

# STYLISTIC CHOICE IN MACHINE TRANSLATION

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## Abstract

The study of comparative stylistics attempts to catalogue and explain the differences in style between languages. We describe a formal model of comparative syntactic stylistics that could be implemented in a machine translation system, enabling the system to make a more informed decision about possible translation choices and their potential stylistic effects.

## 1 Stylistic adequacy of translation

We have all had the experience of reading a translated text, and feeling that it was not quite right, but not being able to articulate exactly why this was so. The text may be divided into the correct number of paragraph units, the semantic content may all be there, but something in the way the material is presented strikes a false note: while the meaning of the source text may be intact, the *style* of the target text is faulty. We have argued (DiMarco and Hirst 1993) that style is not mere surface appearance, but conveys a good deal of meaning, so that if the style of a translation is not appropriate, then some significant aspects of meaning will have been lost.

In earlier work (DiMarco and Hirst 1990), we showed the need to account for aspects of style in machine translation, and noted that style influences translations on all linguistic levels: lexical, syntactic, semantic, and textual. The particular choices of words, the specific arrangement of sentences, the selection of which details to carry over in the translation, all convey a particular stylistic effect. The linguistic choices the translator makes in selecting various ways of realizing the source text in the target language carry pragmatic import, and therefore affect the meaning communicated to the reader.

As we observed in (DiMarco and Hirst 1990), consideration of style in translation involves two complementary, but sometimes conflicting, aims:

- The translation must preserve, as much as possible, the author's stylistic intent—the information conveyed through the manner of presentation.
- But it must have a style that is appropriate and natural to the target language.

From *comparative stylistics*, we recognize that languages differ in their stylistic approaches, that each has its own characteristic stylistic preferences. Thus, what is needed for truly effective machine translation is a way of incorporating knowledge of comparative stylistics to make the most appropriate choices during the process of generating target text.

In (DiMarco and Hirst 1990), we first proposed the outline of a computational model of comparative stylistics for machine translation. The model focused on syntactic aspects of style; theoretical

details of the basic, unilingual, model were developed in (DiMarco and Hirst 1993; Green 1992; Hoyt 1993). In related work (DiMarco, Hirst, and Stede 1993), we have begun to extend our work on syntactic style to consider the effects of lexical style on machine translation and multilingual generation. In recent work (DiMarco and Mah (*in press*)), we extended the basic model to present a computational model of French-English comparative stylistics that we propose as the basis for a 'microtheory' of style in a machine translation or multilingual generation system.

In this paper, we will focus on how our model might be used in a machine translation system, to provide additional information for making systematic choices among linguistic options, in full awareness of the kind of stylistic subtlety that will be conveyed by each choice.

## 2 Overview of a computational model of style

Our basic model of style is a multi-level representation of stylistic grammar rules that takes as its starting point the notion that style is *goal-directed*, that is, a writer makes particular linguistic choices to achieve a particular stylistic goal, such as expressing clarity, being dynamic, or even being deliberately obscure. The top level of our model provides a definition of such *stylistic goals*, which we take to be the writer's intentions for high-level pragmatic properties of text. The stylistic goals are realized in terms of lower-level rhetorical properties, the *abstract elements*, which are general stylistic properties of groups of sentences. In turn, the definitions of the abstract elements are given in terms of *primitive elements*, stylistically significant syntactic properties of sentence components. Thus, the model ties together low-level syntactic structure and high-level stylistic goals, through the intermediary of classic rhetorical properties of sentence structure.

The fundamental concepts that are used to integrate the multiple levels of the model are stylistic *concord* and *discord*, which we define as follows:

Concord: A stylistic construction that conforms to the norm for a given genre.

Discord: A stylistic construction that deviates from the norm.<sup>1</sup>

Throughout the model, these concepts of concord and discord are used as the defining principles in determining stylistically significant terminology appropriate for each level of the model. At the lowest level, we consider two aspects of syntactic structure, the cohesive bonds of linear ordering and the nested structure of hierarchical organization,<sup>2</sup> and give rules that relate these structures to primitive concordant and discordant stylistic effects. These primitive stylistic elements provide a precise syntactic basis to the model, yet also allow a mapping to the abstract elements.

The abstract elements describe general rhetorical properties related to syntactic parallelism, structure nesting, and linear ordering. At this level also, we define different ways of obtaining stylistic concord and discord; for example, exact syntactic parallelism is very concordant, while disruptive interruptions of canonical linear ordering are discordant.

<sup>1</sup> Discord, in our view, is not necessarily 'bad'. Indeed, it is the strategic use of discord, deviation from the norm, that can give expressiveness to writing.

<sup>2</sup> These two complementary kinds of analysis are implicit in the work of most stylists and rhetoricians.

The abstract elements are in turn used as the basis for rules defining high-level stylistic goals. Stylistic goals can be organized along orthogonal dimensions. For example, a writer might try to be clear, or obscure, or make no effort either way. *Clarity* and *obscurity* are thus opposite ends of a stylistic dimension. Likewise, the goals of *concreteness* and *abstraction* form a dimension, and so do *staticness* and *dynamism*.

We adapted descriptions of stylistic goals from textbooks of style and rewrote these descriptions in terms of our abstract elements. Clarity, for example, is characterized by simple sentences with a straightforward linear ordering, by more-complex sentences that are still concordant but have a hierarchical structure, and by parallel sentences. Concreteness is associated with sentences that highlight a particular component: these are sentences that interrupt the usual ordering or are otherwise discordant. And staticness is characteristic of 'fixed-form' sentences in which there is little stylistic variation, that is, sentences that are actually overly concordant.

To this basic unilingual model of style, we added rules of comparative stylistics that describe how sentence structure in the source language may be preserved or modified in the target-language sentence, with consequent maintenance or variation in rhetorical structure and stylistic goals (Di-Marco and Mah (*in press*)). In the section below, we give examples of how our model could be used to choose among different structures for a target-language sentence and show how the stylistic goals would be affected.

### 3 Applying the model to stylistic choice

As we noted above, our model of comparative stylistics gives rules defining rhetorical properties related to syntactic parallelism, nested structure, and linear ordering. For all these properties, we can choose to vary syntactic structure to produce different stylistic effects. For example, we can decide whether to nest a component within a nominal group or 'break it out' into the top-level clause; we can also choose among different arrangements for the placement of components at the top level of the sentence. In the examples below, we show how these kinds of syntactic choices can be made in translation to either maintain the style of the original text or produce a different effect.

#### 3.1 Choosing the same style

The default choice when we translate will be to produce a corresponding structure in the target language that will preserve the style of the source text. In sentence (1) below, we need to decide how to translate a postmodifying clause; in sentences (2) and (3), we show two possible variations, the literal translation and the more elegant actual translation:

- (1) Mais maintenant, les chercheurs présument que des radicaux libres d'oxygène, métabolites naturels, mais nocifs, pourraient être les principaux déclencheurs de la réaction en chaîne qui aboutit à la cataracte.<sup>3</sup>

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<sup>3</sup> Andy Dappen. "A l'attaque de la cataracte." *Canadien*, 4(9), janvier 1991, pp. 15-16.

- (2) But now, the researchers presume that oxygen free-radicals, natural, but harmful, metabolic by-products, may be the main trigger of the chain reaction that leads to cataracts. (literal translation)
- (3) But now researchers feel free radicals of oxygen, natural but harmful bi-products of our metabolism, are the prime suspects in starting the domino reaction leading to cataracts.<sup>4</sup>

In this example, the relative clause in the French sentence could be translated either as another relative clause in English, or as a reduced relative (participle) clause. According to our model, the French relative clause is cohesive and concordant, producing an effect of clarity. Either variation (2) or (3) would maintain this effect, but sentence (3), which uses an elliptical structure, is considered more cohesive in English, and therefore slightly clearer. In this case, the second variation has been chosen to maintain the same degree of clarity across the translation.

### 3.2 Choosing a different style

While maintaining the same style in translation may be the most usual choice, there will also be situations where the style has to be changed in order to make the target-language text sound more natural. In the French sentence (4) below, the adverbial clause has been placed in a very canonical, concordant position at the end of the main clause. We might choose to maintain this position in translation, as in sentence (5), or move the clause, as in sentence (6):

- (4) L'instabilité régnera jusqu'à la mise en place de nouveaux arrangements.<sup>5</sup>
- (5) The instability will remain until the putting in place of new arrangements, (literal translation)
- (6) Until a future arrangement is understood, there will be instability.<sup>6</sup>

We consider the French sentence, (4), to have a clear, canonical structure, and we could choose to preserve this effect of clarity by keeping the same linear arrangement in the English translation, as in (5). But English tends to favour a more concrete style (Vinay and Darbelnet 1958), so that fronting the adverbial clause, as in (6), will highlight the clause and create an effect of immediacy and concreteness. Note though that the choice is not always so deterministic, as it may be the case that while the French source sentence has a concrete style, we may choose a simpler, clear structure for the English translation if the resulting effect sounds less disruptive.

<sup>4</sup> Andy Dappen. "Preventing cataracts." *Canadian*, 4(9), January 1991, pp. 15-16.

<sup>5</sup> Unknown author. "L'avenir du pays." *Canadien*, 4(9), janvier 1991, pp. 67-75.

<sup>6</sup> Unknown author. "Looking ahead." *Canadian*, 4(9), January 1991, pp. 67-76.

### 3.3 Choosing the same style in a non-obvious way

The choice of whether to preserve or modify style in translation becomes even more complicated when we consider options that satisfy this primary aim, but do so in a non-obvious way. For example, in the translation below, an interrupting prepositional phrase can be maintained in the same position (8), or moved within the sentence (9):

- (7) Dans sa petite robe noire, les yeux cernés par les larmes et la fatigue, Germaine raconte: « Mon frère perdait son sang, et je n'ai rien pu faire. »<sup>7</sup>
- (8) In her little black dress, her eyes shadowed by tears and fatigue, Germaine said, "My brother was losing blood, and I couldn't do anything." (literal translation)
- (9) "My brother was losing blood, and I couldn't do anything for him," said Germaine, a woman in a little black dress, tearful and hollow-eyed with fatigue.<sup>8</sup>

In either variation (8) or (9), we would preserve the highlighting of the prepositional phrase, and hence both versions would display concreteness. Both arrangements would preserve the style of the source sentence; the particular choice would depend on the degree of 'naturalness' or simply a desire for 'elegant variation' over a number of similar translations.

### 3.4 Choosing a different style in a non-obvious way

Finally, we may choose to modify the style in translation, but do so in an unexpected way to make a striking rhetorical statement. In the example below, the cohesive, concordant, canonical structure of sentence (10) could be maintained as in (11), but could also not only be modified, but in a rather unusual and emphatic manner, as in (12):

- (10) On leur a dit aussi que trop peu de professeurs méritent le qualificatif de remarquables ou d'excellents, surtout à cause des attitudes vis-a-vis de l'enseignement car la communauté universitaire ne souligne pas assez la valeur de l'excellence à ce chapitre.<sup>9</sup>
- (11) We also told them that too few professors warranted the status of remarkable or excellent, particularly because of attitudes with regard to education for the university community doesn't stress enough the importance of this issue. (literal translation)
- (12) They also heard that too few teachers can be described as outstanding or excellent, primarily because of attitudes towards teaching—not enough is done in the academic community to emphasize the value of teaching excellence.<sup>10</sup>

<sup>7</sup> Françoise Chipaux. "Bsouss, village libanais martyr." *Le Monde*, octobre 1990, pp. 1, 3, 21-22.

<sup>8</sup> Françoise Chipaux. "Bsouss, the martyred village." *Manchester Guardian Weekly*, 143(17), 28 October 1990, p. 13.

<sup>9</sup> Gloria Pierre. "Encore à propos d'enseignement et de recherche." *Affaires universitaires*, 32(2), février 1991, p. 2.

<sup>10</sup> Gloria Pierre. "What about teaching? and publishing?" *University Affairs*, 32(1), January 1991, p. 2.

In version (12), the clarity of the French sentence (10) been replaced by a concrete effect, by setting off the terminal clause by disruptive discordant punctuation. In this case, the straightforward structure of the source sentence, and its literal translation, have been avoided in favour of an emphatic, much more rhetorically strong, translation.

## 4 A closer look at the computational model

### 4.1 Basic elements of style

As we noted earlier, in our computational model, each component of a sentence is assigned a stylistic classification according to two syntactic properties: its contribution to cohesion within the sentence and its degree of nesting within the hierarchical structure of the sentence. In this paper, we are concerned only with stylistic effects that either contribute to or disrupt intrasentence cohesion.

Cohesion is defined in terms of a component's 'conjunctness', or connectivity, and so a component can be conjunct<sup>0</sup> (neither cohesive nor disruptive), conjunct<sup>1</sup> (mildly cohesive), conjunct<sup>2</sup> (moderately cohesive), and so on, up to conjunct<sup>6</sup> (excessively cohesive). We also have a complementary scale of *antijunctness*, which measures disruption in cohesive structure. We assign a degree of cohesion according to rules based on Halliday and Hasan's (1976) classifications of the relative cohesive strengths of substitution, ellipsis, reference, and conjunction. We also added a new factor, interpolation, a disconnective factor that works against cohesion. So, for example, an instance of ellipsis is classified as strongly connective, conjunct<sup>4</sup>, while a referential structure is judged to be only moderately connective, conjunct<sup>2</sup>.<sup>11</sup>

### 4.2 Abstract elements of comparative stylistics

The basic elements of style are grouped into patterns that describe the more general abstract elements. In our model, we use the following groups of abstract elements to describe stylistic properties, associated with cohesive structure, that can be maintained or modified in translation:

**Concord:** Elements associated with effects of cohesion in translation.

A concord can be *augmented* (the degree of cohesion is increased in translation), *diminished* (the degree of cohesion is decreased), or *sustained* (the same degree of cohesion is maintained).

**Discord:** Elements associated with too little or too much cohesion.

A discord can also be *augmented*, *diminished*, or *sustained*, depending on whether the degree of cohesion is increased or decreased too much, becomes concordant, or is maintained at the same level in the translation.

<sup>11</sup> Green (1992) and Hoyt (1993) present the full details of all the classifications at the basic level of our model of English stylistics.

**Heteropoise:** Elements associated with an interruption, or parenthesis, in the linear ordering of a sentence in translation.

A heteropoise can be *augmented* (a parenthesis is introduced in the translation), *diminished* (a parenthesis is removed), or *sustained* (a parenthesis is maintained). There are several types of sustained heteropoise: *non-shifted* (parenthesis remains in the same position within the sentence in translation), *front-shifted* (parenthesis moves to start of sentence), *medial-shifted* (parenthesis moves to middle), or *end-shifted* (parenthesis moves to end).

In Section 3.1, we observed how the relative clause, *qui aboutit à la cataracte*, in the French sentence (1) would best be translated as the reduced relative clause, *leading to cataracts*, in the English sentence (3). In our model, a full relative clause is classified as an instance of reference, and so is a conjunct<sup>2</sup> postmodifier; a reduced relative clause is classified as an instance of ellipsis, and so is a more cohesive conjunct<sup>4</sup> postmodifier.

Such correspondences between French and English syntactic structure are grouped according to the kind of stylistic transformation that they describe. A rule of comparative stylistics is formed from the pairing of a type of transformation, i.e., an abstract element of comparative stylistics, with all the correspondences that can produce it. For example, an *augmented concord* could be realized in a translation by a change from a conjunct<sup>2</sup> postmodifier (a relative clause) to a conjunct<sup>4</sup> postmodifier (a reduced relative clause).

In DiMarco and Mah (*in press*), we present the full set of rules in our model and discuss how it might be incorporated into a general machine translation system to provide additional information on the various translation choices and their potential stylistic effects.

## 5 Conclusion

When we translate, we often have a number of different ways of expressing the content of the source-language sentence and each variation can have a subtly different stylistic nuance that will affect the overall meaning conveyed. We have shown how a computational model of comparative stylistics provides rules that can be used to select among the possible translations, using knowledge of the stylistic effect of each choice. Such stylistic decision-making can enable a machine translation system to make more informed decisions about the effectiveness and the appropriateness of the resulting target-language text.

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