

Approaching Machine Translation from Translation Studies – a perspective on commonalities, potentials, differences

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Abstract

The exchange between Translation Studies (TS) and Machine Translation (MT) has been relatively rare. However, given recent developments in both fields like increased importance of post-editing and reintegration of linguistic and translational knowledge into hybrid systems, it seems desirable to intensify the exchange. This paper aims to contribute to bridging the gap between the two fields. I give a brief account of the changing perspective of TS scholars on the field of translation as a whole, including MT, leading to a more open concept of *translation*. I also point out some potential for knowledge transfer from TS to MT, the idea here centring around the adoption of text-centric notions from TS both for the further development of MT systems and the study of post-editing phenomena. The paper concludes by suggesting further steps to be taken in order to facilitate an intensified future exchange.

1 Introduction

Translation Studies (TS) and Machine Translation (MT) share core goals, the most prominent among them being the study and accomplishment of translation between two languages. Still, exchange has been remarkably rare between the two disciplines in the past decades.

Despite possible reasons for misunderstandings and scepticism, some of them being discussed in section 2, this paper intends to show that intensified exchange between the two fields is possible

and even desirable, especially in the light of recent developments. On the one hand, paradigms in MT have been shifting into a direction in which linguistic and translational knowledge is being reintegrated in various ways in hybrid architectures, cf. e.g. (Eisele et al., 2008), by means of adding morphological or word order information, e.g. (Koehn and Hoang, 2007; Collins et al., 2005), adding syntactic information, e.g. (Quirk et al., 2005; Ding and Palmer, 2005), or adapting models to domains, e.g. (Koehn and Schroeder, 2007; Bertoldi and Federico, 2009). On the other hand, TS has seen a rise of empirical, often corpus-based research in various areas, e.g. (Hansen-Schirra et al., 2012; Oakes and Ji, 2012; Rojo and Ibarretxe-Antunano, 2013), which in method and communication style certainly is more accessible to researchers from MT. Last but not least, post-editing – where humans and the machine meet – is of growing importance in the translator's world.

This paper thus addresses some points with regard to fostering exchange between TS and MT. Section 2 gives an account of some emerging views towards a more open concept of the phenomenon called translation. Section 3 makes suggestions how MT could benefit from adopting text-centred notions prominent in TS. Section 4 presents some initial findings from post-editing studies, indicating a case of how post-editing influences the process of translation, thus pointing out the need to further study these two processes in a contrastive manner. Section 5 discusses the observations presented and makes suggestions with respect to potential further directions in the endeavour to bridge the gap between TS and MT. Section 6 then concludes the paper.

Having been written by someone who is aware of some of the developments in MT but usually

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is concerned with more human-centric issues of translation, it is conceivable that in this paper some of the latest and greatest developments in MT have been missed. While inevitably this opinion piece is shaped in many ways by my personal view of MT, the main goal of this contribution is to give an account of a potential common ground of MT and TS as well as to promote further discussion on this topic.

2 Towards a cluster concept of translation

At first sight, the image that one could come up with for MT and TS is that of unequal twins. While being concerned with the same core goals, the approaches to translation taken by the two fields differ. While MT is often associated with a somewhat mechanistic view of language and seems more interested in “how to make things work”, TS emphasises the importance of cultural factors and discusses problems such as (un)translatability or the dichotomy between freedom and loyalty in translation. In short, TS at least is much concerned with the “things that don’t work” as with those that work. Also, MT discourse traditionally shows many characteristics of fields like engineering, e.g. the frequent use of mathematical symbols, while TS communication is more discursive in nature. Last but not least, the entity “at work” in the translation process is a very different one. Following Catford’s (1965, 31) definitions, I see the translation machine as a device operating with co-textually based algorithms, whereas the human translator follows looser, more contextually based rules and norms which can deliberately be bent or ignored.

Present-day mainstream TS theory liberates the human translator from merely being an inter-operator decoding messages in one language and encoding them in another. Translation is seen as an intentional human act with the goal of producing a text in a target language with a specific relation to the target culture. Rozmyslowicz (in press) discusses this conceptualisation as a cause for a theoretical dilemma: By this definition of translation which emphasises the aspects *agentivity* and *intentionality*, MT is in fact discarded as a type of translation, as the criterion of intentionality is something a machine does not match.

Rozmyslowicz aims at helping to overcome the scepticism towards MT that exists amongst

translators, translation scholars, etc., a scepticism which he connects to feelings of uncertainty in a progressively digitalised world. He proposes a view on MT as a tool available to humans; humans, then, would still be the agents in the translation process, as someone has to design and use MT systems. Rozmyslowicz’s view might indeed help solve the dilemma of intentionality and agentivity and tear down some of the walls having been erected over time. After all, nobody would think of declaring lexicography as useless or not of interest to TS, and if dictionaries are merely “tools” available to us in the translation process, then so can be MT.

Ultimately, though, it will be necessary to redefine TS in a way which will not rule out MT as a field of interest to translation scholars. Cronin (2012), for instance, goes so far as to define *translation* as a technology by itself and describes the progressing digitalisation as a mere change in the nature of translation. This does not say much, however, about the different perspectives on and approaches to translation and their relation to each other. More promisingly, Tymoczko (2005) puts forward a view on translation as a *cluster concept*, i.e. an open concept in which the various clusters (e.g. linguistic and cultural translation theory, various national or regional traditions, etc.) are connected by family resemblances. Tymoczko also emphasises that the translation concept will in future inevitably extend further due to the ongoing technological changes. Her view underlines the diversity of approaches to translation, perspectives on it, etc. and, by the very meaning of diversity, does not bear any aspect of dominance¹ of one side over the other.

In this paper, I will adopt the views expressed by Tymoczko. If MT is related to human-centric TS by family resemblances, it is necessary to identify the common ground of MT and TS. In the following, I will discuss areas which may be of value to both, by means of knowledge transfer, exchange, or joint research. Of course, only a fraction of possible topics can be addressed here.

¹As opposed to such concepts like *acceptance* or *tolerance* which I understand to presuppose certain structures of power or dominance, or the struggle for it

3 The translation unit *text* and its implications for Machine Translation

Translators have benefitted from many technical innovations in MT. Translation memories, term databases, and parallel corpora have radically changed the translator's workplace in the past decades; MT proper is set to equally become part of the translation process. This can also work the other way around, as will be argued in the following, with the translation world – or in this case TS – holding things in store that may be valuable to MT. We will look at how TS uses the concept *text* to model translation, and how MT could benefit from adopting notions associated with this concept.

MT has been using notions like domain which, quite obviously, have an effect on lexis, phraseology, and grammar, and of course also on translation. To just pick out one example: Words like *Mutter* should be translated differently depending on the domain a text is rooted in. In general language, *Mutter* will mostly mean 'mother', in engineering it would rather be translated as '(screw-)nut'. Other notions connected to the concept *text* that seem underrepresented in mainstream MT are text type, translation direction, and text status. Before we turn to investigate these notions, a brief overview of one type of translation theory, functional theory, will serve to highlight the relevance of the concept text for translation.

3.1 Text-centric factors in Translation Studies: the examples of text type, translation direction, text status

In functional translation theory (Nord, 1997; House, 1997; Nord, 2006), the notion of text is predominant. The text as a whole is taken to be the main translation unit, and factors like cultural and situational context as well as purpose of the translation are decisive factors in the process. A text can retain or change its function, either by someone's intention (e.g. when toning down a pamphlet and translating it as political program) or because it is differently received in the target culture than in the source culture. The function of the text is marked on various linguistic levels, from orthography (e.g. progressive vs. conservative spelling in German) to text structure; in other words, the translation unit is not a horizontal, but a vertical phenomenon (Nord, 2011). Moreover, translations can be either documentary, highlighting features of the source text, or instrumental, i.e. appearing

and behaving like a target culture text. In terms of functional translation theory, one could characterise MT as a kind of translation which generally aims at being instrumental and functionally constant (i.e. retaining text function).

With text as a key concept for translation, text type is one of the factors that comes into focus. While it is useful to think of translation happening in different domains with all the effects described above, two different text types in the same domain may be of very different nature – even more so in two different languages, thus adding the factor of translation direction to the set of relevant factors. Let us look, for instance, at the business domain. A financial report will be very formal both in English and German. Shareholder letters, however, exhibit various differences in style and grammar: English shareholder letters are of much more colloquial style. Emotive expressions like "We can make it!" remain untranslated in translations from English to German, as they are not deemed appropriate (Čulo et al., 2011). Also English resorts to less formal phrasing than German, regarding e.g. the verb phrase, with English simply using forms of the verb *be* where German uses formulaic expressions such as *betragen* 'amount to' (Čulo, 2010).

Some of the differences in style between English and German shareholder letters can also be quantified in terms of grammar. Part of the CroCo project (Hansen-Schirra et al., 2012) was the study of grammatical properties of originals and translations. The corpus compiled for the study contained a parallel part with texts from 8 registers like computer manuals (INSTR), shareholder letters, or political essays (ESSAY), both with English originals translated to German (E2G) or vice versa (G2E). Each register contains at least ten texts totalling around 30,000 tokens.

One study within this project investigated the shifts of grammatical function that occur in translation. The study was performed on data which were automatically aligned on word level, manually aligned on sentence level, and manually annotated with grammatical functions. All the instances in which two aligned content words (i.e. noun, verb, adjective, or adverb) did not appear in the same grammatical functions in original and translation were counted as indicative of a grammatical shift. Figure 1 shows how the proportion of subject-to-object shifts in relation to all subject

shifts varies depending on translation direction and register.

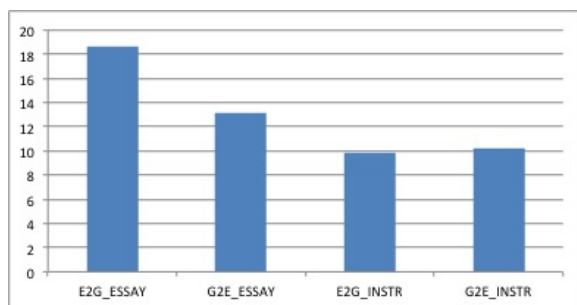


Figure 1: The proportion of subject-to-object shifts in all cases of subject shifts for the registers ESSAY and INSTR and for the two translation directions E2G and G2E

Lexico-grammatical features such as objects in theme position do not only behave differently with respect to translation direction, but also with respect to *text status*. In other words, originals and translations in one language differ in the distribution of these features. For instance, Teich (2003) observes *shining through* of grammatical features: German texts translated from English over-exhibit passive forms when compared to original German texts. Diwersy et al. (in press) analyse a broad range of lexico-grammatical features for English and German originals and translations (amongst others) and make similar observations for features like objects in theme (i.e. sentence initial) position: English translations over-exhibit these, while German translations under-exhibit them when compared to original texts in the same language.

3.2 Existing and potential applications of text-centric concepts

How can such findings as those cited above be of value to MT? That factors like translation direction and text status can be made fruitful for MT purposes has been demonstrated e.g. by Kurokawa et al. (2009). In their experiments, the authors found that they were able to train an equally performant translation model on a fifth of the data size when classifying the training data according to whether they were from originals or translations prior to using them in the training phase, as opposed to training their model on all data available regardless of their status. When considering the findings on the different lexico-grammatical behaviour depending on translation direction and text status, a positive

effect on the performance of a translation model was to be expected. Similarly, an adaptation of MT systems to the patent domain, not only to the lexis, but also to its “various stylistic and formatting peculiarities” (Ceaşu et al., 2011, 25) – conforming to the concept of text type – results in significant gains in the system’s performance.

The study of linguistic features of translated texts has also been applied to MT products, e.g. by Lapshinova-Koltunski (2013). She compares the distribution of features like nominality vs. verbality in various types of translations such as human translations from scratch, translations made with CAT tools, and translations made by statistical MT systems. She finds, for instance, that output from statistical MT systems tends to be more nominal than output produced by using a translation memory system. She also presents a pilot experiment of how this method of comparison can be extended to more complex features such as verb-last vs. verb-second position for passives in German. Such a metric could be used complementary to existing metrics which are sentence-bound and relate to reference translations, such as BLEU (Papineni et al., 2002) or METEOR (Banerjee and Lavie, 2005).

From the viewpoint of TS, Lapshinova-Koltunski’s method constitutes a text-wide (and thus text-centric) metric, examining how machine translations behave with respect to certain features. This metric could be useful for studying in greater depth the performance of MT systems which are already adapted to a certain domain or text type, as in the case of patent MT, or which in general achieve well higher than average results, comparing them not only to translations, but also to original language.

In a second step, the products of post-editing could be analysed using this metric and contrasted with the feature analysis of the preceding MT product, in order to investigate whether and how the post-editing process influences the outcome of the translation process in contrast to a human from-scratch translation. The following section deals with this question from the viewpoint of lexical consistency.

4 The influence of post-editing on the translation process

Post-Editing (O’Brien, 2010), i.e. the task of correcting MT output, is a process in which human translators and the machine meet. As O’Brien

notes, post-editing and revision are similar but different tasks: They differ in such dimensions as the types of errors translators are faced with or the time available. There are studies on the efficiency of post-editing, e.g. with regard to gains in processing time and/or errors typically changed in the post-editing process, e.g. (Groves and Schmidtke, 2009; De Almeida and O'Brien, 2010). The changes observed are typically *local* phenomena, like inserting missing articles or correcting terminology. However, as pointed out above, in terms of functional translation theory, the main unit of translation is the text. The following example, an individual observation from an ongoing pilot study on post-editing, shall highlight that the rendering of textual features may, too, be influenced by the post-editing process.

In a recent pilot study, students and professionals were asked to translate, blind-edit (i.e. edit the MT product without the source text as reference) and post-edit short snippets from newspaper texts. The products from the three processes were contrasted with regard to lexico-grammatical errors as well as with regard to *global* translation strategies like ensuring lexical consistency.

Consistency in translation is ensured by various strategies like determining a terminology to be used, backtracking during translation, or including a drafting phase in the translation workflow. As post-editing already constitutes something like a (first) drafting phase, one would hope that it would aid the goal of reaching consistency in a text. Let us look at the following sentence pair which consists of an original English title of a newspaper article plus its first sentence, one post-edited translation into German, and the gloss of the German translation:

*Killer nurse receives four life sentences.
Hospital nurse C.N. was imprisoned for
life today for the killing of four of his
patients. (source text)*

*Killer-Krankenschwester zu viermal
lebenslanger Haft verurteilt. Der
Krankenpfleger C.N. wurde heute auf
Lebenszeit eingesperrt für die Tötung
von vier seiner Patienten. (post-edited)*

Lit. “Killer female-nurse to four times life-long imprisonment sentenced. The male-nurse C.N. was today for lifetime

imprisoned for the killing of four of-his patients.”

Besides issues of lexical choice and grammar, there is a noteworthy problem with lexical consistency in the post-editing product. The MT system had in both cases translated *nurse* into the German word *Krankenschwester* which indicates a female nurse, though the text refers to a male nurse. The post-editor failed to edit the first occurrence of *nurse* such that it reflects in German that this is a male nurse (*Krankenpfleger* rather than *Krankenschwester*). The second occurrence was edited accordingly, facilitated by the fact that the gender of the nurse is made explicit by the pronoun *his* in the same sentence.

When looking at the distribution of these errors as shown in Table 4, the picture seems quite clear: This specific error only occurs in the post-editing task, in four out of eight cases; it does so for students and professionals alike. The playback of the translation sessions reveals that in the human translation task four of the translators first translated *nurse* as *Krankenschwester* (female nurse) and revised it during the translation of the rest of the text. The remaining four translators read the whole text first or performed a search on the topic in the internet before they started translating. Therefore, they translated *nurse* correctly right from the start. We get very similar results for the blind editing: Four of the editors changed other words/phrases first, before they realised that *Krankenschwester* was not correct, while the other three editors started editing after reading the complete MT output and corrected *Krankenschwester* right away.

Table 1: Number of inconsistent translations for human translation (HT), blind editing (ED), and post-editing (PE)

	HT	ED	PE
(fe)male nurse inconsist.	0 (8)	0 (7)	4 (8)

The point to be made here is thus not that MT “got it wrong”. It is more remarkable that half of the post-editors did not seem to care or manage to correct this striking inconsistency. Similar observations are currently being made with regard to terminological consistency in a follow-up study using not general language texts, but LSP texts such as technical documentation; this data is still being evaluated, though.

At this time, I can only speculate about the reasons. It might be that working with two texts in parallel (the source and the MT output) results in a cognitive load which makes it harder to perform other operations. Another possibility is that the post-editors relied more on the MT output than they would admit or even be aware of. We might even be looking at a combination of these factors; however, this remains mere speculation at this point, as I am not aware of any study which investigates such a phenomenon in depth. In any case, something about the post-editing process seems different enough to lead to such errors. While consistency is an important textual criterion, the text-oriented scrutiny of the data from this study will extend to other textual factors like, for instance, the grammatical marking of text function (e.g. addressee vs. content orientation by means of avoiding resp. using impersonal constructions etc.).

5 Discussion

This paper has approached translation as an open concept which includes MT as an area of interest for translation scholars; a view that has been voiced before and has positively evolved in the past years, as described in section 2.

The goal of this paper is to be another step on the way to more intense exchange and collaboration between TS and MT. The sections 3 and 4 depart from text-centric notions prominent in TS and show how some of the phenomena described and studied by means of these can be of common interest to both disciplines. In section 3, I discuss some examples of how factors like translation direction have already successfully been applied in MT. I then propose to extend one of these approaches to make it a text-centric metric for the distribution of linguistic features in MT products and to subsequently use this metric to study the influence of the post-editing task on the outcome of the translation process in contrast to from-scratch translations.

In section 4, I show that the post-editing task can have an influence on the translation process when seen on a textual level and with respect to the global strategy of ensuring lexical consistency. In consequence, this finding emphasising that the two processes seem to differ enough to deserve being studied further; in fact, we might learn a lot more about both kinds of processes by further contrasting them. With respect to the findings presented in section 4, one might be inclined to criticise that

such inconsistencies in post-editing may occur due to lack of familiarity with the task. But one might as well reply to this that if the task and the problems were understood and taught well, such inconsistencies and other potential problems should be minimised right from the start (cf. e.g. O'Brien, 2002).

On a more general level, I would suggest several steps to be taken in order to continue establishing a common ground for TS and MT:

- identify more common areas of interest
- identify concepts and methods that can be shared
- define, create, or learn a common or at least mutually understandable terminology
- find platforms for exchange, e.g. common workshops, publication platforms etc.

With this paper, I have attempted to contribute to the first two points.

6 Conclusion

Both TS and MT have seen developments in the past years which have paved new ways for potential collaboration. This paper has addressed some commonalities, potentials, and differences for and between the two disciplines from the perspective of TS. I have laid out some possibilities for knowledge transfer and further collaborative research both in corpus-based translation research as well as process-based research on the human translation process and post-editing. At the end, some more general suggestions as to how exchange could be intensified were made. The views stated and suggestions made in this paper are inevitably influenced by the perspective of the author rooted in human-centric translation and are certainly incomplete. In any case, MT scholars are more than welcome to join the discourse.

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