

Machine Translation of Various Text Genres¹

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Machine translation (MT) has been both praised and criticized since the 1930's when it was first introduced. Today, MT – much improved since then, is a vital tool for the human translator, although not without its problems. One important unresolved issue is the success of MT for different text types. In the present study, we compare the performance of German-English machine translation in four different text genres which vary in their structures, using Systran Systems. Systran Company, one of the oldest and most reputable MT producers (dating back to 1968), has been involved with top governmental agencies, such as the US National Air Intelligence Center and the US Air Force's Foreign Technology Division. The texts are analyzed with respect to two types of linguistic errors; errors which impede correct transfer of meaning (such as mistranslation of idioms) and errors which merely affect the flow and readability of the texts (e.g., mistranslation of prepositions). Our results show that MT is still limited in its ability to process certain text types, namely those with complex sentence structures, high amounts of pragmatic information and broad semantic domains. In addition, MT tends to produce a number of linguistic errors, most notably the mistranslation of polysemous items. In the final part of the paper, we identify the most frequent linguistic errors and the text genres MT is best suited for. The theoretical implications of the methodology proposed and the hypotheses investigated constitute the core of the contribution made by this paper.

Key words: German-English translation, machine translation, text genres, translation, Systran Systems.

1. Introduction and aims

What can be said about machine translation (MT) at the present time? “The resulting literary style [from machine translation] would be atrocious and fuller of ‘howlers’ and false values than the worst that any human translator produces” said J.E. Holmström in his famous report for Unesco (1951). However, the idea that machines could be employed in some form of translation survives today and has arguably done so for the last 60 years since its birth in the mid 1930s, which incidentally predates that of the computer (Hutchins, unpublished, p. 1).

This study contributes to the field of MT by taking the novel approach of comparing various text genres with respect to different linguistic errors found when these are translated using machines. Will different text types have different error types or different proportions of the same error? Are there particular texts that machine translation handles better than others? Should we expect to receive “better” machine translations when translating technical texts – whose (semantic) domains are more restrained – than a text such as a short story extract?

The core strength of this paper lies with its methodological considerations and with the hypotheses put forward throughout the research. The complete validation of the results presented in the latter part of the work necessitates the support of other similar studies (which employ this methodology) on a much larger scale, with longer texts, possibly a larger number of languages and better quality translation software.

Our goal is not that of directly comparing the quality of human translation versus machine translation, but rather that of obtaining a compilation of frequent linguistic errors which occur in MT. This is of critical importance for future improvements to MT systems and also as a comprehensive guide for optimal usage of this translation tool.

In order to achieve these goals and answer the questions above, we compare different text genres with respect to sentence structure, amount of pragmatic information contained and semantic scopes. Section 3.1 explains the text genres in more detail and the basis on which they were chosen.

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We then identify the kinds of linguistic errors that one might expect in the raw output obtained from fully automated machine translation (FAMT) and classify them in two groups: vital errors which impede the accurate translation of meaning and errors which merely slow the flow and readability of the text, without actually changing or breaking down the intended meaning. The specific kinds of errors discussed in this paper will be outlined in section 3.3.

The translation of four texts from German into English was done using the SYSTRAN engine currently available on the internet. The types of texts are: technical set of instructions, newspaper extract, popular non-fiction piece and a short story extract.

2. Background, history and attitudes

The mid 30s saw the birth of a revolutionary idea, supported by the French-Armenian Georges Artsrouni and the Russian Petr Troyanskii: machines used as translation tools (Hutchins, unpublished, p. 1). The latter not only envisioned an “automated bilingual dictionary” (ibid), but also a “scheme for coding interlingual grammatical roles” (ibid). To imagine that all this happened before the invention of the first computer is almost unthinkable.

In spite of all this, the first impact of these ideas became a reality in 1946 when the mathematician Warren Weaver developed them further (Hedden, 2000 – unpublished, p. 2). Today, we find various kinds of machine translations: machine-assisted human translation (MAHT), computer-assisted translation (CAT), human-assisted machine translation (HAMT) and fully automatic machine translation (FAMT). They all have different uses. Some are used exclusively as aids to human translators, while others are a quick way of obtaining a translation (admittedly of lower quality) at ‘the touch of a button’ (Hedden, 2000 – unpublished, p. 1-2). It is the latter kind of machine translation – FAMT – that we are concerned with in this paper.

Attitudes towards machine translation have developed in both directions: positive and negative. It is of vital importance that reasons for the two sides are presented and that MT is understood in the context of what it is designed for rather than as a mere competitor of human translators.

2.1 Negative points of view

The report that ALPAC (Automatic Language Processing Advisory Committee) produced in 1966 came close to killing MT altogether. It claimed that “there is no immediate or predictable prospect of useful machine translation” (Hutchins, unpublished, p. 1). In 1975, Chomsky himself wrote “as for machine translation and related enterprises, they seemed to me pointless as well as probably quite hopeless” (Chomsky, 1975, p. 40 in Gross, 1992, p. 109).

And who can ever forget the most classic examples of machine translation blunders? One machine translated the Russian proverb “the mind is willing, but the flesh is weak” as “the vodka is good, but the meat is rotten” (Hedden, 2000 – unpublished, p. 10). Another thought that “out of sight, out of might” referred to an “invisible idiot” or that “water goats” are in fact “hydraulic rams” (Newton, 1992, p. 10). Finally, the headline “Company posts sizeable growth” turned into “Guests mail large tumour” (Gross, 1992, p. 115).

Gross (1992, p. 109-110) explains that there are two main problems with machines and natural languages. The first is related to context and cultural issues. Computers are not able (currently?) to perceive the contextual and pragmatic information that humans can. Similarly, they are not aware of cultural differences which often surface in linguistic exchanges. Arnold *et al* (1994, p. 108) also support this point.

The second is to do with the function of language. Conveying meaning is just one use of human language, but in addition there are several others such as: humour, establishing solidarity, sharing emotions and feelings without needing to convey any actual information, etc. Plays, poetry, advertising, newspaper articles and songs lyrics are difficult to translate even for humans, hence for the reasons mentioned above, computers cannot provide quality translations for any of these pieces, according to Gross (1992, p. 111).

Ambiguity, idioms, collocations and structural and lexical differences between the source language (SL) and the target language (TL) are also valid concerns in MT (Arnold *et al*, 1994, p. 105). These problems are discussed in more detail in section 3.3.

2.2 Positive points of view

Among the multitude of complaints MT still receives some well-deserved praise. As Crystal (1987, p. 350) puts it “the pendulum has begun to swing back again in recent years, following the major intellectual and technological developments of the 1970s in linguistics and computing”.

“A computer’s inability to acquire, comprehend and rationally apply real-world knowledge in this way does not render MT useless as a production tool” says Newton (1992, p. 4). Even though it cannot be used “indiscriminately” (Newton, 1994, p. 7), according to Newton, MT can be of benefit because machines are consistent in interpretation and terminology, do not skip paragraphs or pages and do not make some of the wrong assumptions that even experienced human translators might make.

Gross (1992, p. 109-101) agrees with Newton and adds that machines are faster, more cost effective and more accurate than their human counterparts. He argues that given a particular subject domain, computers are competitive if limited to that domain in the same way that human translators specialised in a particular translating domain can be made efficient. He also warns that the apprehensiveness towards MT may be a side effect of people’s general fear of machines and technology, rather than a valid criticism to the actual field itself (1992, p. 116).

The question that arises is the following: if MT is seen as being successful at all, then what proof is there? The only proof that can be brought comes from current projects where MT is used. The English-Spanish translating system used by the Pan American Health Organization (PAHO) is indeed one such example. It is a machine translation engine, built especially to deal with medical data. This system is the primary mode of translation employed by the company (Vasconcellos and Bostad 1992, p. 64). PAHO undertook a study in order to evaluate the quality of MT versus human translations which showed MT to be more effective (Vasconcellos and Bostad, 1992, p. 67).

Another system which uses MT tools is the Air Force’s Foreign Technology Division (FTD) in America. A partially edited text which was translated from Russian into English was assessed by independent sources. Their conclusions about the comparison between the machine translated parts vis-à-vis the human translations were the following: “While the [human] translation read somewhat more smoothly, it seemed to use inappropriate or erroneous terminology more often than the [machine] translation did. Consequently, we relied primarily on the [machine] translation, using the [human] translation mainly for reference.” (Vasconcellos and Bostad, 1992, p. 76).

According to Somers (1992, p. 194), by far the most success enjoyed by MT is related to its use in the French weather predictions translations. “... the METEO system, which translates daily more than 30,000 words of weather bulletins from English into French at a cost of less than 0.5¢ (Canadian) per word, with an accuracy rate of 95 per cent” performs a “boring” job which could have difficulties finding human translators willing to do it, explains Somers (1992, p. 194).

A further application of MT is also that of web-searches and translation of web pages. As the internet is flooded with new users from various backgrounds and cultures, linguistic demands are also increasing and languages become barriers to communication. As a consequence, many search engines (Google, AltaVista, Yahoo and others) provide machine translation services to improve (if not eliminate) this problem.

2.3 Direction of study

A completely different point of view is taken by those who deny any competition between human and machines in the field of translation. This is not the purpose of MT, they claim. Hutchins says that “there is no doubt that computer-based translation systems are not rivals to human translators, but they are aids to enable them to increase productivity in technical translation or they provide means of translating material which no human translator has ever attempted” (Hutchins, 2001, p. 5).

One innovative aspect of this research comes from my approach to the problem of MT, described in what follows. In extension to Hutchins’s view, we propose that once established as a tool, MT should be assessed and improved just like any other instrument (such as an automated airplane pilot or an automatic car). In accordance with this vision, our research attempts to make suggestions about possible and needed improvements for MT, from a linguistic point of view, as well as to comment on the types of text genres that MT is best suited for. The artificial intelligence part and computer programming areas are left to the experts. Here we only discuss linguistic concerns.

3 Methodology

Several factors related to the design of this study will be addressed in this section. The following three sub-sections are dedicated to explaining how the texts were chosen, what translation tools have been used and what types of linguistic errors are expected in the final product of the machine translation.

3.1 Sample of texts

The number of different text genres analysed was limited to four. They ranged from the most pragmatic to the least context bound. On the one hand, we wanted to choose a kind of text that will have little pragmatic information, relatively concise and even short (where possible) sentences and a narrow semantic scope. This is why we chose a set of technical instructions. Naturally, at the other end of the scale, it was desired to have a highly pragmatic, stylistically and semantically rich, elaborate text, i.e., an extract from a classic short story.

Between the two extremes, a newspaper article was also chosen, since newspapers thrive on context-bound information (it is presumed that the readers already know of previous developments of events around the world). However, newspapers use a lot of short, effective sentences. The last item chosen was a piece from a popular women's magazine. This is a more neutral kind of text, as far as our criteria is concerned. Pragmatic information creeps in occasionally, but is not always there. Sentences are neither elaborate, nor short. They are usually a good mix of both.

Table 1 summarizes the desired properties of the chosen texts.

Text genres	Sentence types	Amount of pragmatic information	Semantic domain/scope
Technical set of instructions	Short	Little	Very limited
Popular magazine extract	Combination of long and short	Neutral	Neutral
Newspaper article extract	Many short and effective	Lots	Very broad
Short story extract	Long, elaborate	In abundance	Very broad

Table 1. Text genres

The length of the texts translated was limited to circa 200 words. As we wanted all the texts to finish at the end of a sentence, some texts may go over the 200 words boundary. The limit was decided upon for the following reasons:

- First, it was desired to have a decent length which would give us a good range of linguistic errors, or at least the most frequent ones.
- Secondly, as the aim of the paper is not that of comparison between different styles of translations, but instead it is one of investigating the optimal contexts for MT use and the most urgently needed improvements to this method of translation; we are not interested in obtaining an evaluation measure for MT. Hence, there is no need to perform statistical analyses on the texts and the word size can be limited to a manageable one, as long as the previous condition is satisfied.

3.2 Translating tools

As discussed in section 1, the texts were translated from German into English. The machine translation engine used is SYSTRAN systems. According to Crystal, "One of the best-known MT systems, SYTRAN, was developed in the US with particular reference to Russian-English translation – for example it was used to translate Russian into English during the Apollo-Soyuz space project." (1987, p. 350). Since then, SYTRAN was extended to other languages, German being one of them. The engine used is part of a free service and can be found at the following internet address: <http://www.systranet.com/systran/net>. This service is a well established, reputable MT engine, which a private consumer could use if in need of a quick translation at no cost.

The texts were submitted in a simple text format and the translation was instantaneous. The translations obtained were discussed with a human translator with native knowledge of the German language.

3.3 Sample of errors

The linguistic errors under investigation in this study were chosen in accordance with the typologies suggested by Catford (1965) and Arnold *et. al* (1994).

Both pieces discuss the issue of ambiguity. This type of problem may show itself in various forms. We concentrate here on two of them, namely lexical gaps and polysemy. We continue to use the terminology proposed by Arnold *et. al* i.e., lexical gaps. However, We will differentiate between *gaps with superfluous words*, where a word in SL (German) does not require a word in TL (English), but is nevertheless wrongly included by the machine translation, and *gaps which require an entire phrase, not just a word*, where a word in SL requires an entire phrase in TL, but the machine fails to fulfil this.

Similarly, we also distinguish between two types of polysemous items (words in SL which have two or more meanings in TL). In the first category are those words which have not been translated by the appropriate variant, but in spite of this, the overall meaning is preserved from contextual information. This type of error will be referred to as *polysemy with preserved meaning*. The second category contains those words whose meaning have been mistranslated and consequently, the general meaning is thereby completely lost. These will be included in the category of *polysemy with loss of meaning*.

Arnold *et. al* (1994) also mention the problems of idioms and collocations in MT. We will follow this terminology and use the term idiom to refer to specific phrases whose meaning cannot be guessed from that of the individual words representing them. In contrast, collocations are understood to be units whose meaning can be guessed from the individual parts, but “what is not predictable is the particular words that are used” (Arnold *et. al*, 1994, p. 119).

The other linguistic problems investigated are: complete loss of translation (words are left in the SL with no attempt of translation) and structural differences between the two languages (breaching of syntactic and word order rules).

After performing the translations, it was observed that there appeared to be a specific linguistic error which was not mentioned elsewhere in the literature, namely the mistranslation of prepositions. This problem appeared consistently across all text genres and hence it was decided to include it in the analysis as a separate category. Further discussion of it will be given in section 5.2.

Table 2 summarizes the linguistic problems discussed in decreasing order, from the ones which contribute *most* to the loss of meaning; to the ones that have the least impact on it. The items that appear on the same line are considered to present an equal amount of damage to the conservation of meaning.


<p>Most damaging to meaning conservation</p>  <p>Least damaging to meaning conservation</p>	(1) No translation given	
	(2) Idioms	(2) Polysemy with loss of meaning
	(3) Gaps requiring an entire phrase, not just a word	
	(4) Structural difference between languages	
	(5) Collocations	(5) Polysemy with preserved meaning
	(6) Prepositions	
	(7) Gaps with superfluous words	

Table 2. Sample of linguistic errors

If the exact same word was translated incorrectly, hence appearing as an error, more than once within the same text, then that error was only recorded once in the table constructed for that particular extract.

Two main groups of errors were identified in Table 2: those which impede the accurate translation of meaning, and those which merely impede the flow and readability of the translated texts. Errors classified as types 1, 2 and 3 (in the table) belong in the first group and errors 4, 5, 6, and 7 are in the second. Hence gaps with superfluous words would not be considered to affect the correct transfer of meaning from the source language to the target language, whereas idioms are thought to have a strong effect on it.

4. Results

The results obtained for the three text genres are presented in table 3 on the next page. Each text type is discussed individually in further detail in sections 4.1-4.4.

Linguistic errors	Occurrences (number of words)		
	Technical Set of instructions	Newspaper extract	Popular non-fiction extract
No translation given	3	5	4
Idioms	0	0	1
Polysemy with loss of meaning	0	6	12
Gaps requiring an entire phrase, not just a word	1	3	2
Structural differences between SL and TL	4	6	14
Collocations	0	0	6
Polysemy with preserved meaning	14	13	16
Prepositions	2	4	5
Extraneous words which require a gap	1	1	8
Totals	25	38	68

Table 3. Results obtained for the three text genres²

4.1 Technical set of instructions

The technical set of instructions chosen are instructions for the use of a coffee machine (produced by Bialetti). This text type had the least number of linguistic errors. As shown in Table 3, there were no idioms or collocations and no polysemous words were mistranslated to the point that meaning was actually lost.

By far the most frequent error was that of polysemous words being translated outside the correct context. We give a couple of the most representative examples below:

4.1.1	<u>Translation given</u>	<u>Correct translation desired</u>
	attach	add
	additions	additives
	cooking	boiling

The pairs of words given in 4.1.1 are close to being synonyms and it is the context (i.e., that of preparing coffee) which selects the most appropriate lexical item. In spite of the occasional “wrong” choices made by the machine, the context is also the one that saves the situation by suggesting the intended meaning to the reader.

Prepositions were also a problem. Example 4.1.2 lists the three that were mistranslated.

² The fourth text genre (the short story extract) was so poorly translated that no coherent and meaningful results could be obtained from its translation. This text is discussed in section 4.4.

4.1.2	<u>Translation given</u>	<u>Correct translation desired</u>
	by	through
	whether	that
	upper	top

The structure differences between SL and TL were as following:

- Two German separable verbs (verbs composed of two parts: the main verb and a preposition which appears at the end of the sentence) are treated as if they were prototypical verbs,
- One adverb is placed in the wrong place in the sentence (i.e., word order not respected in TL),
- Four verbs are placed in the wrong place in the sentence (word order not being respected in TL).

The words which were left in their original form, i.e., no attempt was made to translate them into English were: *trichterfoermigen*, *gemahlenem*, *fest*. Something peculiar happened to the last word in the list. It was not only left un-translated, but it was in fact left out altogether from the English translation.

4.2 Newspaper extract

The newspaper piece is an extract from an article taken from Die Zeit which discusses the present political situation in Afghanistan. It is the text with the second best error score, after the technical set of instructions. Here, we also find no problems related to idioms or collocations.

The most frequent error is the same as in the technical set of instructions: polysemy without loss of meaning. However, there is an increased number of polysemy with loss of meaning and we give some examples of this in 4.2.1:

4.2.1	<u>Translation given</u>	<u>Correct translation desired</u>
	like	how
	growing over the masses	disproportionately
	dwelling	rented

Another type of linguistic error which severely affects meaning is that of words in SL requiring a whole phrase in TL, as opposed to a single word. Here are some examples from this text type:

4.2.2	<u>Translation given</u>	<u>Correct translation desired</u>
	7 October	the 7 th October
	warfare	the way the war is conducted

The prepositions mistranslated are given in example 4.2.3 below.

4.2.3	<u>Translation given</u>	<u>Correct translation desired</u>
	of	by
	for	from
	of	in
	where	wherever
	to	on

The structural differences between SL and TL in this piece are:

- One adjective is placed in the wrong place in the sentence (word order not being respected in TL),
- One genitive construction from SL is left out in the TL,
- Verbs (three) are placed in the wrong place in the sentence (word order not being respected in TL),
- One adverb is placed in the wrong place in the sentence (word order not being respected in TL).

The words which were not translated at all were the following: *passanted*, *marktschreiern*, *Menschengewimmel*, *verscharrt*, *Oktober*.

4.3 Popular non-fiction piece

This text is an extract of an article from a German women's magazine, Brigitte, discussing health and fitness tips for busy, career-oriented women. Its translation was worse than all the other texts, excluding the short story extract.

The most frequent error was also polysemy with preserved meaning, just as in all the other pieces translated. The next most common problem was that of structural differences. Below is a list of the types of errors found:

- Eight German separable verbs (verbs composed of two parts: the main verb and a preposition which appears at the end of the sentence) are treated as if they were prototypical verbs,
- One adverb is placed in the wrong place in the sentence (i.e., word order not respected in TL),
- Four verbs are placed inappropriately in the sentence (word order not being respected in TL),
- One adjective is placed in the wrong place in the sentence (word order not being respected in TL).

Similarly, there is a high number of polysemous items with loss of meaning. Some of the most significant examples are shown below:

4.3.1	<u>Translation given</u>	<u>Correct translation desired</u>
	appropriate	corresponding
	assume	notice
	means	advises
	missing	lacking
	peace	rest

This translation contains one idiom and seven collocation problems. It is the only text genre which produced these types of linguistic errors. Example 4.3.2 gives some of these.

4.3.2	<u>Translation given</u>	<u>Correct translation desired</u>
	in the advance	on the way
	who to the peace comes	when you relax
	well	that is good
	in the job	at work
	in it	on

Similar to the other texts, prepositions also create problems in this translation:

4.2.3	<u>Translation given</u>	<u>Correct translation desired</u>
	during	with
	for	of
	on	for
	on	to

The German words which were not translated were: *morst*, *Vitamine*, *Schokoriegel*, *Energiebringer*, *hecheln*.

4.4 Short story extract

The translation of this text – a short story called “Die Flucht”, written by Maria Rilke – was indeed virtually unreadable. There was not one single coherent sentence in the translation. The disappointment started with the title itself: “The flight” instead of “The escape”. The following is a representative sample of what the machine translation looks like:

“By the multicolored *glasfenster* over the main altar fallow the evening jet, broadly and simply, like the old masters the faded colours of the level carpet represent, into the main ship and refurbished it on the *verkuendigung Mariens*.”

There is one remark to be made about this piece, in spite of its lack of intelligibility. The word “color” from the first line is spelled “colour” in the following one. It appears that there are different varieties of English used within the same translated text. This is an easily fixable error and one which raises some doubts about the quality of the translation engine.

Due to the low quality of the translation, there is no point in even counting up the errors made. However, it was counted that nine words were not translated at all and hence appeared in their original German form. These are: *glasfenster, verkuendigung, Mariens, Lettner, blinzelten, zerschliessen, staken, zusperren, schiegt*.

5. Discussion of results

The general findings of the study are presented in this section. First, the results will be discussed with respect to the text genres chosen, and secondly, in reference to the specific linguistic errors analysed.

5.1 The text genres

All translations contained at least one or more of the linguistic errors investigated.

The short story extract was impossible to translate. There was virtually nothing to be gained from using MT to translate it, as there was not one single sentence translated correctly. The technical set of instructions, on the other hand, scored best in terms of linguistic errors made (i.e., had the least number of mistakes). The newspaper extract followed and the popular non-fiction extract came third overall.

The results presented in this study agree with Gross (1992, p. 109-101), who claims that texts with “limited subject domains” can be translated successfully by machines. These findings show that text genres which contain little pragmatic information, clear and short sentences and restricted semantic domains achieve best results in MT. In contrast, those which are heavily dependent on contextual information, have long, elaborate sentences and a broad semantic domain are poorly translated by machines.

A back-translation was performed for the best translated text (the set of technical instructions), whereby the first translation obtained (German → English) was re-translated into the original language (German). The newly obtained translation was almost better than the first one³ (German → English). There were no words left in the SL (this time English) and there were less linguistic errors identified overall (under 10). This finding may not be at all surprising since the vocabulary and constructions in the translated English text were generated from the computer programme itself – hence it might be expected that it would recognize and translate them accordingly. On the other hand, this also shows that the linguistic errors identified in the translated English (German → English) version did not constitute a barrier in the following task of re-translation (English → German). The area of back-machine-translation may prove to be an interesting field of further investigation.

5.2 The linguistic errors

All linguistic errors investigated appeared in at least one or more of the texts analysed. The most frequent error, for all text genres is that of polysemy with preserved meaning. This is not a problem which threatens the accurate transmission of meaning from one language to another. It merely slows the readability and flow of the piece.

Other frequent errors are (in the order of frequency, from the most frequent to the least frequent) structural differences between SL and TL and polysemy with loss of meaning.

Separable verbs contribute uniformly, across text genres, to the category of structural differences between languages. This seems to be a problem which the machine is able to deal with to a certain extent, as there are cases where separable verbs were correctly identified and hence accurately translated. 5.2.1 shows some of these examples.

5.2.1	<u>Translation given</u>	<u>Correct translation desired</u>
	setzen ...ein	insert
	fallen ...auf	are noticeable
	hörten...auf	stopped

Word order problems such as the correct placement of adverbs and adjectives were also present, even if more infrequently. They did not affect meaning as much as the mistranslation of

³ There were however problems regarding the difference in symbols from English and German alphabets (the ‘ä’, ‘ö’, ‘ü’ and ‘ß’ were not identified correctly in my version of Word – Microsoft Office 2000).

separable verbs because all the needed components of the sentence are present, whereas in a separable verb construction, the meaning of the verb “unit” is different than that of the original “single” verb.

The number of words which were not translated at all stayed relatively constant (3 words – 5 words per piece) for each text type. Lexical gaps requiring an entire phrase (not just a word) were also present at a constant rate (1 word – 3 words per piece) in all text genres. These two errors were infrequent and did not pose problems to the preservation of meaning. The most infrequent linguistic errors found were idioms and collocations. They were only present in the popular non-fiction text. This can be explained by the fact that the popular non-fiction text was the only one to contain these types of constructions.

Among those errors which contribute to the loss of meaning, the most frequent error was polysemy with loss of meaning across all text types, with the exception of the set of technical instructions (where it was the error of “no translation given” – words left in the original German form).

The category of prepositions, although not mentioned in the literature, contributed to the list of linguistic errors found. It was present in *all* text genres. This is a problem which poses a lot of difficulty because prepositions are heavily dependent on contextual information. In a sense, one could argue that prepositions belong to the category of collocations because they occur in phrases whose meaning can be guessed from the individual parts representing them, but the process of choosing the parts (i.e., the prepositions) is still a mystery, e.g., in English it is said that a book is written “**by** Jules Verne”, whereas in German the book is “**from** Jules Verne” (*von Jules Verne*). However, due to its high number of occurrences, there is a need for linguistic as well as computational strategies which can eliminate this problem.

There were also potential linguistic problems which the machine translation avoided. For example, negations were translated appropriately and modal verbs and auxiliaries appeared in the correct form and the appropriate place in the translations given.

6. Concluding remarks

The present study analysed machine translated extracts from various text genres, with respect to different linguistic errors. The findings show that machines produce better translations of technical sets of instructions than of other types of texts. Translations of highly contextual pieces containing complex sentences and broad semantic domains, such as short story extracts, are virtually unintelligible. There is little gain from submitting pragmatic and linguistically complex material to a machine and comparing its output to a human translation. This is not the purpose of an MT system (at least not for now).

Some of the types of linguistic errors which need urgent consideration are polysemous items which lead to loss of meaning, structural differences such as inseparable verbs (German), mistranslation of prepositions and last but not least, words which are not translated at all in the target language.

Machines can be valuable tools in translation and they perform better in some text genres than in others. However, there remain particular linguistic problems which need to be solved before progress in this field can be made. Ultimately, it is the kinds of texts which machines are used to translate that determine whether the output is at all useful and meaningful and as with many other computer-related tools (such as the internet) it is up to the user to make the most gains from it. Such gains come from informed use, from being aware of both limitations and strengths of the tool at hand.

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References for the translated texts

- **Technical instructions piece** the Bialetti coffee machine consumer instructions.
- **Newspaper article extract** Die Zeit, collected on March 8th 2002, from <http://www.zeit.de/>
- **Popular non-fiction extract** Brigitte, collected on March 12th 2002, from <http://www.brigitte.de/gesundheit/gesundheit/koerpersignale.html>
- **Short story extract** Rilke, Maria. Die Flucht, collected on March 19th 2002, from http://www.unix-ag.uni-kl.de/~kasperek/Rilke/Die_Flucht.html

References for the translating engine

- Main web page for SYTRAN is at <http://www.systransoft.com/>
- The translating service used can be found at <http://www.systranet.com/systran/net>