

Chapter 9

The translation network

A model for a fine-grained description of translations

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Abstract: In this paper, I argue for the need for more complex models to describe actual translations (in aligned corpora) and present a particular proposal designed to accomplish such a description, termed the “translation network”. A translation network joins models of the two languages involved, inspired by the aspectual networks of Moens (1987), and attempts to cater, in a systematic way, for many situations that occur in actual translation. This chapter is divided into four main sections. In Section 1 a brief description of many problems that are not addressed by simpler models of translation is presented. Section 2 represents the core of this chapter, describing how translation networks are composed. This description is illuminated with examples from literary translations between English and Portuguese. Section 3 critically reviews some problems with the model, before Section 4 concludes with a short defense of it.

1. INTRODUCTION

The need to describe translations has long been recognized in translation studies. A good description promises a way to shed light on the process of translation itself and on the properties of the languages involved. More recently in natural language processing, the description of human translations has proved an essential aid in the process of improving machine-aided translation and being able to fully understand machine translation specifications.

The immediate motivation for the translation model described in this chapter was a contrastive study of English and Portuguese in the area of tense and as-

pect. This study was undertaken with the goal of being able to process the two languages automatically.

A parallel corpus was created for the two languages. The intended use of the corpus was to provide contrastive facts that would lead to a better understanding of the translation between the two languages – and, in that way, also provide relevant information concerning the two languages involved, English and Portuguese.¹

The detailed study of the corpus prompted the discovery of interesting regularities in several specific cases. The attempt to describe the general properties of the translations in the corpus, and especially problems specific to the Portuguese/English language pair, led to the creation of a robust, abstract model of translation. The model, while complex, is better than simple models based on assumptions that simply do not hold, such as meaning preservation, identity of order, or word-to-word correspondence.

This chapter is thus different from the others in the present book, because it describes the *result* of the processing of parallel corpora and not the processing itself. With that said, I would now like to return to some of the assumptions that the model presented later in this chapter avoids in order to demonstrate why they should be avoided.

1. *Sentence structure and overall text organization are preserved.* This is not necessarily true. Punctuation and sentence separation are, to a large extent, language-dependent: both the use of direct/indirect speech (Santos, 1998) and the way sentence connectives are employed are very different in English and Portuguese, as illustrated in Figure 1.

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<p><s> Then, with a quiet , “Good night, John,” to the husband, he went out. </s></p>
<p><s> Depois, em tom mais suave, ele acrescentou para o marido, ao se retirar: </s></p>
<p><s> — Boa noite, John. </s></p>
<p><s> Then, in a softer tone, he added to the husband, as he retired: </s></p>
<p><s> — Good night, John. </s></p>

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Figure 1. Different discourse organization including direct speech²

Also, different cohesive strategies are used by the two languages. According to Frankenberg-Garcia (1998), the text in Figure 2 is typical of Portuguese

¹ Corpus-based contrastive studies seem to be an active research area at the moment, as witnessed by the appearance of several books on the subject; see e.g. Aijmer *et al.* (1996) and Johansson & Oksefjell (1998). The need to investigate translation *performance* has, however, been recognized earlier in contrastive linguistics (see Johansson, 1975; Maslov, 1985[1977]; Fisiak, 1980; Filipovic, 1984).

² All my examples are taken from literary works. Contrary to common belief, translation of this text type tries to be closer to the original than e.g. scientific translation, where form is almost irrelevant and the translator therefore has much more freedom (Doherty, 1997a).

learners of English, who export their native language discourse strategies into English.

[8] **William Golding** was born in Cornwall in the beginning of this century. [8a] **He** joined the Royal Navy in the Second World War, and what **he** saw made **him** think that human beings were evil. [8b] **?The author of *Lord of the Flies*** won the Nobel Prize for Literature in 1983

Figure 2. Example of failing anaphoric description, from Frankenberg-Garcia (1998)

2. *Translators favour literal translation.* No necessarily so. Even when there is a “standard translation” (Gellerstam, 1986) for a term or grammatical device, it is often the case that the internal structure of the target language leads to non-standard translations (in the sense of different choice of meanings, or of complete rephrasing of an apparently possible literal translation).³ Translation mismatches of all kinds (in the sense of not preserving structure, meaning, discourse or speech act) occur even though they cannot be predicted from the systems of the two languages (i.e., even when a corresponding structure, meaning, discourse choice or speech act exists and can be used in the target language). In other words, restructuring and rewriting are the rule rather than the exception, as illustrated by some examples in Table 1.

Table 1. Examples of “far from literal” translation

Source	Translation
where the pearl was buried	onde a pérola estava guardada 'where the pearl was kept'
the doctor said, and he saw Kino's eyes flick involuntarily to the floor near the side post of the brush house.	disse o médico, ao mesmo tempo que seguia os olhos de Kino, irresistivelmente parados no chão ao pé do pilar da cabana. 'said the doctor, at the same time that he followed Kino's eyes, irresistibly fixed on the ground near the post of the house'
Era um longo hábito de frade o que vestia, quase até às sandálias que, na lama, se distinguíam pouco dos pés magros e ossudos. 'It was a long habit of friar he had on, almost to the sandals which, in the mud, were hard to distinguish from his thin, bony feet.'	He wore a long friar's habit that reached almost to the muddy sandals on his thin, bony feet.
Quando elas o deixaram exaustas, levantou-se para espreitar. 'When they left him, exhausted, he rose (...)'	When they were exhausted and left, he got up to peep around.

3. *Literal translation represents a non-problematic case.* Often, this is not the case. When there seems to be a relatively straightforward match between the source and target text, one is often in the presence of translationese, i.e., the

³ In addition, as Kellerman (1999) observes, foreign language learners (and I add translators here) often suffer from what he calls homoiophobia, the fear of similarity.

(mostly⁴ unintentional) twisting of the target language in order to artificially mirror the source language text. For a wide range of examples from child literature translated into Portuguese, see Santos (1997b).

4. *Translation can be handled without significant processing of either text.* This is hardly ever true. One has to understand what is being said – and how – in each language in order to understand how the two texts are related. In each language there is a set of language-specific categories (and language-specific lexical items, grammatical devices, pragmatic conventions, etc.) that the author (or translator) has to employ in order to achieve a particular goal. And, as Keenan (1978:166) noted, “it would surely be surprising, and a very strong empirical claim, that different languages using different means to express ‘meanings’ always arrived at exactly the same end.” In other words, one has to cope with the language-specificity of each text in order to be able to model translation from one text to the other. Table 2 offers some relevant translation pairs.

Table 2. Examples of differences in rendering in original and translation

Source	Translation
now that you have become a rich man	– Agora, que és um homem rico. ‘Now, that you are a rich man’
Kino stood in the door, filling it, and hatred raged and flamed in back of his eyes	Kino, de pé, barrava a entrada, com o ódio e a ira chispando no fundo dos olhos. ‘Kino, standing, obstructed the entrance, with the hate and the rage flaming in the back of the eyes’
Mas com dia não chegava já. ‘But with day he no longer would arrive.’	But there was no way he could arrive by daylight.
and the pearl, knocked from his hand, lay winking behind a little stone in the pathway. It glinted in the soft moonlight.	Mas a pérola, que lhe saltara da mão, rolara na terra para trás de uma pedra do caminho e cintilava sob a pálida lua. ‘But the pearl, which had jumped from him from the hand, had rolled into behind of a path stone and twinkled under the pale moon.’

5. *One meaning is conveyed by each sentence.* Across language borders, meaning may be distributed differently. Vagueness (and compactness) are pervasive properties of natural language. Since the possible instances of vagueness (and compactness) vary from language to language, one of the most common problems for the translator is how to cope with these phenomena

⁴ In some cases of literary translation, this strategy is actually pursued by the adherents of the “foreignization” school (see Øverås, 1997).

(see Santos (1997a) for a detailed motivation and Santos (1995) for further examples).

6. *A translation model does not need to account for “noise”*. Contrary to mainstream approaches to parallel corpus processing, I believe that exceptional cases can actually teach us more about the two languages and the delicate problems of translating between them than the common translation patterns. Table 3 presents some “interesting” mistakes.

Table 3. Examples of translation mistakes that point at difficult areas

Source	Translation
<i>onde entrara em rapazinho quando as paredes da casa ainda se erguiam.</i> 'where he entered as a small boy when the house buildings were still up'	<i>which he had entered as a young lad when the walls of the buildings were still being raised.</i>
<i>Muitas vezes ouvia os habitantes da aldeia (que ele já conhecera como antepassados deles mesmos ou de animais que lhes circulavam ao pé)</i> '(...) (whom he had met before as their own ancestors (...))'	<i>he heard near him the villagers (whom he knew as their own ancestors or as animals that gathered around them)</i>
<i>After a while they lay down together on the sleeping mat</i>	<i>Momentos depois, estavam estendidos, lado a lado, na esteira.</i> 'Moments after, they were lying, side by side, on the mat.'
<i>Na repartição, todos os momentos de distração do chefe, por detrás dos seus óculos de aro escuro e espesso, que dão seriedade e impõem respeito, eram atribuídos à comemoração,</i> '(...) every moment of absent-mindedness (...)' was attributed to the commemoration.'	<i>At the office, the chief, behind his glasses with dark, thick frames which convey solemnity and command respect, devoted every spare moment to the commemoration;</i>

Instead of looking for reliable rules or correspondences and considering data which deviates from that norm to be residual noise (Church & Gale, 1991) or rejecting creative language as not relevant for semantics (Dyvik, 1998), I believe that every translation pair – including plain errors and complete rewriting – sheds light on the systems of the two languages. In fact, more often than not, translation mistakes are correlated with actual difficulties stemming from language differences (“garden path translations”⁵). Extreme rewriting may actually reflect the unnaturalness of preserving some of the features of the source text.

For example, one language may excel in extensive manner descriptions, while the other may be especially concerned with conveying subject perspec-

⁵ This label was inspired by Doherty's (1997b) “textual garden paths”.

tive. To go from one system to another, the translator needs to somehow down-tone the excess of description in one field while adding a richer description in the other. See Slobin (1996) and Santos (1998b) for examples concerning, respectively, “moving” in English and Spanish, and “perceiving” in Portuguese and English.

So far, most descriptive models do not address these issues, thus compromising their accuracy, as well as reducing the usefulness of the tools or applications that employ them. For example, translation browsers may fail to display the most interesting cases; translation checkers may reward translationese (like the system described by des Tombe & Armstrong-Warwick, 1993), and corpus-based bilingual dictionaries may fail to significantly improve (as noted by Ebeling, 1999).

2. THE TRANSLATION NETWORK MODEL

The first assumption on which the translation network model is based is that it is necessary to describe the two languages on their own terms – rather than resort to common categories a priori. The possibility that there are shared categories/meanings is not ruled out; it becomes, rather, an empirical question. Translation is seen as establishing a mapping from categories specific to the source language into categories particular to the target language, subject to the specific constraints of the latter. Metaphorically, translation is like seeing a source text with target language eyes.

With the help of this model, what I argue for in this chapter is that, compared to what a source language native speaker sees, a translator can see *more*; and a translator can see *less*. In short, these two cases show that translation mapping in general is not functional.⁶

While it is common knowledge that some delicate shades of meaning are often lost in translation into a language which does not have similar means to convey them, the cases of seeing “more”, albeit more interesting, have not received so much attention. Some cases of seeing more will be called “coercion brought about by translation”, and can be defined, anticipating a little, as the need for translation⁷ coercing the meaning of the original text to something which was not there in the first place.

In other cases, a different situation holds, not related to the source text at all. The potentialities of the target language lead the translator to provide information that is commonly expressed, just to sound natural or produce a clearer formulation. In this case, the translator did not interpret the original text in that

⁶ It should be clear that I do not abide by the interlingual model for machine translation. For a more detailed explanation why, see Santos (1996; 1998a; 1999).

⁷ Or the need for understanding the original text when one “thinks” in the target language; cf. Slobin’s (1987) “thinking for speaking”.

way. Rather, he embellished the translation for the target language reader's sake.

2.1 Abstract properties of a translation model

Translation networks are based upon the assumption that an appropriate language model can be defined as a set of categories which are linked, acted upon and/or created by a set of operators. This is a reasonable model for tense and aspect, as the work by Moens (1987) and his followers has shown (e.g. Caenepeel, 1989; Kent, 1992; Sandström, 1993). It has also been applied to the nominal domain (Pustejovsky, 1995).

Before turning to translation, let me say a few words about the monolingual models. An aspectual network has nodes standing for aspectual classes (understood as language-specific conceptualizations of kinds of situations), while arcs represent category changes brought about by grammatical (or other) devices. The progressive, the presence of a definite direct object, the pluperfect tense, an adjectival modification, a temporal phrase, etc., can all label arcs in the English aspectual network and, consequently, be understood as conveying meaning in two ways: by assigning an input category, and by producing a result in an output category. Unlabelled arcs are transitions which are possible without overt marking (which does not mean randomly, or without other clues).

Unlabelled arcs explain why it is sometimes possible to apply an operator to an expression of the “wrong” input type: according to Moens (1987), it first gets coerced into the “right” type. In the simple example of Figure 3, depicting the relevant subset of the English aspectual network, the sentence *My program ran in less than four minutes this morning* is modelled by the path PROCESS (*run*) >> CULMINATED PROCESS in X CULMINATED PROCESS, as analysed by Moens (1987:47). In more detail, the expression *run* (*My program ran*) originally belongs to the category PROCESS, but is first reinterpreted as belonging to category CULMINATED PROCESS (‘>>’ stands for “coerced into”), and only then a (new) expression of category CULMINATED PROCESS is built.



Figure 3. A subset of the English aspectual network

A model for the translation between two languages will need to include two such language models, one for the source and the other for the target language. Additionally, translation from the source to the target must induce some mapping between the categories (and possibly between the operators as well).

A simple example is shown in Figure 4. (Small circles represent “nodes”, and stand for categories, arrows represent “arcs” and stand for transitions. All

nodes must be labelled; arcs may or may not be labelled. The two larger circles enclose source and target language; arcs from the former to the latter are called “translational arcs”.)

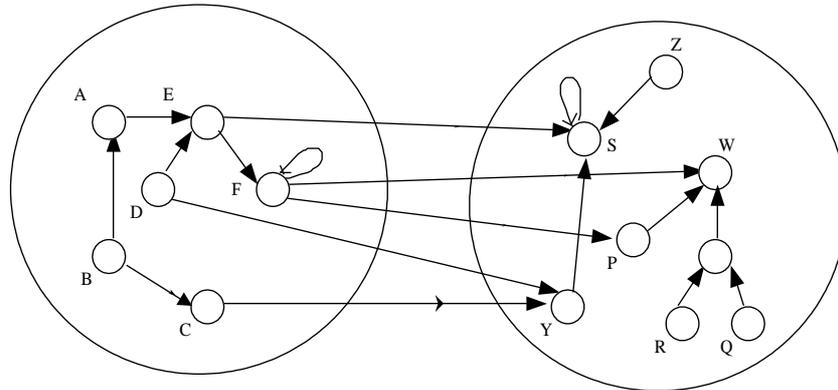


Figure 4. A fictitious translation network

Some of the points illustrated by the figure are worth noting:

1. node names are different (there is no common metalanguage)
2. there are source nodes which have no correspondence in the target network (namely A and B)
3. there are target nodes which do not correspond to any source node (such as Z, R and Q)
4. the same source node may correspond to more than one target node (cf. F)
5. the same target node can correspond to more than one source node (e.g. Y)

In order to make use of such a model, one needs to be able to analyse a source text as a path in the source translation network, a target text as a path in the target translation network, and decide which correspondences hold between the two (i.e., which translational arcs are involved).

In this connection, note that there is no requirement for path isomorphy of any kind in this model of translation. The paths in the two languages can have different lengths, and visit the same or different nodes (i.e., have loops or not). Furthermore, not all nodes need to be linked by translational arcs.

Figure 5 illustrates these points with another fictitious translation network. One particular translation pair is marked in bold in the two monolingual networks (no longer surrounded by a large circle).

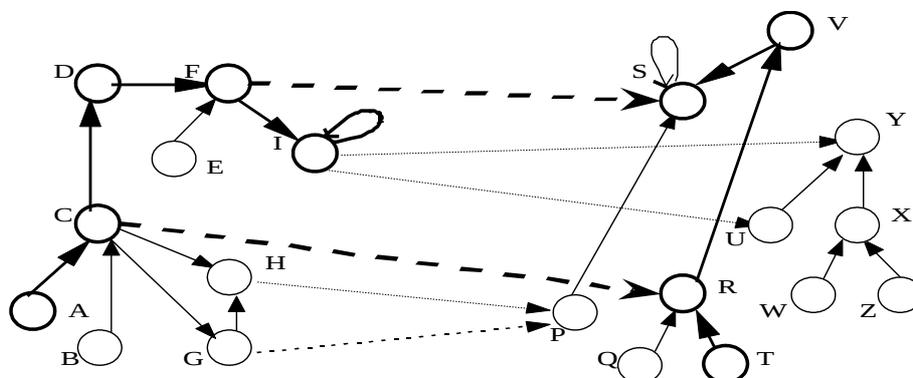


Figure 5. One translation pair described in a fictitious translation network

While the source path (A C D F I I) includes six nodes (five different ones) the target path only contains four (T R V S). Also, only the second and the fourth nodes of the source path are translationally related to some node in the target language model. Finally, note that, *in this particular translation pair*, the last node in the source path has no correspondence in the target language.

There is a point worthy of note here. Even though there may be (translationally) related categories in the two languages, they may not be (monolingually) connected in the same way. It is not necessarily possible for “corresponding” lexical items (path beginnings) to arrive at “corresponding” final nodes. So, in the example of Figure 5, even though nodes I and Y are translationally related in the system, there is no path from V or S to Y in the target language network.

Finally, an important feature of language, which plays a key role in translation, vagueness, can be represented in this model. Vagueness is modelled by the existence of unlabelled arcs (i.e., no overt grammatical operators) from one node to two or more nodes. Context alone determines which is selected on reading (in cases where such a choice is required). The expression is *coerced* into that category. In the translation model suggested, if there are no corresponding vague categories in the target language and no choice is required by the source text, translation implies a choice, which always corresponds to a loss of information, as pointed out by Kaplan et al. (1989).

2.2 Coercion by translation

To illustrate this, let us turn to the concrete example of English states, which, in a contrastive perspective (contrasting with Portuguese), are vague between denoting an essential property and an accidental state.⁸ There is no way (most of the time) to preserve such vagueness in Portuguese, so translation will have to decide which interpretation will be rendered. This is a case of contrastive

⁸ For explanation of and motivation for the categories employed, see Santos (1996).

vagueness, and so coercion (the need to follow an unlabelled arc) is brought about by translation (indicated by T's in Figure 6).

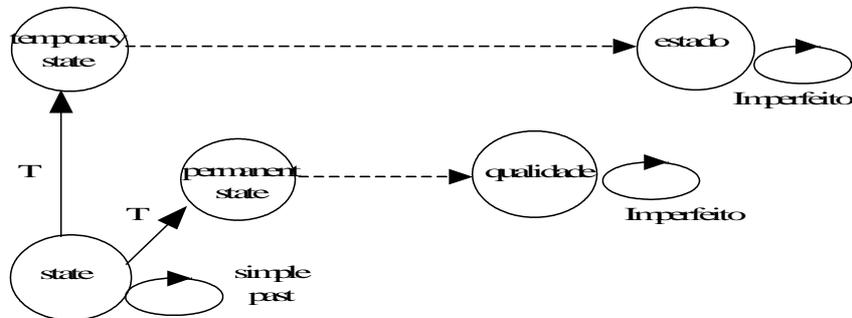


Figure 6. Coercion by translation in an English-to-Portuguese translation network

Let me note, first, that we *only* have the relevant part(s) of a complete translation network here that would describe the translation from English into Portuguese. The monolingual paths accepted by the two monolingual networks are minimal, simply taking a lexical item belonging to the “state” class (or to the “estado permanente” or “estado temporário” classes) and leaving it in the same class after the application of the simple past tense (or of the Imperfeito tense). Still, this simple case is enough to show the difficulties posed by contrastive vagueness and to illustrate the way the model works.

Consider the English sentence displayed in Table 4, whose corpus translation is presented first, followed by an alternative translation. The two different translation pairs are described as two different pairs of paths in the translation network (‘T>’ stands for “coerced by translation”):

Table 4. Example of two possible translations and respective analyses of one English sentence

English	Portuguese
<i>Beside him on a table was a small Oriental gong and a bowl of cigarettes</i> STATE (on a table be) <u>simple past</u> STATE T> PERMANENT STATE	<i>Ao lado, na banca de cabeceira, havia um pequeno tantã oriental e um maço de cigarros</i> QUALIDADE (haver) <u>Imperfeito</u> QUALIDADE
<i>Beside him on a table was a small Oriental gong and a bowl of cigarettes</i> STATE (on a table be) <u>simple past</u> STATE T> TEMPORARY STATE	<i>Ao lado, na banca de cabeceira, estava um pequeno tantã oriental e um maço de cigarros</i> ESTADO (estar) <u>Imperfeito</u> ESTADO

Consider now the example in Table 5, which is more complicated (though not from the point of view of English), and whose alternative translation follows, in fact, the same path as the published translation of Table 4:

Table 5. Another example of an English sentence where the interpretation of the state matters

English	Portuguese
<i>And he drank a little pulque and that was breakfast</i>	<i>Bebeu um pouco de pulque. E foi o seu pequeno almoço</i>
<i>And he drank a little pulque and that was breakfast</i>	<i>bebeu um pouco de pulque e isto era o seu pequeno almoço</i>

The relevance of these examples is that both alternatives are “correct” translations but presuppose a vagueness resolution that is outside what is conveyed by the English text proper. In fact, *that was breakfast* in the English original might as well refer to that particular instance of breakfast, or to the habitual sequence of events that constituted breakfast for Kino, or to *both*. Note, furthermore, that if Kino had had a typical instance of breakfast at the time of the narrative, the two interpretations could not even be objectively distinguished. The same is true of the position of the oriental gong mentioned in Table 4, although not leading to such striking meaning differences. Does the English sentence refer to the gong’s position, immutable since long ago, or to its being there then, because, for example, the maid or the doctor had placed it there? One may well say that the English text does not lead us to ask this kind of question, but each of the translations conveys one of these meanings. A translator must therefore decide, in each case, which formulation to use, and he must also decide whether the “details” are relevant or not.

The more complex (partial) translation network displayed in Figure 7 (which properly includes the one in Figure 6) must be used for the analysis of the example in Table 6 (where ‘>>’ stands for “normal” coercion). The reader is directed to Santos (1996; and forthcoming) for a detailed discussion of the several interpretation possibilities.

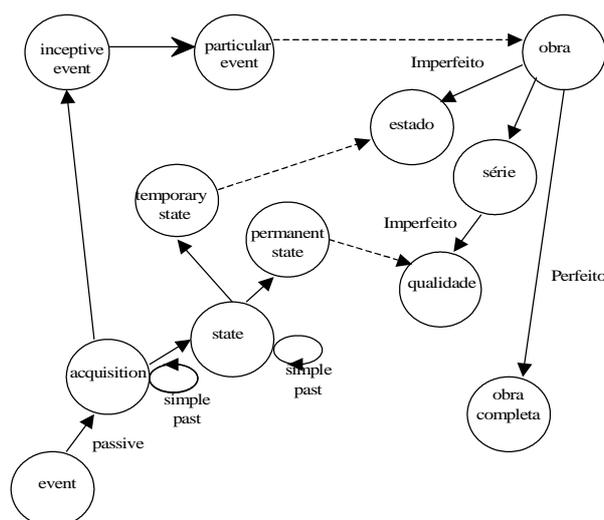


Figure 7. A more complex English-to-Portuguese translation network

Table 6. A more complicated example with many possible coercion paths

English	Portuguese
<i>and the canoes were drawn up in front of this area</i>	<i>e era em frente dessa zona que os barcos se alinhavam</i>
EVENT(draw up the canoes) <u>passive</u> ACQUISITION <u>simple past</u> ACQUISITION >> STATE T> PERMANENT STATE	OBRA (os barcos alinharem-se) >> SÉRIE <u>Imperfeito</u> QUALIDADE
EVENT (draw up the canoes) <u>passive</u> ACQUISITION <u>simple past</u> ACQUISITION T> STATE T> PERMANENT STATE	OBRA (os barcos alinharem-se) >> SÉRIE <u>Imperfeito</u> QUALIDADE
EVENT (draw up the canoes) <u>passive</u> ACQUISITION <u>simple past</u> ACQUISITION T> INCEPTIVE EVENT T> PARTICULAR EVENT	OBRA (alinhar os barcos) >> SÉRIE <u>Imperfeito</u> QUALIDADE
EVENT (draw up the canoes) <u>passive</u> ACQUISITION <u>simple past</u> ACQUISITION >> STATE T> TEMPORARY STATE	OBRA (os barcos alinharem-se) <u>Imperfeito</u> ESTADO

2.3 Node unfolding

The description of a significant number of differences between the two languages occurring in real translations (whose result can be appreciated in Santos (1996; and forthcoming)) led to several refinements of the model.

It became clear that, in order to describe translation pairs, significant changes in the source model are needed. In fact, the description of the source language has to be considerably more detailed in order for us to be able to state translation options and translation correspondences. Not only the translation arcs, but also the overall organization of the source language, must be reconsidered in order to perform translation.

In addition to coercion by translation, two clear examples are:

- categories that must be split, not due to grammatical differences in the source language, but due to the fact that they are differently translated by the target language;
- history-based categories required by translation, i.e., translational correspondences that depend on previous translational correspondences in the same path.

Figure 8 illustrates the first case: The *one* Portuguese category *Mudanças* is conceptualized with different aspectual properties in English if the event is a change of position or another kind of change (cf. the two first examples in Table 7).

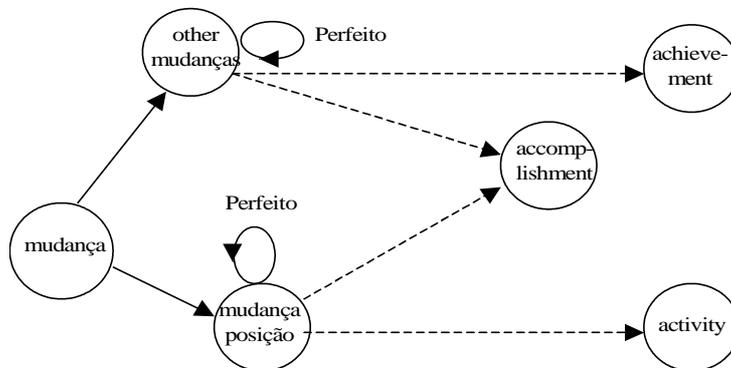


Figure 8. The category Mudanças must be split in the Portuguese-to-English network

Table 7. Examples that show the need for node unfolding

Source	Translation
<i>Ou ele [...] ficara um pouco confuso</i> MUDANÇA (ficar) <u>MQP</u> MUDANÇA	<i>Or else he [...] had become a little confused.</i> ACHIEVEMENT (become) <u>pluperfect</u> ACCOMPLISHMENT
<i>O escravo, tão suavemente como entrara, saiu.</i> MUDANÇA (sair) <u>Perfeito</u> MUDANÇA	<i>The slave slipped out as quietly as he had entered</i> ACTIVITY (slip) <u>goal particle</u> ACCOMPLISHMENT <u>simple past</u> ACCOMPLISHM.
<i>que se interessara demasiado pela homenagem,</i> OBRA (interessar) #> OBRA 1 <u>MQP</u> OBRA COMPLETA 1	<i>who had become too interested in the commemoration</i> ACHIEVEMENT (become) <u>perfect</u> ACQUISITION
<i>O papá discursou?</i> OBRA (discursar) #> OBRA 2 <u>Perfeito</u> OBRA COMPLETA 2	<i>Did you give a speech, Papa?</i> ACHIEVEMENT (give) <u>simple past</u> ACHIEVEMENT

Figure 9 illustrates the second case exemplified by the two last examples in Table 7: depending on the path already followed in the translation of a Portuguese Obra, the translation options available are different.

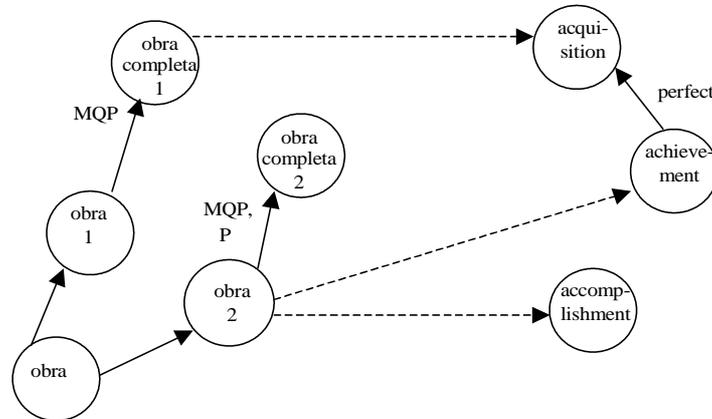


Figure 9. History-based translational arcs in the Portuguese-to-English network

3. DISCUSSION

I would like to discuss some limitations of the present model, related specifically to descriptive power and empirical validation.

3.1 Descriptive issues

This model was basically conceived for handling grammatical phenomena at the clause level. Lexical items are consequently taken as belonging to basic categories. It is, however, conceivable that similar phenomena in terms of translation topology may be at work inside the lexical items themselves. In other words, a suitable lexical decomposition in each language might be contrasted with the help of a similar model. I have not found, however, translation data showing that this is relevant for the English-Portuguese pair.

Likewise, the relationship to quantification has not been carefully considered, even though a possible extension of the aspectual network (and the corresponding translation network) might be called a quantificational network. So far the model has only been applied to sentences *describing* events, not quantifying them. In this regard, however, it seems that there is interesting contrastive data requiring such extensions to be made.⁹

On the other hand, although the translation of temporal reference also involves questions of vagueness, difference of granularity, ambiguity and the like, and the present model has even been extended with temporal-aspectual categories to encompass it, reference to an external timeline is obviously not ideally

⁹ Especially the translation of descriptive sentences by sentences expressing quantification over events and vice-versa.

treated in terms of language-internal categories only. This means that additional machinery should be invoked to adequately handle the temporal import of tense. But it is also true that temporal mismatches are not so frequent, and therefore relevant, for the description of human translation.

Finally, omissions and sentence restructuring pose complex problems for the model, by adding several degrees of freedom in the choice of translation correspondences. Additionally, the model obviously breaks down if whole sentences have not been translated.

3.2 Practical issues

This model bears little relationship to the several quantitative studies that helped shape it. This low correlation with surface quantitative patterns can, however, be explained easily by noting that translation pairs are, in the vast majority of cases, the result of many interactions (and, therefore, many possible quantitative surveys).

The model presented here was not obtained automatically from those studies, but it is undeniable that the *process* used to arrive at the categories, arcs, and translational arcs depended heavily on quantitative exploratory studies. The English-Portuguese and Portuguese-English models can thus be seen as the main *result* of such studies.

Note that the translation network as a general model of translation and the two translation networks concerning translation from English to Portuguese and translation from Portuguese to English exist at different levels of abstraction. Only the two latter allow empirical validation, namely testing whether a wide range of translation phenomena between English and Portuguese can be shown to be adequately described by them. That, in turn, will furnish indirect support for the relevance of the general model for translation in general.

How can a concrete translation network be shown to be descriptively adequate? In addition to the discussion of particular cases using this descriptive framework, and the formulation of testable predictions regarding translation distribution, it would be desirable to have an implementation of the model that would allow one to check coverage and gather statistics concerning categories, translation strategies, etc. Such an implementation would considerably boost progress in the description of translation and help work in contrastive linguistics.

However, due to the heavy parsing required in order to analyse sentences according to each aspectual network, and the lack, at least for Portuguese, of working systems that could serve as a basis for the translation network, an implementation has not been attempted.

Hence this model's adequacy in dealing with a vast plethora of real translation cases remains thus to be proved, notwithstanding the relatively large num-

ber of translation pairs whose analyses have been cast in it. The most reasonable way to employ this model in a computer application would be to incorporate it into a translator's workbench, with substantial human intervention for the first data stored (as in Sadler & Vendelmans' (1990) bilingual knowledge bank).

4. CONCLUDING REMARKS

Translation is a much more complex phenomenon than two sentences in different languages expressing the same thing. To assess what is the same and what is different, one cannot make *a priori* assumptions.

A descriptive model that allows one to describe real translations without biasing such a representation must be at least as complex as the one described here. It is dubious whether simpler models allow anything but the simplest applications. In machine translation, one can artificially limit the degree of change from a literal rendering. But a model designed to describe human translations has to cope with the full complexity of human translation. This claim is, actually, the opposite of what is generally held true in the processing of parallel texts, cf. Isabelle's (1992:80) remark that "in contrast with the active linguistic capacity required for the production of translations, the reconstruction of translation correspondences in existing translations requires only a passive linguistic capability".¹⁰

The present model is offered as a first step towards a more informed computational processing of aligned bilingual corpora that goes beyond the simple identification of gross correspondences. It is my belief that – based on, and even at times driven by, sound empirical work – one must begin by identifying what is going on in translation in order to satisfactorily process its result. One should not proceed as if all translation pairs were homogeneous: in fact, most are an idiosyncratic combination of "explicitation", "ambiguation", introduction of vagueness, addition of detail, removal of information, etc. That these concepts are expressible in terms of the topology of the translation network just presented is a necessary (although not sufficient) condition for its adequacy.

I hope that the presentation of this model (which evolved from corpus based analysis) will foster the development of implemented systems, and that it may contribute, at least, to clearer intuitions in contrastive linguistics, if not in the computational processing of parallel texts.

¹⁰ Interestingly, this belief was presented by Isabelle as one of the reasons to engage in our field of research.

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