

BILINGUAL ALIGNMENT AND TENSE

Diana Santos

INESC

R.Alves Redol, 9, Apartado 13069, P-1000 Lisboa, Portugal
dms@inesc.pt

Abstract

In this paper, I describe one annotation of tense transfer in parallel English and Portuguese texts. Even though the primary aim of the study is to compare the tense and aspect systems of the two languages, it also raises some questions as far as bilingual alignment in general is concerned. First, I present a detailed list of clausal mismatches, which shows that intra-sentential alignment is not an easy task. Subsequently, I present a detailed quantitative description of the translation pairs found and discuss some possible conclusions for the translation of tense. Finally, I discuss some theoretical problems related to translation.

1. Introduction

Many people have recently suggested that aligned texts could be used for several NLP tasks such as automatic building of bilingual terminology, or machine translation (see the Call for Papers for this workshop). In this paper, I describe a study conducted on manually aligned bilingual corpora, at the clause level, annotated with respect to tense transfers.

This study shows that, given sentence alignment, it is not a simple task to proceed to smaller units: In fact, there is considerable divergence from the desirable one-to-one clause correspondence. In addition, and as a possible morphological clue, tense is not a reliable indicator for a more refined alignment (Section 2).

On the other hand, it provides the first quantitative results of tense translation that I am aware of, and the way those results may be used is discussed (Section 3). However, one should not forget that these empirical results should be evaluated in the light of a theory of translation. Without stating one's view on the semantic relation between translations, one cannot draw any conclusions from parallel texts (Section 4).

2. The study

I selected an (American) English novel¹ and its translation into (European) Portuguese and a collection of Portuguese short stories² and their translation into (American) English. The type of the texts is narrative discourse, thus providing a fertile ground for studying the translation of tense and aspect. Given that the texts are relatively small, they are characterized by favouring the description of actions. In addition, none of the original texts can be considered "difficult" by the ordinary reader. A relatively detailed quantitative description of the texts is given in Tables 1 and 2.

English original	Words in English	Words in Portuguese	Sentences (Eng)	Sentences (Port)	Transl pairs	Tensed transl
EP1	3416	3051	211	224	207	535
EP2	2233	2017	115	127	113	248
EP3	5815	5172	349	410	340	782
EP4	5051	4554	347	393	337	701
EP5	2827	2472	194	235	191	396
EP6	6718	5996	412	472	412	1082
Total	26060	23262	1628	1861	1602	3744

Table 1

Portuguese original	Words in Portuguese	Words in English	Sentences (Port)	Sentences (Eng)	Transl pairs	Tensed transl
PE10	4410	4898	323	324	322	596
PE11	1501	1719	70	71	70	217
PE3	3447	3695	210	211	210	456
PE8	2019	2279	107	107	106	239
PE6	4460	5258	352	355	351	595
PE9	4393	4698	208	210	208	487
Total	20230	22547	1270	1278	1267	2590

Table 2

The texts were aligned manually, at sentence level. As is well known, some cases X-Y occurred where both X and Y contained more than one sentence. I numbered these "translation pairs".

Sentence alignment numbers follow. They were actually negligible for the Portuguese originals. I should also note that a considerable proportion, in the case of the English original, came from direct speech conventions, completely different in the two languages.

Source-target	PE10	PE11	PE3	PE8	PE6	PE9	Total
1 - 2	2	1	1	1	4	2	11
2 - 1	1			1	1		3

Source-target	EP1	EP2	EP3	EP4	EP5	EP6	Total
1 - 2	16	12	46	32	20	48	174
2 - 1	3	2	4	2	3		14
1 - 3		1	8	9	8	6	32
2 - 2	1		1	2	3	1	8
2 - 3			1	1	1		3
3 - 1				1			1
3 - 2				1			1
3 - 3			1			1	2
2 - 4				1			1
1 - 4			1		1		2
1 - 5					1		1

Then I typed the tense transfer for each clause. It is important to understand what I mean by "clause" here. Since I am specifically interested in tensed clauses, untensed ones were only counted if they were the translation of tensed ones. Clause-like structures without a verb have not been counted as clauses, but VP conjunction is counted as two clauses.³ Conversely, when two or more verbs are rendered by only one, I have only counted **one** transfer. This means that the number reported under "Tensed transl" above is less than the number of tensed clauses in either of the two languages.

Let me now describe the annotation in detail. First, throughout the paper I use "tense" for tense forms which can be simple or complex: for example, present progressive is considered a tense distinct from simple present. I generally omit the word "simple", too. The annotations were kept in separate files, in the following format: For each translation pair (resulting from sentence alignment), I recorded: First, the "translation pair" number, then the tense transfer, preceded by the number of times if consecutive. The tense transfer is displayed by a mnemonic for the source tense, a dash, and a mnemonic for the target tense, or, if the mnemonic is shared by the two languages, it appears only once (so *pres*, instead of *pres-pres*). Tense transfers in each translation pair are separated by semicolons. In case the main source verb is *be*, *ser* or *estar* (the two usual translations of *be*), the verb precedes the specification of the tense transfer (e.g. *3 x be PS - I*). One example is translation pair 273 of EP4:

4.273 *His senses were burningly alive, but his mind went back to the deep participation with all things, the gift he had from his people.*

Os seus sentidos ardiam, vivos, mas, com aquele dom que os antepassados lhe tinham transmitido, regressava à íntima comunhão com todas as coisas.

which is annotated:

273	be PS - I; PS - I; PS - MQP;
-----	------------------------------

This example was chosen because a) it shows a "be" main verb which does not get translated by a corresponding Portuguese "be" (and that is not marked in the annotation); b) there is a clause inversion: C1 C2 C3 in English is rendered as TC1 TC3 TC2 in Portuguese.

During the course of this annotation, my views about **clause** alignment changed. *Prima facie*, it should be more reliable than sentence alignment, since the division in sentences seemed more a stylistic matter than a semantic one: E.g., it seemed less harmful to translate a two-claused sentence into two sentences of one clause each (or vice versa) than to change the overall number of clauses. However, contrary to my intuitions, I found out that the number of clause mismatches even outnumbers that of sentence mismatches.

Here, I systematize and illustrate clause misalignment by means of a set of examples, presented in order of decreasing predictability. (The labels given do not carry any claims as to theoretical analysis of the phenomena described). If this were the main purpose of the study, I should have separated the English to Portuguese mismatches from those in the opposite direction. However, being only a by-product of the main investigation, and given space limitations, I grouped them together.

1. Differences (well?) known from the grammars of the two languages.

a) Dependent clauses which are tensed in one language and not in the other

10.119 -- *Ajuda-me a despendurá-lo, Marco Semprônio. Eu quero que ele viva.*
"Help me unfasten him, Marcus Sempronius, I want him **to live**."

b) Temporal clauses that may have different tense requirements

10.110 -- *Que foi que ele revelou antes de desfalecer?*
"What did he reveal **before** he **lost** consciousness ? "

5.64 *We must be gone before the daylight comes.*
Temos de fugir antes que o dia nasça.

c) Subordinated clauses attached to noun phrases

11.20 *Não era uma tentação que repelia assim; mas era, como bem sabia, um esforço para que o céu se contentasse com as relações espirituais de uma oração.*
It was not a temptation that she repelled in this way; but it was, as she well knew, an effort to satisfy the heavens with the spiritual offering of a prayer.

2. Translation between tensed and non-tensed clauses

a) Main into adverbial

11.51 *É certo que, por mais que fizesse, ocasiões havia em que se afastavam*

dela as outras, a **deixavam** só, como se a propiciarem a repetição de acontecimentos que eram honra do convento.

*For invariably, whatever they did, there were moments when the others would go away from her, **leaving** her alone, as it to propitiate the repetition of events that were the honor of the convent.*

b) Main into adnominal

5.17 *He turned away from her and walked up the beach and through the brush line. His senses **were dulled** by his emotion.*

*Virou as costas à mulher, subiu pelo areal, atravessou as sebes, com os sentidos **embotados** pela emoção.*

c) Relative into gerundive

10.11 -- *Ouviram uma voz **que gritava**, não **gritava**, não, mas **soluçava**, **uivava**, era um rugido triste, dentro da noite, em cima do cabo, ou dentro dele...*

*"They heard a voice **shouting**, no, not **shouting**, but **crying** out, **howling**, it was a sad wailing, deep in the night, above the cape, or from within it..."*

d) Infinitive into main

10.208 *Há sempre quem suponha, na sua paixão, que destruir Roma, a devassa Roma, a pecadora Roma, é **dar** testemunho dos desígnios de Deus.*

*There are always those who, in their zeal, believe that by destroying Rome, that debauched Rome, that sinful Rome, they **are carrying** out the designs of God.*

3. Reduction of the overall number of clauses

a) Conjunction reduction

5.35 *Her back **was bent** with pain **and** her head **was** low.
*Levava as costas curvadas pela dor e a cabeça caída.**

b) Conjunction merging into a complex predicate

5.123 *"Go now to Juan Tomás **and bring** him here and tell no one else.
Vai buscar João Tomás e não digas nada a mais ninguém.*

6.115 *She took him up quickly and put him under her shawl and **gave** him her breast **and** he **was** silent.*

*Joana agarrou nele bruscamente, pô-lo debaixo do xale, **fê-lo calar** com o seio.*

c) Adverbial into adjectival modification

6.202 *And the path **rose steeply** now, so that he panted a little as he went.
O caminho, agora **escarpado**, fazia Kino arquejar na subida.*

d) Clause into prepositional or noun phrase (see also 6.202 above: "as he went" into "na subida")

6.36 *But Kino sat on the ground and **stared** at the earth in front of him.
Mas Kino ficou sentado no chão, **com os olhos** na terra.*

e) Deletion of perception clauses

6.7 *Kino could feel the blown sand against his ankles and he was glad, for **he knew** there would be no tracks.*

Sentia com alegria a areia fustigar-lhe os tornozelos, porque, assim, não deixariam pegadas.

4. Expansion of the overall number of clauses

a) Adding perception clauses

6.170 *His work would come last, for he would not take them back.*
*O seu trabalho ficaria para o fim porque não **pensava** levá-los para trás.*

b) Adding verbs to sentences with no verb

6.67 *And there in the pearl Coyotito's face, thick and feverish from the medicine.*
*E, na pérola, **viu** o rosto de Coyotito inchado e febril com o medicamento.*

b) Conjunction expansion

5.34 *The pale moon **dipped in and out** of the strands of clouds so that Juana walked in darkness for a moment and in light the next.*
*A pálida Lua **mergulhava e emergia** desses fiapos de nuvens. E Joana caminhava, ora às escuras, ora iluminada.*

5. Simply no correspondence

a) Omission

6.213 *The animals from miles around came to drink from the little pools, **and the wild sheep and the deer, the pumas and raccoons, and the mice--all came to drink.***

De quilómetros em volta, os animais vinham beber àquelas lagoas.

b) Creation

6.284 *"If they kill me," he said, "lie quietly.*
***Acabou por dizer:** --Se eles me matarem, não te mexas.*

This last item (point 5) is connected to the first problem I had to deal with: the existence of blatant mistranslations⁴. To my astonishment, they⁵ were fairly frequent. Surely, not all cases can be attributed to the translator alone. Some could have originated in the use of a slightly different version of the original text, with typos, or else could themselves be typos in the final published version. For this study, I decided nevertheless to count the temporal information of those examples where the mistake lay somewhere else.

Summing up, this is a first (and surely incomplete) survey of tensed clause mismatches. Since I was primarily concerned with tense, I did not mark the number mismatch in the annotation, except for the case of tensed - untensed clause. So, I was only able to show a qualitative description of the phenomenon. My impression is nevertheless that non-agreement of clause alignment was frequent⁶. In addition, I have also not marked the cases where actual changes of order among the translated clauses occurred, which is undoubtedly another complicating factor for automatic alignment (cf. the example 4.273 above).

3. Survey of actual translation pairs

Before discussing the results, I should explain why this study was conducted.

First, I believe that language studies should rely on corpora and not on subjective considerations, since language is not what we would like it to be. In addition, relative frequencies of problems and of their theoretical discussion in the literature are completely unrelated, to the extent that only a superficial examination of the data can already provide interesting information.

Therefore, I wanted not only to find regularities in tense transfer but to see the problems as well. For example, superficial mismatches (such as theoretically unforeseen pairs, or clause number mismatches) could be a good pointer for problematic transfer cases.

I turn now to these two points in turn, after presenting a quantitative description of all cases of tensed clauses translated into another clause, tensed or untensed. For lack of space, only data concerning the past tenses are shown: In upper case, the source tense, then the names of the target tenses used in the translation. The cases of main verb "be" are shown in parentheses.

	EP1	EP2	EP3	EP4	EP5	EP6	Total
PAST SIMPLE	323 (54)	185 (39)	499 (52)	412 (69)	242 (33)	644 (85)	2305 (332)
imperfeito	125 (38)	85 (34)	175 (34)	179 (56)	89 (29)	260 (73)	913 (264)
perfeito	161 (9)	75	265 (8)	192 (7)	123 (2)	318 (7)	1134 (33)
infinitivo	5	4	10 (2)	9	9	20	57 (2)
gerúndio	5	2	10	3	6	9 (1)	35 (1)
imperfeito conjuntivo	3		3	10		10 (1)	26 (1)
mais-que-perfeito	6 (2)	5 (3)	11 (2)	10 (2)	4 (1)	3 (1)	39 (11)
condicional	1 (1)		4	2	4	3 (1)	14 (2)
presente		5 (1)	5	1 (1)		4	15 (2)
presente conjuntivo		1			1	3 (1)	5 (1)
part. pass.	4 (2)	3	3	5		3	18 (2)
ir gerúndio	2	2	4	1	2	1	12
pôs-se a infinitivo	2	2		1		5	10
estar part. passado	2		1	1	1	1	6

For the simple past, only forms which have been used more than five times are listed. It has also been translated by a prepositional phrase, a noun phrase, periphrases employing Portuguese 'began' 'made', 'got', etc..

	EP1	EP2	EP3	EP4	EP5	EP6	Total
PAST PROG	8	5	19	4	8	14	58
imperfeito	3	4	12		5	8	32
imperfeito prog.	1	1	2	3	2	4	13
gerúndio			2			1	3
mais-que-perfeito	2				1		3
ir ger	2		1				3

For the past progressive, I used a threshold of two. Once, it was translated by infinitivo, by presente, by an adjective, etc..

	PE10	PE11	PE3	PE8	PE6	PE9	Total
IMPERFEITO	127	109	155	99	198	200	888
past simple	101	91	120	64	136	156	476
past progressive	11	5	8	16	20	11	71
gerund	5	3	2	3	3	6	22
could	3	2	4	4	4	7	24
conditional	1	1	8	1	15	4	30
used to	2		1	2			5
passive			1	4	4	4	13
pluperfect			1	3	5	4	13
infinitive			2				2

For the Portuguese tenses, I listed all cases translated more than once. Imperfeito was once rendered by a past simple in the passive voice, and by *came to* infinitive. All occurrences of *ser* and *estar* in imperfeito were rendered by simple past in English.

	PE10	PE11	PE3	PE8	PE6	PE9	Total
PERFEITO	229	37	109	79	108	74	636
past simple	201	35	100	70	100	69	575
present perfect	13		3	2	5	2	25
present	4			1			5
passive	2	1	2	2	1		8
gerund	2					1	3
could			1		3	2	6
pluperfect				3	1		4
conditional	2						2

The other perfeitos were translated once by the periphrastic expressions '*stopped plus gerund*' and '*went plus gerund*'.

These numbers demonstrate that there is far from a one-to-one correspondence between tenses. This is clearly not an original statement, but still one that has not, to my knowledge, been formally documented, nor taken into account as a performance problem by practical systems. Given the results above, it seems fair to say that one cannot rely on tense indications for automatic alignment of clauses, since even the trichotomy past, present and future is not preserved in general.

I will try nevertheless to draw some first conclusions⁷:

1. The low frequency of progressive in English⁸ is most surprising, even though it is known that it is more frequent in speech than in writing. This casts doubt on the traditional (Kamp, 1981) DRT analysis of progressive filling the same role as French imparfait (by itself and also if we assume that Imperfeito is similar, to a great extent, to the French tense).

2. It seems that the distinction between foreground and background in English is not given primarily by tense, since the vast majority of tenses (62%) were past simple. This agrees with Couper-Kuhlen's contention, (1987:24): "(...) for the organization of temporal relations in narration the contribution of the Past tense (as opposed to some other tense) is minimal (...)".

3. Couper-Kuhlen (1987, 1989)'s description of relative clauses "not advancing narrative" was also supported by this study: in all relative clauses with a relative pronoun in EP1 and EP2, 39, only one (2.6 %) was translated by a perfeito.

4. Stativity in English strongly favoured imperfeito. But this is not an easy thing to determine. In fact, the easiest clue (main verb "be") was only translated by Imperfeito in 80% of the cases.

5. As far as Portuguese to English is concerned, only a negligible fraction of imperfeitos (4%) was translated by conditional or periphrastic "used to". In order to check my own contention (Santos, 1993) that habituality is an important feature of imperfeito; I analysed every occurrence of this form in PE10, concluding that 12 imperfeitos (in 127) could be considered habitual. The vast majority of the imperfeitos was used in connection with verbs of being (32), cognition, perception and locatives. Imperfeito was also frequently used to describe an extended action in progress, in 21 cases.

6. While the use of imperfeito to convey "the action in progress" is observed in some translations into the English progressive, no tense difference is observable in the English translation for the most part (actually in 15 of the above 21). In fact, progressive was used for other reasons in the other 5 cases.

These two last observations show a less explicit tense system in English as far as the dimensions habituality/non habituality and in progress/finished are concerned.

On the hope of getting evidence that an automatic tool could help finding mistakes in translation, the answer seems to be negative. On one hand, it was clear that superficial mismatches do not necessarily mean mistranslations, as can be checked in the examples presented above. On the other hand, I was able to find several cases where the tense translation was common although I believed the translation was incorrect. Cf. the following translation from simple past into imperfeito, where perfeito should have been chosen:

5.49 *His senses were coming back and he **moaned**: "They have taken the pearl..."*

*Ele estava a voltar a si, **gemia**.--Roubaram a pérola...*

(He was coming back to himself, he moaned (imperf): -)

Still, one could gather some complex bilingual dictionary entries in the cases where the translation mismatches were due to lexical matters. What was left unproved, at best, was the possibility of

building a translation checker program working on unrestricted aligned text in the two languages.

4. Theoretical considerations

The empirical studies and tentative results described so far have, I believe, to be put in perspective as far as the theoretical issue of translation equivalence is concerned.

In the first place, one has to clarify the ontological status of tense: Tense can be seen as a purely grammatical category, and the grammars of two different languages would not require any similarity (as is the case with grammatical gender, for example). This has been recently argued for by Vlach (1993), who claims that tense is an idiosyncratic feature which does not carry meaning outside the grammatical system of one particular language.

But tense can be -- and generally is -- regarded as having a strong semantic import, together with an important discourse role. If semantic content and discourse function are preserved by translation, then it is puzzling why in the material above tenses diverge so much.

However, I believe that translation does not preserve the meaning conveyed by a text (even though it ideally approximates it). This claim is fairly old and is held by a multitude of researchers in the translation (Bar-On, 1993) and philosophical camps (Keenan, 1978), even though typically researchers in machine translation (as well as in tense and aspect studies in general) continue for the most part to presuppose the equality of meanings across languages.

If translation does not necessarily preserve meaning, one should be very careful in comparing translation pairs, since if, in some cases, the meaning can be regarded as the same, in others, it has to be seen as an optimal approximation (or less). For actual examples of these "semantic mismatches", see Santos (1994).

Thus, all translation pairs do not have the same status. In order to use them meaningfully, one needs to assess first what descriptive content and kind of use can be satisfactorily rendered by a pair of languages, then study separately the cases where this is not the case, i.e., when the two languages have different expressive power, or efficiency requirements (Keenan, 1978).

Before drawing substantive conclusions, one should make the distinction among

1. those cases where there is superficial disagreement but a semantically satisfying translation;
2. those cases where there is semantic disagreement because of the characteristics of the two language systems;
3. and finally those cases where there is semantic disagreement as a translation option⁹.

Putting the three cases in the same bag only obscurs the whole issue of translation instead of clarifying it.

5. Practical conclusions

- The number of tensed verbs in the two languages is not a reliable indicator for sentence alignment.
- Robust clause alignment does not seem to be feasible using tense indicators in the two languages. Surely, this point is only of importance if one expected to perform alignment based on unilingual analyses, that is, having an annotated English and an annotated Portuguese text but no specific contrastive resources.
- The size and the non-balancing of the texts used does not allow to generalize as to specific probabilities of translation between English and Portuguese in general. However, given that the number of source tense forms is fairly small, it seems right to assume that some sort of Zipf's law holds for tense transfers: Given enough data, the probability of the strangest tense translation is greater than zero. In other words, if we annotated more and more narrative text we would get more and more instances of the translations pairs already found, in roughly the same proportion, while some new (and rare) combinations would still be found.
- A corpus study is important for eliciting some regularities in the translation of tenses and also to discover factors that may play a role in it.
- Tense translation embodies different degrees of "correctness", which should be studied before one can draw conclusions about specific pairs of tense forms. In particular, worse than the difficulties of clause alignment and of tense translation is the fact that actual translations may not preserve the information content of the original text and may add information which is not there.
- Aligned texts are not so obviously fit to use in practical systems. One has to perform in-depth studies of various subjects in order to be able to use them usefully.

Acknowledgements

I gratefully acknowledge a PhD grant from Junta Nacional de Investigação Científica, and am grateful to Lauri Carlson for his supervision and detailed comments, and to Jan Engh for helping me to make some points clearer.

References

- Bar-On, Dorit. "Indeterminacy of Translation : Theory and Practice", *Philosophy and Phenomenological Research*, Vol. LIII, No. 4, December 1993.
- Couper-Kuhlen, Elizabeth. "Temporal relations and reference time in narrative discourse", in Schopf, Alfred (ed.), *Essays on Tensing in English. Vol 1: Reference Time, Tense and Adverbs*, Niemeyer, 1987, 7-25.
- Couper-Kuhlen, Elizabeth. "Foregrounding and temporal relations in narrative discourse", in Schopf, Alfred (ed.), *Essays on Tensing in English. Vol 2: Time, Text and Modality*, Niemeyer, 1989, 7-29.
- Kamp, Hans. "Evènements, représentations discursives et référence temporelle", *Language* 64, 1981, 39-64.
- Keenan, Edward L. "Some Logical Problems in Translation", in F. Guenther & M. Guenther-Reutter (eds.), *Meaning and Translation: Philosophical and Linguistic Approaches*, Duckworth, 1978, 157-89.
- Santos, Diana. "Integrating tense, aspect and genericity", *Actas do IX Encontro da Associação Portuguesa de Linguística* (Coimbra, 29/9-1/8/93), 391-405.
- Santos, Diana. "Translation mismatches and tense and aspect", 1994, submitted to *Computational Linguistics*.
- Vlach, Frank. "Temporal Adverbials, Tenses and the Perfect", *Linguistics and Philosophy* 16, 1993, 231-83.

¹ *The Pearl*, by John Steinbeck. Each chapter will be described by EPn, from 1 to 6.

² By Jorge de Sena, respectively: PE10: *A noite que fora de Natal* (A Night of Nativity); PE11: *O grande segredo* (The Great Secret); PE3: *Mar de pedras* (Sea of Stone); PE8: *A campanha da Rússia* (The Russian Campaign); PE6: *A comemoração* (The Commemoration), and PE9: *Kama e o génio* (Kama and the Genie).

³ Basically, the number of tensed "clauses" is that of tensed verbs (with one proviso: see below), but I talk about clauses because I am interested in comparing tense and aspect which are influenced by all participants in a clause.

⁴ Note that (6.213) is not a mistranslation. As pointed out by Lauri Carlson, it is possible that "the Portuguese translator omits listing all the local animals coming to the waterhole because she estimates the effect of the list on her supposed audience would be opposite of its effect on readers of the original --- making the image more concrete and familiar for the former who have intimate acquaintance with the local fauna, but causing puzzlement or estrangement for foreign readers".

⁵ I am not including in this category the (rather frequent) cases where I did not agree with the specific choice made by the translator, but it was possible that the published translation was

intended.

⁶Note that this description was only based on the files EP5, EP6, PE10 and PE11, a much smaller corpus.

⁷But acknowledging that these corpora should be used to measure detailedly factors that may influence the selection of a particular tense form in translation, such as kind of argument (definite/indefinite, singular/plural), stativity, previous or following tense forms, matters on which I expect to report soon.

⁸And especially in Portuguese.

⁹Given that human translation is a highly elaborate cognitive task, and thus heavily grounded on intuitions and subjective knowledge of language and world, it is not amenable to description in algorithmic terms, for instance as analysis of all possible renderings and their semantic implications. Therefore, "translation options" may be done without full conscience of the translator. Hence, I suggest that (non-trivial) translation errors should be regarded as options as well.