system has never been developed. Where on the one hand its simplicity as a system is a big advantage, the difficulty of identifying universal features of language is a big disadvantage. It has been philosophised about since the seventeenth century, but no linguist has succeeded in developing a truly language-independent interlingua (Hutchins & Somers, 1992).

Transfer systems

The second approach to a rule-based system is a transfer system. While this system also makes use of an intermediate abstract representation of the languages of the language pair, it is less ambitious than the interlingua-approach. Where the interlingua approach aimed for a universal abstract representation applicable to any language, the abstract representations of a transfer system remain language-dependant (Hutchins & Somers, 1992; Quah, 2006).

The system is built up of several different modules. The modules can be divided into transfer modules, generation modules and analysis modules. The analysis modules create an

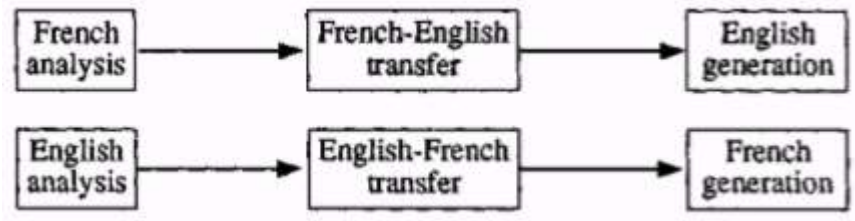

Figure 3. A FR-EN and EN-FR tranfer MT system (Hutchins & Somers, 1992)

abstract representation of a text. The transfer module transforms this abstract representation into the abstract representation of a different language. The generation module generates the translated text from the abstract representation produced by the transfer module (Hutchins & Somers, 1992; Quah, 2006). Because the system needs a transfer module for every language pair and translation direction, the number of modules can quickly expand (Hutchins & Somers, 1992). In a simple system with only one language pair (French and English) which can translate both ways (EN-FR and FR-EN), the system needs six modules:

As shown in Figure 3, the English to French and French to English transfer require their own modules. If the system has to be expanded with a new language in such a way that the new language can translate to languages already integrated in the system and vice versa, six new modules have to be added (see Figure 4).

Figure 4 shows a similar system as Figure 3, except for the fact that German has been added to the system. This addition means that a module has to be added for the analysis and generation of German, modules for the transfer of German to French and English and modules for the transfer of French and English to German. Adding even more languages becomes exponentially complex (see Table 2). If n is the number of languages, the number of transfer modules needed is $n(n\text{-}1)$. This is in addition to the generation and analysis modules.

Languages (*n*)	**Analysis modules (=*n*)**	**Generation modules (=*n*)**	**Transfer modules (*n*(*n*-1))**	**Total modules**
2	2	2	2	6
3	3	3	6	12
4	4	4	12	20
5	5	5	20	30

Table 2. The number of modules needed per number of languages (Hutchins & Somers, 1992)

As Table 2 shows, the number of transfer modules is almost the number of languages squared. This is opposed to the interlingua systems, were no transfer modules are needed at all (see Figure 2).

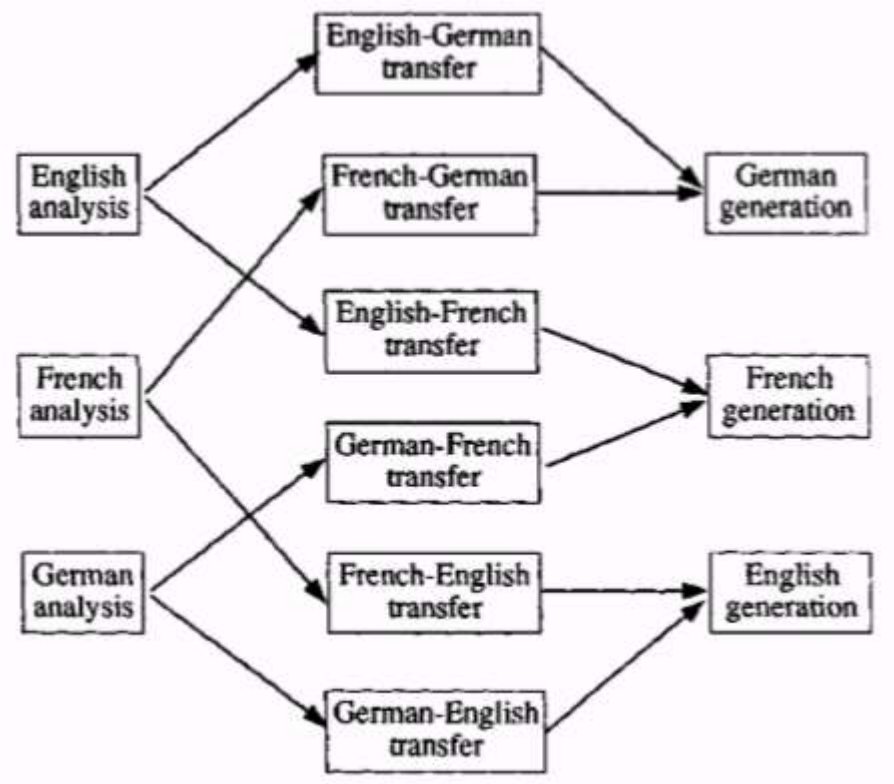

Figure 4. A transfer MT system with three languages (Hutchins & Somers, 1992)

The reason transfer systems are preferred over interlingua systems, apart from the difficulties of identifying universal features as discussed before, is that the generation and analysis modules are less complex. Since the abstract representations are still language dependant, the analysis does not have to be as thorough and the generation is fairly easy, since the representations are still close to the language in question.

2.2.3 Corpus-based systems

Trying to codify the linguistic rulesets which form the skeleton of a language has proven itself to be a difficult task (Koehn, 2010). In the 1980's, the idea of learning from past translations arose (Koehn, 2010; Somers, 2011). Systems were developed which had access

to a large collection of texts (a corpus) and their translations. This corpus is aligned, which means that the system knows which translation corresponds to which source text sentence corresponds with which translated sentence. When translating a source text, the system can use the existing translations as a reference and give a translation based on translations made in the past. How this process works in detail depends on the type of corpus-based MT system. Such systems can be put into three categories: example-based systems, statistical systems, and, the most recent development, neural systems (Koehn, 2010; 2017).

Example-based systems

The most straight-forward of these three systems is the example-based system. Example-based systems are also referred to as memory-, analogy-, or similarity-based systems (Quah, 2006). The idea for such a system was first proposed in 1984 by Makoto Nagao. In his paper, he compares such a system with a student memorising English and Japanese translations and emphasises that there is no translation theory involved, only memorisation and reproduction.

An example-based system operates in three stages: first, the source text is compared to the corpus and an algorithm extracts example translations from the corpus which are similar to, but not necessarily the same as, phrases of the source text. Then, these examples are aligned with their corresponding source text segments. Finally, the translated segments are recombined to form a new text (Quah, 2006).

For example, the sentence '*The man is eating a hamburger at the restaurant'* is fed to an example-based MT system for an English to French translation. The system now compares this sentence to its corpus and an algorithm extracts any relevant examples. For this example, the algorithm has extracted the following sentences from the corpus:

English example	French translation example
The man is tall.	L'homme est grand.
The girl is eating a hamburger.	La fille mange un hamburger.
I met him at the restaurant.	Je l'ai rencontré au restaurant.

Table 3. An example of examples extracted from a corpus

None of these examples match the input sentence 100%, but the algorithm has found a few similarities between these examples and the input sentence. Now, the system will align these examples and the input sentence (see Figure 5).

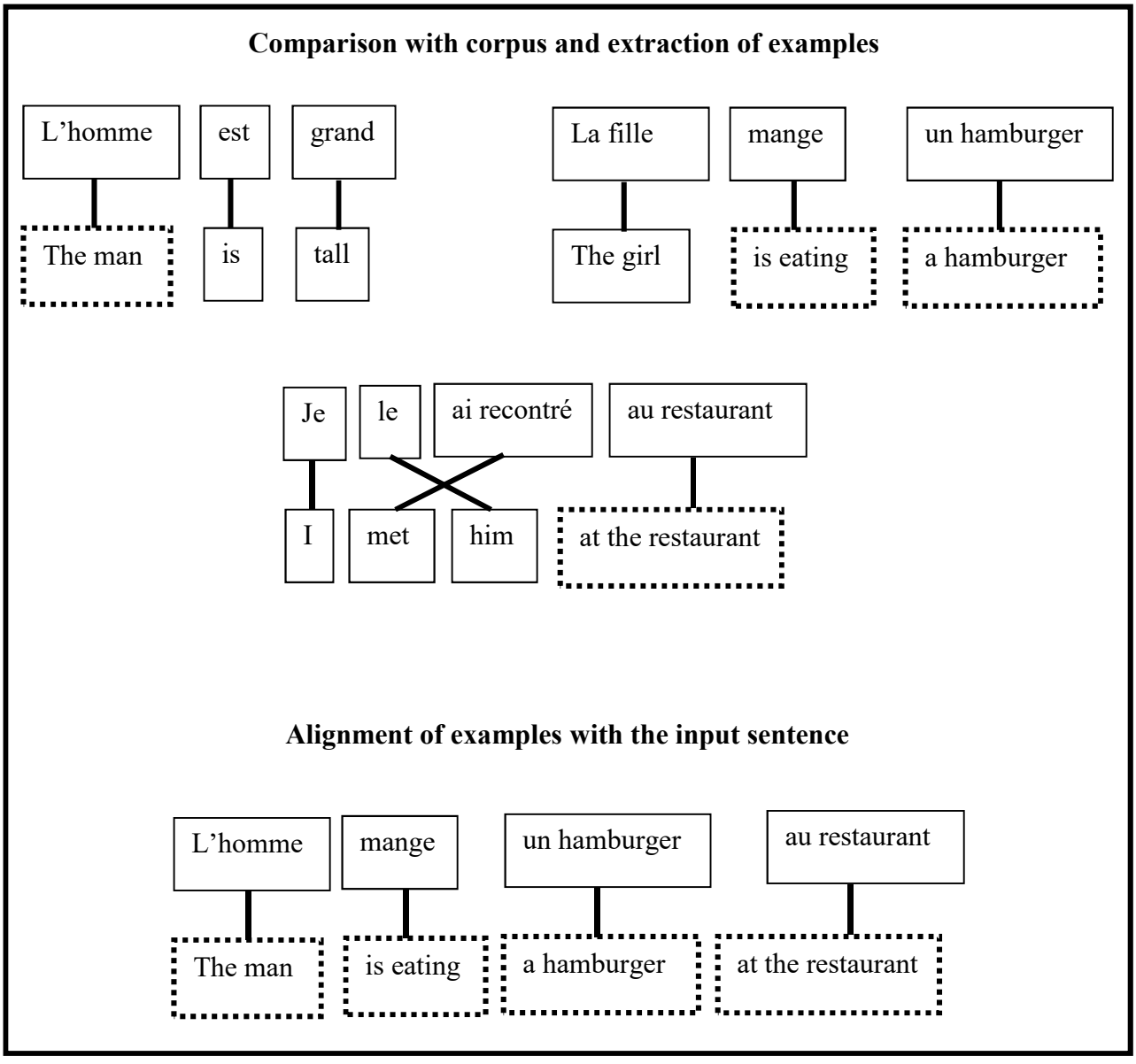

Figure 5. The translation process of an example-based system (adapted from Quah, 2006)

As Figure 5 shows, the system takes the relevant segments from the examples and forms a translation of the input sentence. Since the corpus is aligned per sentence, the system does not per definition 'know' which English words correspond to which French word. The system can learn this by deduction and minimal pairs (Cicekli & Güvenir, 2003). These are sentences which differ only one or two words. For instance, the corpus contains the sentences '*the girl is eating a hamburger*' and '*the girl is eating quickly*'. The translations of these two sentences are '*la fille mange un hamburger*' and '*la fille mange vite'*. From these two sentences and their translation, the system can deduce that '*la fille mange*' corresponds to '*the girls is eating*',
since these segments remain constant in both instances, and that '*vite*' corresponds to '*quickly*' and '*un hamburger*' to '*a hamburger*'. The larger the corpus, the more of such deductions the system can make.

Statistical systems

The idea of approaching translation from a statistical point of view was already suggested in Weaver's 1949 memorandum. However, this idea was never pursued earlier because of the limitations of early computational power (Koehn, 2010). In the 1980's, researchers at IBM started developing statistical MT systems, mainly thanks to the success of statistical approach in speech recognition (Quah, 2006; Koehn, 2010).

Statistical MT works on a similar system as example-based MT. The main difference is that where example-based systems had no sophisticated way of dealing with many possible translations of a source text (Quah, 2006), statistical MT systems employ statistical equations to determine the probability of any given translation to be a suitable for a given source sentence (Brown et al., 1990; Qauh, 2006; Koehn, 2010).

In 1990, this approach started off as a word-based statistical approach (Brown et. al., 1990). This meant that a statistical analysis was carried out for individual words. First, since

the corpus is sentence-aligned, the system has to figure out which word corresponds with which translated word. To do so, a mathematical formula[3] determines which alignment has the highest possibility of being correct by evaluating every possible word-to-word alignment of sentence pairs (Koehn, 2010). With this alignment, the probability of the correctness of translations can be evaluated. In other words, in a German-English system, given the word '*Haus*', what translation has the highest probability of being correct? The alignment shows that '*Haus*' can be translated with '*house*', '*home*', '*building*', and '*shell*'. Based on the frequency of these translations, the system determines that the correct translation of '*Haus*' is probably '*house*'.

In order to be able to take the context of a word into account, to handle for instance a homograph, statistical MT systems use *n*-grams in their calculations, where the *n* stands for the number of words preceding the translated word are considered (Koehn, 2010). For instance, an *n*-gram where *n* is 2 considers the translated word and the preceding word. If '*book*' is preceded by '*fantasy*', the term probably refers to a written work. If '*book*' is preceded by the particle '*to*', the term most probably refers to the act of organising a holiday.

Approaching a statistical MT on a word-by-word basis does lead to some problems. Sometimes, a word in the source text is translated by two words in the target text. The other way around is also possible: two words in the source text are translated by only one in the target text. In some instances, words are not translated at all (Koehn, 2010). To address these issues, developers have deviated from using the word-level as the level at which meaning is conveyed, and started using the phrase-level as the level at which meaning is conveyed (Koehn, 2010).

[3] Providing the actual formulas for this and other probability calculations warrants extensive clarification of mathematical terms. Since the purpose of this section is to give a brief overview and not to give an in-depth explanation, I refer to Brown et al. (1990), Quah (2006) and Koehn (2010) for a more detailed description of the mathematics involved.

This is especially useful where an idiom is translated. For instance, '*John kicks the bucket*' is translated with '*John biss ins gras*'. Which word corresponds to which word? '*John*' obviously corresponds to '*John*', but does '*kicks*' correspond to '*biss*'? The sentences do mean the same, but the individual words bear no resemblance in meaning. This problem is solved by not dividing the sentence into words, but into phrases. The phrase '*kicks the bucket*' corresponds to '*biss ins gras*' (Koehn, 2010).

The accuracy of this approach relies mainly on the quality of the corpus the system is based on (Somers, 2011). If a statistical MT system has been developed on the basis of a corpus on the subject of sports, it will not produce an accurate translation of a text on music, since it has not required any lexical information on the relative nomenclature. For this reason, such systems are built on a corpus on the subject for which the system is intended to be translating (Somers, 2011).

With statistical MT systems, developers introduced monolingual language models. Such models are purely designed to make sure that the translation 'makes sense' in the target text (Koehn, 2010). This is done by statistical calculations, too. Apart from calculating whether a given source phrase corresponds to a target phrase, the system calculates in which order the target phrases probably belong, with the aim to produce an as coherent sentence as possible.

Neural systems

In the 2000s, computer engineers started experimenting with hybrid systems of statistical and neural systems (Koehn, 2010). Neural networks allowed for more thorough statistical calculations (Koehn, 2017). In the 2010's purely neural translation models were developed (see e.g. Kalchbrenner & Blunsom, 2013; Cho et al., 2014). In the later years, research focused mainly on neural translation systems (Koehn, 2017).

Cho et al. (2014) presented the encoder-decoder approach to neural MT. Trained on a large corpus, the encoder encodes the source text and produces a set of vectors for each word. These vectors can be thought of an abstract representation which allows computers to understand the properties of a word. Words with similar semantics will have similar vectors. This is a big advantage of neural systems over statistical systems. For statistical systems, every word (or phrase) was regarded as a unique unit, with no semantic relation to one another. Neural systems, because of vectoring, know that '*cat*' and '*cats*' are very similar, because they are bound to have similar vectors (Macken, 2020). If one were to project a set of word on a 2D-plane based on their vectors, it could look like Figure 6.

Figure 6. A 2D visual representation of vectored words (cropped from Koehn, 2017)

Figure 6 shows a set of words that have been mapped on a 2D-plane based on their vectors. In the top-right corner, '*drama*' and '*theater*' are very close together, because they share many semantic similarities and therefore have similar vectors.

These vectors are fed to the decoder. The decoder takes these vectors and maps them to the target language. Per word, it considers which word is the most suitable translation (Koehn, 2017). In order to allow the decoder to take the context of the words into account, an attention system is implemented. This attention system allows the system to compute the

association between the word that is being decoded and the other input words. Based on the strength of these associations, some vectors are weighted, which can influence the translation preference of the system (Koehn, 2017).

2.3 State of the art

The direct and rule-based systems have all fallen out of favour since the rise of statistical and neural systems (Google and DeepL for instance have adopted a neural system in 2017). However, whether a neural system is more effective than a statistical system is still up for debate (see e.g. Bentivogli et al., 2016; Castilho et al. 2017; Koehn & Knowels, 2017).

In some experiments, involving automatic evaluation and human evaluation of translation, statistical MT systems scored better than neural MT systems (Castilho et al., 2017). In others, neural systems had an overall better score than statistical systems (Bentivogli et al., 2016). Since there are many variables when assessing MT systems, it can be difficult to determine what has caused such a difference in findings.

Koehn and Knowels (2017) have identified some challenges neural systems are still faced with. For instance, when translating outside of the domain the system is trained on (i.e. a system translating a text on computer science when being trained on a corpus on arts and culture), statistical systems performed better than neural systems. Long sentences form a complication, too. When translating long sentences up to sixty words, neural systems performed better than statistical systems. However, when sentences exceeded sixty words, statistical systems surpassed neural systems. Lastly, neural system handle the translation of rare words (words that do not occur in the corpus) better than statistical systems, but there is still room for improvement.

In all, the fact that neural systems (which are still young) can compete with statistical systems (which have been around for quite some years) strongly suggests that it will not take long before the performance of neural systems surpass statistical systems. Furthermore, the

fact that large companies have shifted their attention from statistical systems to purely neural system reaffirms that neural systems are very promising (Castilho et al., 2017).

3. Legal Translation

3.1 Legal language as an independent language

Even though someone might have good command of English, reading through an English legal documents can still prove to be difficult. This is because, though ultimately being an English text, legal document have distinct features (Crystal & Davy, 1969; Tiersma, 2006; Cao, 2007). Features often described are lengthy sentences and vocabulary.

The syntax of legal texts is often complex and leads to extremely long sentences (Crystal & Davy, 1969; Tiersma, 2006; Cao, 2007). In the past, it was not uncommon for draftsmen to compose an entire legal document with only one sentence (Crystal & Davy, 1969). The length of these sentence can be attributed to the large amount of information that has to be conveyed. This information includes many exceptions and conditions which apply to that which is being stated within the sentence, warranting additional clauses (Cao, 2007). These long sentences are often near unreadable for a lay person (Cao, 2007).

Vocabulary is also a distinct feature of legal texts. This is the most visible and striking feature of legal language (Cao, 2007). Many terms used are archaic, which adds a touch of formality to the text (Crystal & Davy, 1969; Tiersma, 2006). The formal vocabulary of legal texts also serves as a way of eliminating any ambiguity of a text, since terms have a single, precise meaning (Crystal & Davy, 1969). Such vocabulary might also serve as a signpost for the reader to signify that the text has been produced in a legal environment (Crystal & Davy, 1969).

Some argue that despite these features, a legal language is still an adjunct of the original language. On the other end of the spectrum, some do see legal language as a distinct technical language and even argue that it is a sub-language or language on its own (Cao, 2007). To answer the question whether legal language is indeed a myth, Tiersma (2006) discusses alleged similarities between legal texts and other text types and concluded that

while it is untrue to say the lawyers have a language of their own, it would be equally as inaccurate to say the legal language is just a formal written language with some technical vocabulary.

For instance, while in normal written texts it is usual to not repeat a name or a noun when mentioned multiple times in a sentence, but to use a pronoun (*My dog* is happy, *he* is wagging *his* tail), legal text repeat the pronoun (*The buyer* promises that *the buyer* will pay) (Tiersma, 2006). Also, legal texts avoid 'elegant variation'. Normally, it would be unsurprising to see a car being referred to as '*wheels*', '*ride*', or '*automobile*' within the same text. Legal texts adhere to a one-meaning-one-form principle. If a different term is used, it is assumed to be referring to a distinct referent (Tiersma, 2006).

3.2 The Translation of Legal Texts

All these features make the translation of legal text a challenging endeavour. Even more so, because while legal language can be regarded as a technical language, it is not a universal technical language like, for instance, text on aviation or computer science. An aeroplane or computer works exactly the same in Germany as it does in Russia. Legal language is based on the legal culture of a country, which is unique for each country (Cao, 2007). This means that a legal text must often be translated in more creative ways, since equivalent terms rarely exist between two legal languages (De Groot, 2012).

Legal text for translation can be divided into three categories: 1) texts for normative translation, 2) texts translated for legal procedures, and 3) text for informative translation (Cao, 2007). Texts for normative translation can be defined as the translation being the law itself (Cao, 2007). Examples of this can be found in multilingual countries, like Canada (French and English), and Hong Kong (English and Chinese), or in international governmental organisations, like the UN or the EU. In Canada, legislation is written in French and Canada. Both of these texts have a legislative status. If a translator at the

European Union translates an English law into Spanish, the Spanish text will have equal legislative status. It is therefore not referred to as a 'translation', but as a 'version' (Cao, 2007). For such translation, it is important that the source text is being respected and the translation does not alter de intended meaning of the source text, since any alterations would directly result in a change of law (Cao, 2007).

Texts that are used in legal procedures do not have any legislative status, but do have a legal status within legal procedures (Cao, 2007). These are documents such as particulars of claim and agreements, but also ordinary texts, such as personal correspondence, a witness statement or expert reports. Such documents fulfil a particular role within a legal procedure. Their contents have legal consequences (Cao, 2007). Any translator can be summed to appear before court as a witness because of their translation (Cao, 2007).

An informative translation is a translation which is meant to only inform the reader of the contents of the original (Cao, 2007). These translation have no legal or legislative status. A translation of a French law for the purpose of informing English lawyers of readers outside of a legal setting is not enforceable because it is not legally binding.

Globalisation has increased the need for legal translation (Wolff, 2011). People are now interacting with other legal areas by means of travel, holiday, or even ordering items from a foreign web shop. Foreign students might want to read the rental agreement in their native language or English, and the consumer might want to read the terms and conditions of a Chinese web shop in English. These situations call for the translation of a legal texts.

The views on how legal texts have to be translated have changed together with changes in translation studies (Wolff, 2011). The text may be adapted to be more comprehensible for the reader, but not as much as is acceptable for other text types (Wolf, 2011). De Groot (2012) has described a few approaches to translation problems which might arise when translating a legal text. Ideally, the source text terms can be translated by an

equivalent target text term. Equivalent terms, however, are hard to find, since the equivalent has to be functionally equivalent and there must be a similar structural or systematic embedding (De Groot, 2012). Often, translator have to resort to subsidiary solutions. The translator can choose to preserve the source term, adding explicatory information between parentheses are in a footnote. A second option is paraphrasing. This can be explained as being a translation of the description of the term. Instead of trying to capture the meaning of the term in a single target text term, the translator can choose to use a multiple-word-equivalent. The last option De Groot (2012) describes is the neologism. The translator uses a target text term which is not part of the legal lexicon of that language, accompanied by an explicatory foot note if necessary. Such a neologism must of course not be chosen arbitrarily, but it must unambiguously reflect the meaning of the translated term. Sometimes, a third language can be chosen for a neologism. Latin is a reasonable choice for this, if it can reasonable assumed that the reader still has knowledge of Roman law. Note that these approaches are most appropriate when producing a text with legal or legislative purpose, as translations with an informative purpose might have to be more accessible and therefore might employ more liberal approaches to make the text more readable for lay people.

3.3 Machine Translation of Legal Texts

Traditional advice when translating legal texts is to "is to trust nothing, to suspect everything, to check all terms in reliable dictionaries and to develop a close familiarity with the language of the law by constant and careful reading in both languages" (Alcatraz & Hughes, 2002). Machine translation is not known for doing any of these things, so it has not been recommended when translating legal texts (Killman, 2014). The following subsection will outline several studies on the machine translation of legal texts.

3.3.1 Previous studies

Yates (2006) evaluated the quality of Spanish to English and German to English translation of Bable Fish, which at that time was running on a rule-based version of Systran. The system translated ten Spanish sentences and ten German sentences. These were chosen because these languages come from a different family (Romance and Germanic), and would thus have more linguistic variety. Also, American law librarians were most likely to encounter these languages in their line of work.

The translations of the sentences were overall found to be failures. In 75% of the time, the system produced a sentence with at least one grave error. None of the translated sentences were error-free. In the conclusion, it was stated that "any professional translation – even non-authoritative – is preferable to a Bable Fish translation".

Killman (2014) evaluated the quality of the Spanish to English machine translation of legal vocabulary. The system used was Google Translate, at that time a statistical machine translation system. Although the evaluation was focused on the translation of particular terms, these terms were first put into a context sentence to give the system more information to work with and to hopefully determine the correct translation. It was hypothesised that the terms should have been able to be translated correctly, since the correct translation could have been taken from the EU database, which is publicly accessible and probably part of the corpus used by Google Translate.

After the system had translated every term, it was found that the system chose an adequate translation 64% of the time. Most incorrect translations occurred when translating contextually driven terms. At that time, statistical machine translation systems translated a text as a string of unconnected sentences.

Wiesmann (2019) evaluated the quality of the Italian to German machine translation of various Italian legal texts. The system evaluated was DeepL, which at that time already

adopted a fully neural machine translation system. Because the development of neural machine translation system happens at a rapid pace, the texts were translated twice, four months apart.

After the translated texts were evaluated, eighteen different categories of errors were found. These errors consisted of, among others: 1) the non-translation of terms (the system used the Italian term in the German text), 2) the translation of proper names (for instance, '*Giovanni'* was translated into '*Johan*'. Ideally, the proper name is maintained), 3) misinterpretation of the antecedent demonstrative pronouns, and 4) erroneous terminology. The second test four months later showed no improvement or deterioration of the quality of the MT output. In all, it was concluded that while MT has progressed, it has not progressed enough to translate legal texts without a major post-editing effort.

Heiss and Soffritti (2018) incorporated an excerpt of 590 words from an Italian law in their evaluation of DeepL's machine translation output for Italian to German translation. The law in question comes from the multilingual province of South Tyrol, which provides digital versions of theirs laws in Italian and German.

Since they found that the output was mostly syntactically correct, they deemed the output 'substantially acceptable if it were requested to make the text generically comprehensible to a German-speaking reader'. Errors found were mostly discrepancies between the terms used by DeepL and the terms used by the administration of South Tyrol. Therefore, using the output as an official version of the law would confuse residents.

The studies above were carried out within a range of fifteen years, and the results varied wildly. This is mainly due to the rapid pace of MT development. The first of these studies was conducted in 2006, on a rule-based system. Within the next fifteen years, rule-based systems were dropped in favour of statistical systems, which were in turn dropped in favour of neural systems. With this development, MT output has seemed to improve, but

none of the studies concluded that MT output could be considered acceptable as an official translation.

A recurring observation is that MT systems fail to accurately translate legal terminology. This could be attributed to the fact that the corpora Google Translate or DeepL are built on are not specialised, meaning their contents are a conglomeration of medical, legal, fictional and other texts. The system has to determine from the context which text type it is dealing with and which translation is probably correct, but despite rapid development, this is an ability MT systems have yet to master.

4. The Study

For this thesis, the MT output of a Dutch to English translation of several Dutch legal texts by DeepL has been studied. These MT outputs have been compared to the original and evaluated based on the 'correctness' and whether the translation would still fulfil the intentions with which it was written. Furthermore, based on the way the identified error affect the text, a conclusion was formulated regarding the safety of relying on MT output. The MT system and the two legal texts used are further discussed in section 4.2 and 4.3 respectively.

4.1 Method

The method used for this study is adapted from the studies presented in section 3.3.1., differences being the language pair (Dutch to English), the addition of an in-depth analysis of some of the errors found in the translation and the effect of the errors on text coherency.

In order to make evaluation easier, parallel overviews were made of the translations and their respective original texts. These overviews show the source sentences aligned with their corresponding target sentences. The complete overviews can be found in the appendix to this thesis.

Evaluation occurred in two steps. First, the errors in the translation were identified and analysed. This analysis included a reasoning for why a given error is considered an error. For terminological errors, the reasoning is founded with relevant legislature and dictionaries. Secondly, the errors identified were categorised as one of the following:

1. Grammatical
2. Syntactic
3. Lexical,
4. Terminological

Furthermore, to be able to comments on the visibility of MT errors and the risks of relying on MT output, errors were also labelled as resulting in either:

a. an incoherent sentence

or

b. a coherent sentence

For this study, an incoherent sentence is understood as being a sentence which can be identified as incorrect based on the conventions of the target language alone, without comparison to the source text. An error resulting in a coherent sentence, on the other hand, is only identifiable after comparison to the source text. These errors likely alter the meaning of the source text, or give opportunity for a broader interpretation than intended, without the reader noticing.

4.2 DeepL

For this study, the MT system studied was DeepL. This system was chosen because most of the previous studies also used DeepL. This way, the results of this study can, together with the results of previous studies, be used to put the improvement (or deterioration) of DeepL into view. Furthermore, on February 16, 2020, DeepL announced that its translation system has been updated. To demonstrate the translation quality, 119 lengthy passages were translated by DeepL and other competitive machine translation systems (for instance, Google Translate). Professional translators evaluated these translations and selected DeepL's translations as the best ones four times as often as competitor's translations (DeepL, 2020). Given this recent advancement, it seems fitting to repeat the evaluation of the translation of legal texts.

4.3 The Texts

For this study, two Dutch texts will be used. The first text, an excerpt from a judgement, has judicial status. The second text, an excerpt from the Dutch Criminal Code, has legislative status. These texts have been chosen because of the complex syntax and use of terminology. The texts can be accessed via internet at *uitspraken.rechtspraak.nl* for text 1 and *wetten.overheid.nl* for text 2.

4.3.1 Text 1, Judgement of the Multiple-Judge Criminal Section

Text 1 is an excerpt of a judgement of the multiple-judge criminal section. This section of the court consists of multiple judges and handles criminal cases in which the prosecution demands a sentence of more than a term of imprisonment of 12 months, or a special measure.

The defendant in this case is being accused of ringing the doorbell of his ex-partner (the victim) and lingering at the front door once or multiple times a day, over a period half a year, with the intention of forcing her to do or not to do something, or to frighten her. The judgement contains the assessment of the evidence, together with the statement of the defence. The court ultimately finds the defendant guilty of what he was accused of.

The judgement then states the sentence demanded by the public prosecutor, the statement of the defence and the decision of the court. The public prosecutor demanded the defendant to be committed to an institution for repeat offenders. The court decides that the defendant is not a repeating offender, and will thus not be committed to such an institute. It does, however, impose and order prohibiting contact with the victim on the defendant, which will remain in effect for five years. Any breaches of this order will result in detention for a period of two weeks. Furthermore, the defendant is sentenced to a term of imprisonment of 6 months, and fined €750, to be paid to the state.

The excerpt taken from this judgement to be translated by DeepL is the final decision of the court. This contains the statement of what the defendant is charged with, and the punishment imposed on the defendant. If the translation of this excerpt were to bear legal status, it must be devoid of any ambiguities or differences in meaning compared to the original. As recent studies have shown terminology and sentence length will be the one of the more difficult challenges for the neural network (Killman, 2014). The excerpt is 698 words long and has an average sentence length of 25 words, with the longest sentence being 52 words. The syntactic complexity of the texts might trigger an incorrect MT output because of large distances between the subject and verb, or because of large noun phrases as the subject. The technical terminology might trigger mistranslation, as some terms have different colloquial meanings as opposed to their meanings in the field of law.

4.3.2. Title 1 from Book 4 of the Dutch Civil Code

Text two consists of the first title of Book 4 of the Dutch Civil Code, which contains the Dutch inheritance law. This law provides for the rules regarding the settlement of the inheritance after someone's passing. In brief, it provides for the rules regarding the settlement of the inheritance *ab intestato* (when the deceased has not disposed of his inheritance by will), and for the rules for writing up such a will.

The title in question contains the general provisions of this law, which consists of eight articles. The first article states the two ways in which an inheritance can be disposed of, namely by will or *ab intestato.* The second article states that if the order in which two people have passed away cannot be determined, they will be deemed having passed away simultaneously. If a beneficiary is having difficulty proving the order of passing, he or she can be granted a postponement. Article 3 states the conditions under which people can be declared unworthy of inheritance and who will thus not gain any benefit. Article 4 voids certain acts carried out before the devolution of the inheritance. Article 5 enables anybody

who, according to the Dutch law of inheritance, has the right to a sum of money, to claim said sum via court. This article would become relevant if somebody was left out of a will, but would have received benefits had the inheritance been disposed of *ab intestato*. This person can then claim the portion he or she would have received. Article 6 states that the value of any goods and chattels is to be determined at the time of passing of the deceased. Article 7 defines which debts are chargeable to the inheritance, and in which order they should be fulfilled. The last article of the title, article 8, defines the different relationships between people (married, partner), and it defines what is being understood by 'stepchild' in this Book.

In total, the text is 1010 words long. The average sentence length is 12.7 words, with the longest being 61 words. Previous research has shown that this is the sentence length at which neural machine translation quality starts to diminish (Koehn and Knowels, 2017). The layout of the text might also hinder the translation system. In some instances, a sentence is not written as a continuous sequence of words, but rather as a sentence which is finished in three different ways, where the different endings are presented as bullet points.

As with text 1, if the translation of text 2 were to have legislative status, the translation must be unambiguous and devoid of any mistranslations or grammatically incorrect sentences.

4.4 Translation Analyses

The aim of this section is to show that the identification of errors was not done arbitrarily. Some translations appear acceptable, but are shown to be incorrect after in-depth legal, grammatical or syntactic analysis. The analyses are provided of several errors identified in the two machine translations. A slice of the parallel overview is presented where one or multiple errors have occurred. The error(s) are highlighted in bold in the target text. Comments on the error(s) are provided underneath the parallel overview. Repeated errors are not highlighted in this section, but these are highlighted in Appendix I and II.

4.4.1. Analysis of Text 1: The Judgement

Dutch source text	**English target text (DeepL)**
verklaart wettig en overtuigend bewezen dat de verdachte het tenlastegelegde feit heeft begaan, zoals hierboven onder 3.5 bewezen is verklaard, en dat het bewezen verklaarde uitmaakt:	declares legally and convincingly proven that the accused has **(1) committed the offence (2) indictment**, as **(3) has been proven** above under 3.5, **(4) and that it is proven**:

1. committed the offence: This is a terminological error. The target text states that the court has declared it proven that the defendant has committed an offence. However, at this stage of the judgement, the court has not yet declared the acts of the defendant an offence. As stated in article 350 of the Dutch Code of Criminal Procedure, the court assesses, based on the evidence provided and based on the accusation of the public prosecutor, whether the defendant has indeed acted according to the accusation, and then whether these actions constitute an offence. In this sentence, the court declares it proven that the defendant has indeed acted according to the accusation, but not yet that these actions constitute an offence.

2. indictment[4]: This is a terminological error. Firstly, the use of '*indictment*' is syntactically incorrect, as an '*offence indictment*' is not a correct compound noun. A more accurate translation would be '*offence as indicted*'. Secondly, due to the difference between the Dutch legal system and the English or American legal system, the term '*indictment*' does not directly apply to Dutch law.

As the Federal Rules of Criminal Procedure state, in the US, an indictment is issued out by a Grand Jury, consisting of 16 to 23 people, in case of a serious offence. The Grand Jury only issues the indictment after revision of evidence and only if said evidence is deemed strong enough to hold a suspect for trial. This indictment then charges the suspect with a

[4] While it could be argued that the DeepL has translated '*feit*' as '*offence indictment*' and omitted '*tenlastegelegde*' because of the placement of '*indictment*', entering only the term '*tenlastelegging*' into DeepL results in '*indictment*' as the translation. Therefore, it has been labelled as a separate terminological error.

specific crime. The necessity of a Grand Jury is also laid down in the Fifth Amendment to the U.S. Constitution, which states that an indictment by a Grand Jury is required before a person can be tried for a serious offence.

In the UK, the Criminal Procedure Rules (2015), provide that a person can be tried on indictment after being heard at the Magistrate's court. The Magistrate's Court, pursuant to the Crime and Disorder Act 1998, has the power to send a person for trial to the Crown's Court. In such a case, an indictment is issued which states the offence(s) the person is charged with.

In both the US and UK, the term '*indictment*' is used when the offence in question is of a greater severity. In Dutch law, however, accusation of an offence is called a '*tenlastelegging*', regardless of the severity of the offence. Furthermore, the Dutch legal system does not at any moment in the judicial process make use of juries. Implications of such should therefore be avoided. Since 'indictment' involves a jury in US law, a more neutral term like '*accusation*' is preferred.

3. has been proven: This is a lexical error. This suggests the text in 3.5 of the judgement plays a crucial role as proof of guilt. However, the evidence provided by the prosecution is what proves the accusations, the accusations have been declared proven under 3.5 on the grounds of the evidence available.

4. and that it is proven: This is a lexical mistranslation of the verb '*uitmaken*' of the source text. Following article 350 of the Dutch Code of Criminal Procedure, at this point in the judgement, the court decides whether the proven fact constitutes a punishable offence. The prosecutor has succeeded in proving the accusations. He does not have to prove it constitutes a punishable offence, as the translation would suggest. That is to the Court's discretion.

belaging;	**(5) harassment;**

5. harassment: This is a terminological error. The court has decided that the proven accusation constitutes '*belaging*'. The definition of this offence is provided for in article 285b of the Dutch Penal Code. In the original bill, the Dutch term '*belaging'* is stated to be used instead of the English term '*stalking*'[5]. Since '*belaging*' and '*stalking*' refer to the same offence in Dutch Law, it should be assessed whether this similarity upholds in English jurisdictions.

Black's Law Dictionary provides definitions of the terms '*harassment*' and '*stalking*'. '*Harassment*' is defined as a conduct or action which annoys, alarms or causes emotional distress in a person without legitimate purpose. '*Stalking*' is defined as following or loitering near a person to annoy or harass that person (Garner, 2009). With these given definitions, it can be said that stalking is a more severe case of harassment.

In UK legislation, harassment and stalking are closely related. While the Protection from Harassment Act 1997 originally included '*stalking*' as a form of harassment, it was later amended to include '*stalking*' as a separate offence (Clough, 2015). It now states that a person is committing the offence of '*stalking*' if the course of conduct amounts to harassment, and the acts are associated with stalking. The Act lists a few examples of such acts, which correspond with the definition of '*belaging*' provided in the original bill.

In American laws, too, a distinction is made between '*harassment*' and '*stalking*'. American laws against stalking were implemented to help remedy actions which were threatening, but not against the law (National Institute of Justice, 1996). Stalking is typically defined in State statutes as following and harassing another person (National Institute of Justice, 1996). This means that stalking is harassment, but with an element of repetition and deliberately seeking contact. Such a definition, together with the position of '*stalking*' in UK law, strongly suggest that '*belaging*' should be translated as '*stalking*', not as '*harassment*'.

[5] See *Kamerstuk* 25768 nr. 5

verklaart het bewezen verklaarde en de verdachte daarvoor strafbaar;	declares the proven offence and the accused punishable **(7) for it**;

.

6. for it: This is syntactically incorrect. The phrase '*punishable for it*' relates to both '*proven offence*' and '*the accused*'. What the source text says is that the act is punishable, and that the accused is punishable for it.

bepaalt dat de tijd door de veroordeelde vóór de tenuitvoerlegging van deze uitspraak in verzekering en voorlopige hechtenis doorgebracht, bij de tenuitvoerlegging van het onvoorwaardelijk gedeelte van de hem opgelegde gevangenisstraf geheel in mindering zal worden gebracht, voor zover die tijd niet reeds op een andere straf in mindering is gebracht;	provides that the time spent by the convicted person in **(7) insurance** and pre-trial detention prior to the execution of this sentence shall be deducted in full **(8) from the execution** of the unconditional part of the sentence imposed on him, to the extent that that time has not already been deducted from another sentence;

7. insurance: This is a terminological mistranslation of '*verzekering*'. The source term refers to a period of time a suspect is held while the investigation is pending (article 57 of the Dutch Code of Criminal Procedure). This term, however, is also used in Dutch contract law (see Article 925 of the Dutch Civil Code). It is the second definition which the machine has translated, since the term '*insurance*' refers to a contract by which one party will compensate any losses of another party which arise because of certain circumstances (Garner, 2009). Since the source term does not refer to a punishment (the suspect has not yet been tried), references to imprisonment should be avoided. An appropriate term would be '*police custody*' (Tak, 2003; Council for the Judiciary, 2008).

8. from the execution: This is a syntactic error. The source phrase translated is '*bij de tenuitvoerlegging*'. This is a reference to a point in time, namely when the punishment is

executed. It is thus a prepositional phrase. In the translated text however, the phrase '*from the execution*', together functions as part of the indirect object of the verb '*deduct*'. The sentence should be rewritten so that '*the unconditional part of the sentence imposed on him*' is the indirect object of the verb '*deduct*'. A change of preposition is warranted to turn '*from the execution*' into a temporal prepositional phrase.

bepaalt dat een gedeelte van die straf, groot 2 (twee) maanden, niet zal worden tenuitvoergelegd onder de algemene voorwaarde dat de veroordeelde:	provides that part of that sentence, **(9) much more** than 2 (two) months, will not be enforced under the general condition that the sentenced person:

9. much more: This is a lexical mistranslation. The source text uses the adjective '*groot*' to indicate the duration of the conditional sentence. The machine has translated this term with '*much more*'. This changes the meaning drastically, as it now means that the unconditional part of the sentence is larger than the intended two months.

- zich voor het einde van de hierbij op twee jaren vastgestelde proeftijd niet schuldig maakt aan een strafbaar feit;	- **(10) is not guilty** of any offence before the end of the probationary period of two years laid down herein;

10. is not guilty: This is a terminological mistranslation. This sentence states the condition under which the conditional term of imprisonment of two months will not be imposed. While the source text clearly states that any punishable actions carried out by the defendant within two years is in breach of the imposed condition, the translation shifts the '*carrying out of punishable actions*' to the notion of '*guilt*'. It could be argued that this means that the defendant should not be found guilty of punishable actions within two years. This means that if the defendant commits a punishable act within the two years, but the guilty judgement is pronounced outside these two years, it could be said that the condition is not breached. A safer choice would be to use a verb like '*commit*', instead of '*being guilty of*'.

beveelt dat vervangende hechtende hechtenis zal worden toegepast voor de duur van 2 (twee) weken voor iedere keer dat niet aan de maatregel wordt voldaan;	orders that substitute **(11) bonded custody** will be applied for the duration of 2 (two) weeks for each time the measure is not complied with;

11. bonded custody: This is a terminological mistranslation. Dutch law distinguishes between two types of '*hechtenis'*. The first one, '*voorlopige hechtenis*', is imposed on a suspect awaiting trial (Section 2, Title IV, Book 1 of the Dutch Code of Criminal Procedure). The second one, *'vervangende hechtenis'*, is imposed as a substitute penalty on, in most cases a defendant who is unable to pay for damages (article 24c of the Dutch Criminal Code). In this case, it concerns a substitute penalty in case the defendant does not adhere to a restraining order.

To translate '*hechtenis*' with '*custody*' could in this case be confusing to the English reader, as this term is sometimes used to refer to pre-trial detention (Tak, 2003; Council for the Judiciary, 2008). If it were '*voorlopige hechtenis*', it would be an accurate translation. However, '*hechtenis*' in this case does not refer to detention before the trial, but as a punishment imposed on the defendant after the trial.

For a more accurate translation of '*hechtenis*', '*detention*' is used (Rayar, 1997). In order to reflect the fact that in this case, the punishment is imposed as a substitute to adhering to a measure, translators could opt for '*substitute detention*', or, in order to reflect the preventive aim of the punishment (in this case preventing the defendant from contacting the victim), for '*preventive detention*'.

Secondly, the machine has translated '*hechtende*' as '*bonded*'. This is a literal translation of the term, which is more likely to confuse than to clarify. The distinction of a '*hechtende hechtenis*' is not provided for in Dutch law. It is most likely used to distinguish between using '*hechtenis*' as a pre-trial measure or as a punishment. This difference would also be reflected by using '*detention*' instead of '*pre-trial detention*'. There is, however, no

physical difference between the two, so in order to avoid confusing the English reader, '*bonded*' should be omitted.

bepaalt dat in geval volledige betaling noch volledig verhaal van het verschuldigde bedrag volgt - onder handhaving van voormelde verplichting - gijzeling zal worden toegepast voor de duur van 15 dagen. De toepassing van de gijzeling heft de hiervoor opgelegde betalingsverplichting niet op;	provides that in the event that neither full payment nor full recovery of the amount due follows - **(12) while maintaining** the aforementioned obligation - **(13) hostage-taking** will be applied for a period of 15 days. The application of the hostage-taking does not cancel the payment obligation imposed for this **(14) purpose**;

12. while maintaining: This is a lexical error. The measure laid down in this part of the text is not done while maintaining an aforementioned obligation, but under the enforcement of an aforementioned obligation.

13. hostage-taking: This is a terminological error. In this case, the Dutch term '*gijzeling*' refers to a measure imposed on a person by the court, if that person fails to comply with a court order, such as, in this case, payment of damages (article 585-600 of the Dutch Code of Civil Proceedings; Caspel et. al, 2008), or on a witness to a case who, without valid legal grounds, refuses to answer questions (articles 221-225 of the Dutch Code of Criminal Procedure; Caspel et. al, 2008). In these cases, '*gijzeling'* is a coercive measure. However, in other cases, the term can also refer to the unlawful deprivation of liberty (article 282a of the Dutch Penal Code; Caspel et. al, 2008). The machine has erroneously the term as referring to the latter, since '*hostage-taking*', is defined as federal crime and has no connection with court orders (Garner, 2009), and is an offence under the Taking of Hostages Act 1982 in the UK.

For the translation of the term in the sense of a coercive measure, dictionaries suggest '*coercive detention'*, or '*committal for failure to comply with a court order*' (Van den End, 2020), or '*civil imprisonment*' (Foster, 2009). Article 596 of the Dutch Code of Civil Proceedings provides that a person is transferred to *Het Huis van Bewaring* when *gijzeling* is imposed. This is facility is something different then a prison, as only short sentences are

fulfilled here. For this reason, allusions to imprisonment should likely be avoided. The preferred translation is '*coercive detention'*.

14. purpose: This is a lexical error. The mistranslated adverb '*hiervoor*' has three different definitions: 1) for this purpose, 2) at a point in time before aforementioned, and 3) concerning aformentioned (Van Dale, 2020). The payment obligation is not imposed with the purpose of committing the defendant to coercive detention, but it is imposed in an earlier point in the text. A more accurate translation would be '*aforementioned payment obligation*', or the adverb could be omitted entirely.

This concludes the analysis of text 1. The complete overview with all errors highlighted can be found in Appendix I.

4.4.2 Analysis of Text 2: Title 1 of Book 4 of the Dutch Civil Code

Dutch source tekst	**English target text (DeepL)**
1. Erfopvolging heeft plaats bij versterf of krachtens uiterste wilsbeschikking.	1. Succession shall take place **(1) on death** or by virtue of a **(2) disposition of property upon death**.

1. on death: This is a terminological mistranslation of '*bij versterf*'. The first article of the law of inheritance states that one's property can be disposed of in two ways: in the manner prescribed by law, or by will and testament. The former is termed '*bij versterf*' and described in Title 2 of Book 4 of the Dutch Civil Code. The translation does not reflect this distinction.

Possible translations of '*bij versterf*' are '*by rules of intestacy*' (Sumner & Warendorf, 2005), '*ab intestato*' (Foster, 2009), or '*by operation of law*' (Van den End, 2020). The chosen translation should clearly reflect the fact of the absence of a last will and testament. In UK law, in order to reflect that someone has died without leaving a will, the term '*intestate*' is used (see, for instance, Administration of Estates Act 1925). The American term '*intestate*'

is also defined as 'one who has died without a valid will' (Garner, 2009). Using this term in the translation might therefore be the clearest, such as Sumner & Warendorf's translation '*by rules of* intestacy'.

2. disposition of property upon death: This is a terminological error. While '*disposition*' does refer to a transfer of property, it does not by definition have to be by will and testament (Garner, 2009). Similarly, according to the general definitions of the Law of Property Act 1925, a conveyance (e.g. a mortgage or a lease) and an appointment of property contained in a will can both be referred to as a '*disposition*'. The source text, however, does specifically refer to a will and testament. A more accurate translation is '*testamentary disposition*' (Garner, 2009), or simply '*will and testament*' (Foster, 2009).

2. Van de erfopvolging bij versterf kan worden afgeweken bij een uiterste wilsbeschikking die een erfstelling of een onterving inhoudt.	2. The succession in the case of death may be **(3) waived (4) in the case of a** disposition of property upon death **(5) involving** an **(6) inheritance** or disinheritance.

3. waived: This is a lexical mistranslation of '*afgeweken'*. The verb is '*to waive*' often used in collocation with a right, privilege or claim (Garner, 2009; OED, 2020). The translation suggests that the rules of intestacy may be ignored if the deceased has left a will. However, the source text states that these rules can be deviated from by will. They can not be ignored, as blood relatives have the right to claim their legitimate share of the inheritance (articles 63-92 of Book 4 of the Dutch Civil Code), which follows the rules of intestacy.

4. in case of a: This a vague translation of '*bij*'. A more concrete translation would be '*by virtue of*' or '*pursuant to*'.

5. involving: This is a vague translation of '*inhoudt*'. A more concrete translation would be '*stating*'.

6. inheritance: This is a terminological mistranslation of '*erfstelling*'. By the disposition of property of an intestate deceased, the Dutch inheritance law (Book 4 of the Dutch Civil Code) provides the rules by which the property ought to be divided. The parties among which the property is divided are the surviving spouse, children, parents and siblings, grandparents and great-grandparents. These parties are called '*heirs*' (Garner, 2009; OED, 2020). The share the heirs receive, is the '*inheritance*' (Garner, 2009; OED, 2020). The translation erroneously uses this term.

The term '*erfstelling*' refers to a deviation from the regular intestacy rules, by the addition of an heir to the list of heirs (articles 115, 116 of Book 4 the Dutch Civil Code). This legal act can be translated as '*the appointment of an heir*' (Sumner & Warendorf, 2005; Van den End, 2020).

1. Van rechtswege zijn onwaardig om uit een nalatenschap voordeel te trekken:	1. Unworthy by operation of law **(7) to take advantage of** an inheritance**: (8) [omission]**

7. to take advantage of: This is a lexical mistranslation of *'voordeel te trekken'*. The translation '*to take advantage*' contains an element of active opportunism (OED, 2020). The source term, however, refers to the passive act of gaining benefits from an inheritance. A more suitable translation would therefore be '*to gain benefits from*'.

8. [omission]: The system has omitted verb '*zijn*', which is translated by the verb '*to be*'.

a. hij die onherroepelijk veroordeeld is ter zake dat hij de overledene heeft omgebracht, heeft getracht hem om te brengen, dat feit heeft voorbereid of daaraan heeft deelgenomen;	a. he who has been irrevocably convicted of having **(9) murdered** the deceased, of having attempted to kill him, of having prepared or participated in the preparation of that fact;

9 murdered: This is a terminological error. The translation suggests that someone is unworthy of their share of the inheritance when he has been convicted of the murder of the

deceased. '*Murder*' is often used as the translation of '*moord'* (article 289 of the Dutch Penal Code; Rayar, 1997; Van den End, 2020). It could very well be the case that someone kills the deceased, but is convicted of '*manslaughter*' (article 287 of the Dutch Penal Code; Rayar, 1997; Van den End, 2020). He is then, according to the translation, still worthy of inheriting. In order to reflect the intended message, a more general and less legal term such as '*killing*' should be used.

b. hij die onherroepelijk veroordeeld is wegens een opzettelijk tegen de erflater gepleegd misdrijf waarop naar de Nederlandse wettelijke omschrijving een vrijheidsstraf is gesteld met een maximum van ten minste vier jaren, dan wel wegens poging tot, voorbereiding van, of deelneming aan een dergelijk misdrijf;	b. he who has been irrevocably convicted of a deliberate crime committed against the deceased **(10) and** for which a custodial sentence **(11) has been imposed** according to the Dutch legal definition with a maximum of at least four years, or for attempting, preparing for, or participating in such a crime;

10. and: This is an erroneous insertion. The prepositional phrase '*for which a custodial sentence […]*' functions a modifier to the head noun phrase '*a deliberate crime committed against the deceased*'. The head and modifier of a noun phrase cannot be divided by a conjunction (Burton-Roberts, 2011). Furthermore, the co-ordinating conjunction '*and*' can only co-ordinate two phrases from the same category, for instance two noun phrases (Mary *and* John), or two prepositional phrases (on the table *and* under the book). It cannot, as in the translation, co-ordinate a noun phrase and a prepositional phrase (Burton-Roberts, 2011).

11. has been imposed: This is a lexical mistranslation of '*is gesteld'.* The source text states that if someone has been convicted of committing an offence against the deceased for which the law has set a maximum term of imprisonment of at least four years, the offender is unworthy of his share of the inheritance. The translation, however, suggests that the offender is only unworthy if the term of imprisonment is actually executed. This leads to legal

problems, since someone who has murdered the deceased (article 289 of the Dutch Penal Code), can be punished with a term of imprisonment with a maximum of twenty years, or with a fine. If that person is fined instead of imprisoned, he is unworthy of his share of the inheritance, according to the source text, but according to the translation, he still is worthy, since he has not been imprisoned. This can be solved by substituting the present perfect particle '*has*' by the modal verb '*can*'

c. hij van wie bij onherroepelijke rechterlijke uitspraak is vastgesteld dat hij tegen de erflater lasterlijk een beschuldiging van een misdrijf heeft ingebracht, waarop naar de Nederlandse wettelijke omschrijving een vrijheidsstraf met een maximum van ten minste vier jaren is gesteld;	c. he has been found by a final judicial decision to have defamed the testator **(12) of** an accusation of a crime **(13) ,** which according to the Dutch legal definition is punishable by a custodial sentence with a maximum of at least four years;

12. of: This is a lexical mistranslation. While it is true that '*defame*' used to be defined as an '*accusation*', it now refers to the act of tainting one's reputation (Garner, 2009; OED, 2020). Because of this, the construction '*to defame someone of something*' is obsolete (OED,2020). A contemporary construction would be '*to defame someone by doing something*'.

13. [comma]: This translation allows for ambiguity. The relative clause '*which […] years*' could refer to the act of defaming, or to the word '*crime*'. In order to reflect the meaning of the source text, it should only be able to be read as referring to '*crime*'. This can be done by erasing the comma and making '*which […] years*' a restrictive relative clause.

This concludes the analysis of text 2. The complete overview with all errors highlighted can be found in Appendix II.

4.5 Results of the evaluation

This subsection provides a clear overview of the total number of errors identified. All errors identified have been categorised and are shown in Table 4 below. In some instances, the

machine repeated the same mistake several times. For instance, the term '*erflater*' was erroneously translated with '*testator*' several times throughout Text 1. This is accounted for in Table 4 by stating the total number of instances, and the number of unique instances.

Category of error	**# of errors in Text 1 (total/unique)**	**# of errors in Text 2 (total/unique)**
Terminological	15/11	28/15
Lexical	15/12	13
Grammatical	3	1
Syntactic	4	2
Total	37/30	44/31

Table 4. Categorised overview of errors identified

As Table 4 shows, the highest number of errors was made in the terminology category. This is to be expected taking into account the way neural systems function (see section 2.2.3) and the results of previous studies (see section 3.3.1).

Table 5 shows the number of errors which result in a coherent sentence, and the number of errors which result in an incoherent sentence. These results can be used to evaluate the risks of relying on MT output.

Category of error	**# resulting in a coherent sentence**	**# resulting in an incoherent sentence**
Terminological	27	16
Lexical	12	16
Grammatical	3	1
Syntactic	-	6
Total	42	38

Table 5. The number of errors resulting in a coherent and incoherent sentences

Table 5 shows that in 42 instances, the reader has no means of knowing he is dealing with an incorrectly translation, other than comparing it to the source text.

5. Conclusion

Similar to the findings of previous studies, the MT system had difficulties translating terminological terms (see section 3.3.1). It did not have trouble finding a possible translation, but it failed to adapt to the legal lexicon. Take, for instance, the translation of '*gijzeling*' (highlighted in 4.4.1, number 13). The machine correctly identified '*hostage-taking*' as a possible translation. It did not, however, take into account the context in which the word occurred. A judge would never impose '*hostage-taking*' on a defendant, especially not in those terms. Human legal translators would not have to doubt between '*hostage-taking*' or '*coercive detention*', since only one of them is a measure imposed by a judge. Such an error shows that the MT system has had trouble identifying the context.

A second example can be found in section 4.4.2, number 9. The source phrase is '*ombrengen*', a quite general term, as the Dutch Penal Code does not specify '*ombrengen*' as an offence. Since the phrase bears no legal significance, the translation should not bare any either. For human translators, this would not be much of a challenge, as the legal and colloquial lexicon are distinct, and they ought to be able to identify which words belong to which lexicon. The machine, however, does not have such knowledge. Its corpus consists of many different texts, made up of a large number of words, with many different vectors (see section 2.2.3 Neural systems), but these words are not labelled with their colloquial definition and their legal definition. It can only make an educated guess based on probability. In many cases, translating '*ombrengen*' as '*murdered*' would be a perfectly acceptable translation. Such cases are works of fiction, subtitles to a crime show or casual conversation. It would be

acceptable, since the message conveyed is only the notion of '*killing someone*'. This is something '*ombrengen'* and '*murdered*' share.

For legal translation, however, the standards for translation are much higher than those for subtitles or casual conversation. While it is true both '*ombrengen*' and '*murder*' convey the message of '*killing a person*', in a legal environment, '*murder*' conveys much more. It is defined as a punishable offence, while '*ombrengen*' is not. This distinction is useless to the general public, and therefore also to publically accessible MT systems like DeepL and Google Translate, but important to the legal translator. The legal difference between '*having killed someone*' and '*having murdered*' someone is great, and should weigh heavily when deciding on a translation.

Secondly, the fact that MT systems are quite good, but not optimal, makes using a machine to translate a legal text dangerous. As Table 5 shows, half of the errors identified in the two translations do not show up on the surface level. This means that a reader does not immediately recognise the mistakes when reading the text. In early renditions of machine translation, mistranslations could be easily identified, simply because the translations would not make sense. Later, researchers developed systems which would make sure the target text was as coherent as possible (see section 2.2.3 Statistical systems). These language models do have a great impact on grammar and syntax, which early MT systems struggled with (see the low number of grammatical and syntactic errors in Table 5). While these language models do improve the quality of MT output at first glance, they also serve to hide any errors still present in the target text. Such 'false quality' might lead people to believe the translated text they have received from the MT system is void of errors, since text 'reads well'. An example of this is error 11 in section 4.4.2.

The translation of '*is gesteld*' is wrong, but the target sentence is coherent. A lawyer who has no command of Dutch might read the translation and be given the wrong idea about

the conditions of unworthiness according to the Dutch Inheritance Law. This is because the sentence is grammatically correct and lexically correct (to impose a custodial sentence is correct collocation and word choice), probably thanks to the language models of the MT system, but it is still a lexical mistranslation. This means that it is, at this point, dangerous to rely on MT output alone, without evaluation by a legal linguist familiar with the source and target language.

Legal machine translation could mainly be improved in the terminological and lexical databases. As described in section 2.2.3, contemporary MT systems are based on corpora, and such systems produce better technical translations when trained on a corpus which fits this purpose. Ideally, for legal machine translation, a system is built which is trained on legal texts. However, for an arising problem, I refer again to translation error 13 in section 4.4.1. The machine would not, per definition, have translated '*gijzeling*' correctly had it been trained on legal texts alone. The term occurs in the environment of criminal law and civil law, and means something different in both cases. The machine would still have to determine from the context whether it is dealing with '*hostage-taking*' or '*coercive detention*'.

A solution for this might be develop separate systems trained on criminal law texts and on civil law texts. This way, overlapping terminology from both fields stays separated and the machine does not have to handle ambiguous translations. A disadvantage of such a proposal is that the size of both corpora would be greatly diminished, maybe even up to a point where the machine has too little information to base its calculations on, which would result in an incorrect translation either way.

Many other options could be thought of, but prove equally as unlikely. For instance, MT developers could turn back to rule-based translation to create a legal interlingua (see section 2.2.2 Interlingua systems). This would take away the intricacies of comparative law, as participating language groups would agree on the fixed translations of terms such as

‘murder’ and ‘inheritance’. However, this would suggest that one legal system has to be elected as the ‘base system’ on which legal language is based, and that other might even have to overhaul their own system.

In short, the evaluation of the translation of two legal texts has shown that machine translation has still not yet developed enough to produce acceptable legal translations. At this stage, because of many subtle errors, machine translations of legal texts warrant evaluation by legal scholars, which takes a lot of time. It should therefore be considered whether using machine translation and post-editing is an efficient substitute of using a human translator for the text altogether. Furthermore, it should probably be considered if legal machine translation is a realistic goal. Legal texts have real-world implication, and many might be uncomfortable with a machine interfering with a legal procedure, and might never not be.

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Appendix I: Parallel overview of Text 1

Dutch source text	English target text (DeepL)	Error Category[6]
9 De beslissing	9 The decision	
De rechtbank:	The court:	
verklaart wettig en overtuigend bewezen dat de verdachte het tenlastegelegde feit heeft begaan, zoals hierboven onder 3.5 bewezen is verklaard, en dat het bewezen verklaarde uitmaakt:	declares legally and convincingly proven that the accused has **committed the offence indictment**, as **has been proven** above under 3.5, **and that it is proven**:	Terminology Terminology (c) Lexical (c) Lexical
belaging;	**harassment**;	Terminology (c)
verklaart het bewezen verklaarde en de verdachte daarvoor strafbaar;	declares the proven **offence** and the accused punishable **for it**;	Terminology (c) Syntactic
verklaart niet bewezen hetgeen aan de verdachte meer of anders is tenlastegelegd dan hierboven is bewezen verklaard en spreekt de verdachte daarvan vrij;	declares unproven what has been charged to the accused more or differently than **has been proved** above and acquits the accused accordingly;	Lexical (c)
veroordeelt de verdachte tot:	sentences the accused to:	
een gevangenisstraf voor de duur van 6 (zes) maanden;	imprisonment for a term of 6 (six) months;	
bepaalt dat de tijd door de veroordeelde vóór de tenuitvoerlegging van deze uitspraak in verzekering en voorlopige hechtenis doorgebracht, bij de tenuitvoerlegging van het onvoorwaardelijk gedeelte van de hem opgelegde gevangenisstraf geheel in mindering zal worden gebracht, voor zover die tijd niet reeds op	provides that the time spent by the convicted person in **insurance** and pre-trial detention prior to the execution of this sentence shall be deducted in full **from the execution** of the unconditional part of the sentence imposed on him, to the extent that that time has not already been deducted from another sentence;	Terminology Syntactic

[6] In this overview, (c) represents an error which results in a coherent sentence

een andere straf in mindering is gebracht;		
bepaalt dat een gedeelte van die straf, groot 2 (twee) maanden, niet zal worden tenuitvoergelegd onder de algemene voorwaarde dat de veroordeelde:	provides that part of that sentence, **much more** than 2 (two) months, will not be enforced under the general condition that the sentenced person:	Lexical (c)
- zich voor het einde van de hierbij op twee jaren vastgestelde proeftijd niet schuldig maakt aan een strafbaar feit;	- **is not guilty** of any offence before the end of the probationary period of two years laid down herein;	Terminological (c)
legt voorts aan de verdachte op:	also imposes on the accused:	
de maatregel dat de veroordeelde zich voor de duur van 5 (vijf) jaren niet zal ophouden in de directe nabijheid van de Loosdrechtsestraat 48, 2574 PN te Den Haag en in de directe nabijheid van de Regentesselaan 173, 2562 CX te Den Haag;	the measure that the sentenced person will not **be** in the immediate vicinity of Loosdrechtsestraat 48, 2574 PN in The Hague and in the immediate vicinity of Regentesselaan 173, 2562 CX in The Hague for a period of five (five) years;	Lexical (c)
beveelt dat vervangende hechtende hechtenis zal worden toegepast voor de duur van 2 (twee) weken voor iedere keer dat niet aan de maatregel wordt voldaan;	orders that substitute **bonded custody** will be applied for the duration of 2 (two) weeks for each time the measure is not complied with;	Terminological
toepassing van de vervangende hechtenis heft de verplichtingen ingevolge de opgelegde maatregel niet op;	the application of **alternative custody** does not lift the obligations arising from the measure imposed;	Terminological
omdat er ernstig rekening mee moet worden gehouden dat de veroordeelde opnieuw een strafbaar feit zal plegen of zich belastend zal gedragen jegens een bepaalde persoon, beveelt de rechtbank, gelet op artikel 38v, vierde lid, van het Wetboek van Strafrecht, dat de opgelegde	because **serious account** must be taken of the fact that the sentenced person **will** again commit an offence or behave **incriminatingly** towards a certain person, the court, in view of article 38v, fourth paragraph, of the Penal Code, orders that the imposed	Lexical Grammatical (c) Terminological

maatregel dadelijk uitvoerbaar is;	measure is immediately enforceable;	
legt tevens op aan de verdachte:	also imposes on the accused:	
de maatregel dat de veroordeelde voor de duur van 5 (vijf) jaren op geen enkele wijze – direct of indirect – contact zal opnemen, zoeken of hebben met [slachtoffer]	the measure that the convicted person shall not - directly or indirectly - contact, seek or have contact with [victim] in any way for a period of 5 (five) years	
geboren op 24 september 1984;	**born on September 24, 1984;**	Syntactical
beveelt dat vervangende hechtende hechtenis zal worden toegepast voor de duur van 2 (twee) weken voor iedere keer dat niet aan de maatregel wordt voldaan;	recommends that substitute **bonded custody** be applied for a period of 2 (two) weeks each time the measure is not complied with;	Terminological
toepassing van de vervangende hechtenis heft de verplichtingen ingevolge de opgelegde maatregel niet op;	the application of **alternative custody** does not lift the obligations arising from the measure imposed;	Terminological
omdat er ernstig rekening mee moet worden gehouden dat de veroordeelde opnieuw een strafbaar feit zal plegen of zich belastend zal gedragen jegens een bepaalde persoon, beveelt de rechtbank, gelet op artikel 38v, vierde lid, van het Wetboek van Strafrecht, dat de opgelegde maatregel dadelijk uitvoerbaar is;	because **serious account** must be taken of the fact that the convicted person **will** again commit a criminal offence or behave **incriminatingly** towards a certain person, the court, having regard to article 38v, fourth paragraph, of the Penal Code, orders that the imposed measure is immediately enforceable;	Lexical Grammatical (c) Terminological
wijst het verzoek om onmiddellijke opheffing van de voorlopige hechtenis af;	rejects the request for immediate release from pre-trial detention;	
opheffing van het tegen verdachte verleende bevel tot voorlopige hechtenis met ingang van het tijdstip waarop de duur daarvan gelijk wordt aan de duur van het onvoorwaardelijke	revocation of the pre-trial detention order **granted against** the accused with effect from the time when its duration becomes equal to the duration of the unconditional part of the custodial sentence imposed;	Lexical Lexical

gedeelte van de opgelegde vrijheidsstraf;		
wijst de vordering tot schadevergoeding van de benadeelde partij gedeeltelijk toe en veroordeelt de verdachte om tegen behoorlijk bewijs van kwijting te betalen aan [slachtoffer] een bedrag van € 750,-, vermeerderd met de wettelijke rente daarover vanaf	partially upholds the injured party's claim for **compensation** and sentences the accused to pay to [victim], **against** proper evidence of discharge, the sum of € 750, plus statutory interest thereon as from	Terminological (c) Lexical
9 november 2019 tot aan de dag van de algehele voldoening;	9 November 2019 until the day of full payment;	
bepaalt dat de benadeelde partij ten aanzien van de gevorderde materiële schade niet-ontvankelijk is in de vordering tot schadevergoeding;	provides that the injured party **shall be inadmissible** in the claim for compensation in respect of the material damage claimed;	Grammatical (c) Syntactic
wijst het overige deel van de vordering af;	rejects the remainder of the claim;	
veroordeelt de verdachte tevens in de proceskosten door de benadeelde partij gemaakt, tot op heden begroot op € 125,29, en ten behoeve van de tenuitvoerlegging nog te maken;	also orders the defendant to pay the costs of the proceedings incurred by the injured party, to date estimated at € 125.29, and to be incurred **for the purpose of enforcement;**	Lexical
legt aan de verdachte op de verplichting tot betaling aan de Staat van een bedrag groot € 750,-, vermeerderd met de wettelijke rente daarover vanaf 9 november 2019 tot aan de dag van de algehele voldoening;	imposes on the accused the obligation to pay to the State an amount **large** €750, plus statutory interest thereon from 9 November 2019 until the date of full payment;	Lexical
bepaalt dat in geval volledige betaling noch volledig verhaal van het verschuldigde bedrag volgt - onder handhaving van voormelde verplichting - gijzeling zal worden toegepast voor de duur van 15 dagen. De	provides that in the event that neither full payment nor full recovery of the amount due follows - while maintaining the aforementioned obligation - **hostage-taking** will be applied for a period of 15 days. The	Terminological (c) Terminological (c) Lexical

toepassing van de gijzeling heft de hiervoor opgelegde betalingsverplichting niet op;	application of the **hostage-taking** does not cancel the payment obligation imposed for **this purpose**;	
bepaalt dat gehele of gedeeltelijke voldoening van de betalingsverplichting aan de benadeelde partij de betalingsverplichting aan de Staat in zoverre doet vervallen, alsmede dat gehele of gedeeltelijke voldoening van de betalingsverplichting aan de Staat de betalingsverplichting aan de benadeelde partij in zoverre doet vervallen.	provides that full or partial **satisfaction** of the payment obligation to the injured party cancels the payment obligation to the State to that extent, and that full or partial **satisfaction** of the payment obligation to the State cancels the payment obligation to the injured party to that extent.	Lexical Lexical

Appendix II: Parallel overview of Text 2

Dutch source text	English target text (DeepL)	Error categories[7]
Artikel 1	Article 1	
1. Erfopvolging heeft plaats bij versterf of krachtens uiterste wilsbeschikking.	1. Succession shall take place **on death** or by virtue of a **disposition of property upon death.**	Terminological (c) Terminological
2. Van de erfopvolging bij versterf kan worden afgeweken bij een uiterste wilsbeschikking die een erfstelling of een onterving inhoudt.	2. The succession in the case of death may be **waived in the case of a** disposition of property upon death **involving** an **inheritance** or disinheritance.	Lexical (c) Lexical Lexical Terminological (c)
Artikel 2	Article 2	
1. Wanneer de volgorde waarin twee of meer personen zijn overleden niet kan worden bepaald, worden die personen geacht gelijktijdig te zijn overleden en valt aan de ene persoon geen voordeel uit de nalatenschap van de andere ten deel.	1. Where the order in which two or more persons died cannot be determined, those persons shall be deemed to have died simultaneously and no benefit shall accrue to one person from the estate of the other.	
2. Indien een belanghebbende ten gevolge van omstandigheden die hem niet kunnen worden toegerekend, moeilijkheden ondervindt bij het bewijs van de volgorde van overlijden, kan de rechter hem een of meermalen uitstel verlenen, zulks voor zover redelijkerwijs mag worden aangenomen dat het bewijs binnen de termijn van het uitstel kan worden geleverd.	2. Where, owing to circumstances beyond his control, an interested party encounters difficulties in proving the order of death, the court may grant him one or more postponements, provided that it is reasonable to assume that the evidence can be produced within the period of the postponement.	
Artikel 3	Article 3	
1. Van rechtswege zijn onwaardig om uit een nalatenschap voordeel te trekken:	1. Unworthy by operation of law **to take advantage of** an inheritance:	Lexical (c)

[7] In this overview, (c) represents an error which results in a coherent sentence

a. hij die onherroepelijk veroordeeld is ter zake dat hij de overledene heeft omgebracht, heeft getracht hem om te brengen, dat feit heeft voorbereid of daaraan heeft deelgenomen;	a. he who has been irrevocably convicted of having **murdered** the deceased, of having attempted to kill him, of having prepared or participated in the preparation of that fact;	Terminological (c)
b. hij die onherroepelijk veroordeeld is wegens een opzettelijk tegen de erflater gepleegd misdrijf waarop naar de Nederlandse wettelijke omschrijving een vrijheidsstraf is gesteld met een maximum van ten minste vier jaren, dan wel wegens poging tot, voorbereiding van, of deelneming aan een dergelijk misdrijf;	b. he who has been irrevocably convicted of a deliberate crime committed against the deceased **and** for which a custodial sentence **has been imposed** according to the Dutch legal definition with a maximum of at least four years, or for attempting, preparing for, or participating in such a crime;	Syntactic Lexical (c)
c. hij van wie bij onherroepelijke rechterlijke uitspraak is vastgesteld dat hij tegen de erflater lasterlijk een beschuldiging van een misdrijf heeft ingebracht, waarop naar de Nederlandse wettelijke omschrijving een vrijheidsstraf met een maximum van ten minste vier jaren is gesteld;	c. he has been found by a final judicial decision to have defamed the **testator of** an accusation of a crime**,** which according to the Dutch legal definition is punishable by a custodial sentence with a maximum of at least four years;	Terminological (c) Syntactic
d. hij die de overledene door een feitelijkheid of door bedreiging met een feitelijkheid heeft gedwongen of belet een uiterste wilsbeschikking te maken;	d. he who forced or prevented the deceased from making a **disposition of property upon death** by **reason** of an offence or by threat of an offence;	Terminological Lexical
e. hij die de uiterste wil van de overledene heeft verduisterd, vernietigd of vervalst.	e. the person who embezzled, destroyed or falsified the **will** of the deceased.	Lexical (c)
2. Rechten door derden te goeder trouw verkregen voordat de onwaardigheid is vastgesteld worden geëerbiedigd.	2. Rights acquired by third parties in good faith before the unworthiness has been established shall be respected.	
In geval echter de goederen om niet zijn verkregen, kan de rechter aan de rechthebbenden, en	However, if the **goods** have been acquired **free of charge**, the court may grant the	Terminological (c) Terminological (c)

ten laste van hem die daardoor voordeel heeft genoten, een naar billijkheid te bepalen vergoeding toekennen.	rightful claimants, and at the expense of the beneficiary, compensation to be determined on an equitable basis.	
3. Een onwaardigheid vervalt, wanneer de erflater aan de onwaardige op ondubbelzinnige wijze zijn gedraging heeft vergeven.	3. Unworthiness shall be extinguished when the **testator** has unequivocally **forgave** the unworthy person for his conduct.	Terminological (c) Grammatical
Artikel 4	Article 4	
1. Een voor het openvallen van een nalatenschap verrichte rechtshandeling is nietig, voor zover zij de strekking heeft een persoon te belemmeren in zijn vrijheid om bevoegdheden uit te oefenen, welke hem krachtens dit Boek met betrekking tot die nalatenschap toekomen.	1. An **act** done before the **opening** of an estate shall be null and void in so far as it is intended to impede a person's freedom to exercise powers which are vested in him under this Book in respect of that estate.	Terminological (c) Terminological
2. Overeenkomsten strekkende tot beschikking over nog niet opengevallen nalatenschappen in hun geheel of over een evenredig deel daarvan, zijn nietig.	2. Agreements **to dispose** of all or a proportional part of **outstanding inheritances** shall be null and void.	Lexical (c) Lexical Terminological
Artikel 5	Article 5	
1. Op verzoek van de schuldenaar kan de rechtbank wegens gewichtige redenen bepalen dat een geldsom die krachtens dit Boek of, in verband met de verdeling van de nalatenschap, krachtens titel 7 van Boek 3 is verschuldigd, al dan niet vermeerderd met een in de beschikking te bepalen rente, eerst na verloop van zekere tijd, hetzij ineens, hetzij in termijnen behoeft te worden voldaan.	1. At the request of the debtor, the court may, for **important** reasons, stipulate that a sum of money owed by virtue of this Book or, in connection with the division of the estate, by virtue of Title 7 of Book 3, whether or not increased by interest to be determined in the order, need not be paid in a lump sum or in instalments until a certain period of time has elapsed.	Lexical (c)
Hierbij let de rechtbank op de belangen van beide partijen; aan een inwilliging kan de	In doing so, the Court will take into account the interests of both parties; a **grant** may	Lexical (c) Terminological Lexical

voorwaarde worden verbonden dat binnen een bepaalde tijd een door de rechtbank goedgekeurde zakelijke of persoonlijke zekerheid voor de voldoening van hoofdsom en rente wordt gesteld.	be subject to the condition that within a certain period of time a **collateral or personal security** approved by the Court is provided for the payment of **principal** and interest.	
2. Een in het vorige lid bedoelde beschikking kan op verzoek van een der partijen, gegrond op ten tijde van die beschikking niet voorziene omstandigheden, door de in het vorige lid genoemde rechtbank worden gewijzigd.	2. An order referred to in the preceding paragraph may, at the request of one of the parties, be amended by the Court referred to in the preceding paragraph, based on circumstances unforeseen at the time of such order.	
Artikel 6	Article 6	
In dit Boek wordt onder de waarde van de goederen der nalatenschap verstaan de waarde van die goederen op het tijdstip onmiddellijk na het overlijden van de erflater, waarbij geen rekening wordt gehouden met het vruchtgebruik dat daarop krachtens afdeling 1 of 2 van titel 3 kan komen te rusten.	For the purposes of this Book, the value of the assets of the estate shall be the value of those assets at the time immediately following the death of the deceased, not taking into account any usufruct which may arise thereon pursuant to Sections 1 or 2 of Title 3.	
Artikel 7	Article 7	
1. Schulden van de nalatenschap zijn:	1. **Amounts owed by** the estate:	Terminological (c)
a. de schulden van de erflater die niet met zijn dood tenietgaan, voor zover niet begrepen in onderdeel i;	a. **the debts** of the **testator** which are not extinguished with his death, as far as not included in section i;	Terminological (c) Terminological (c)
b. de kosten van lijkbezorging, voor zover zij in overeenstemming zijn met de omstandigheden van de overledene;	b. the costs of funeral services, insofar as they are in accordance with the circumstances of the deceased;	
c. de kosten van vereffening van de nalatenschap, met inbegrip van het loon van de vereffenaar;	c. the costs of **settling** the estate, including the liquidator's wages;	Terminological

d. de kosten van executele, met inbegrip van het loon van de executeur; e. de schulden uit belastingen die ter zake van het openvallen der nalatenschap worden geheven, voor zover zij op de erfgenamen komen te rusten;	d. the costs of **execution**, including the executor's wages; e. the debts from taxes levied in connection with the **opening of the** estate, to the extent that they are to be borne by the heirs;	Lexical (c) Termiological
f. de schulden die ontstaan door toepassing van afdeling 2 van titel 3;	f. **debts** resulting from the application of Section 2 of Title 3;	Terminological (c)
g. de schulden ter zake van legitieme porties waarop krachtens artikel 80 aanspraak wordt gemaakt;	g. debts relating to legitimate portions claimed pursuant to section 80;	
h. de schulden uit legaten welke op een of meer erfgenamen rusten;	h. debts arising from **legacies** which rest on one or more heirs;	Terminological (c)
i. de schulden uit giften en andere handelingen die ingevolge artikel 126 worden aangemerkt als legaten.	i. debts arising from gifts and other acts regarded as **legacies** pursuant to Article 126.	Terminological (c)
2. Bij de voldoening van de schulden ten laste van de nalatenschap worden achtereenvolgens met voorrang voldaan:	2. The **debts** to the debit of the estate shall be paid successively with priority:	Terminology (c)
1°. de schulden, bedoeld in lid 1 onder a tot en met e;	1°. the **debts** referred to in paragraph 1 under a up to and including e;	Terminology (c)
2°. de schulden, bedoeld in lid 1 onder f;	2°. the **debts** referred to in paragraph 1 under f;	Terminology (c)
3°. de schulden, bedoeld in lid 1 onder g.	3°. the debts referred to in paragraph 1 under g.	
Ontbreken schulden als bedoeld in lid 1 onder f, dan worden eerst de schulden, bedoeld in lid 1 onder a tot en met c, en vervolgens de schulden, bedoeld	In the absence of the debts referred to in paragraph 1 subparagraph f, the debts referred to in paragraph 1 subparagraphs a up to and including c shall first be paid,	

in lid 1 onder d, e en g, met voorrang voldaan.	and then the debts referred to in paragraph 1 subparagraphs d, e, and g shall be paid with priority.	
3. In de nalatenschap van de langstlevende ouder, bedoeld in artikel 20, en de stiefouder, bedoeld in artikel 22, wordt een verplichting tot overdracht van goederen als bedoeld in die artikelen met een schuld als bedoeld in lid 1 onder a gelijkgesteld.	3. In the **succession** of the surviving parent referred to in Article 20 and the step-parent referred to in Article 22, an obligation to transfer property referred to in those Articles shall be treated as a debt referred to in paragraph 1(a).	Terminological
Artikel 8	Article 8	
1. In dit Boek worden met echtgenoten gelijkgesteld geregistreerde partners.	1. In this Book, registered partners are equated with spouses.	
2. Voor de toepassing van lid 1 is mede begrepen onder:	2. For the purposes of paragraph 1 **[omission]**:	Lexical
a. huwelijk: geregistreerd partnerschap;	a. marriage: registered partnership;	
b. gehuwd: als partner geregistreerd;	b. married: registered as a partner;	
c. huwelijksgemeenschap: gemeenschap van een geregistreerd partnerschap;	c. matrimonial community of property: community of a registered partnership;	
d. trouwbeloften: beloften tot het aangaan van een geregistreerd partnerschap;	d. marriage promises: promises to enter into a registered partnership;	
e. echtscheiding: beëindiging van een geregistreerd partnerschap op de wijze als bedoeld in artikel 80c onder c of d van Boek 1.	e. divorce: termination of a registered partnership in the manner referred to in Section 80c(c) or (d) of Book 1.	
3. Onder stiefkind van de erflater wordt in dit Boek verstaan een kind van de echtgenoot of geregistreerde partner van de erflater, van welk kind de erflater niet zelf ouder is.	3. In this Book, the stepchild of the **testator** is understood to mean a child of the **testator**'s spouse or registered partner, of whom the **testator** is not himself a parent.	Terminological (c) Terminological (c) Terminological (c)

Zodanig kind blijft stiefkind, indien het huwelijk of het geregistreerd partnerschap is geëindigd.	Such a child remains a stepchild if the marriage or registered partnership has ended.	