Part 2. Intonation and macrosyntax

In part 1 of lessons 3 and 4 devoted to spontaneous speech, we presented some software tools to transcribe and align large corpora. In this lesson, we will describe an innovative approach to describe the interaction between syntax and intonation, based on a macro syntactic model integrating prosodic components.

INTRODUCTION

The linguistic analysis of spontaneous speech brings new challenging questions in the study of language. First, transcription and interpretation problems may arise from the presence of speech events such as hesitations, repetitions, false starts, corrections, etc. However, we can easily disregard these disfluencies as they clearly do not belong to the linguistic code. More serious linguistic interpretation problems appear in non prepared speech production as sequences of words are often not well formed in the (classical) syntactic sense. Many studies have been conducted recently on the linguistic characteristics of such characteristics, but they were mainly concerned by their syntactic properties. By contrast, this lesson proposes an integrated view of the interaction between prosody and syntax in spontaneous speech based on a macrosyntactic approach.

SYNTAX AND MACROSYNTAX

Having discarded the disfluent speech events (hesitations, repetitions, false starts, corrections, etc.) from the data (Blanche-Benveniste, 2000), non prepared speech appears frequently as word sequences hard to interpret by present classical syntactic theories. Examples such as (in French) *je pars non finalement une bière* (I was going to leave finally no a beer) appear at first difficult to interpret with classical grammar(s). Although they seen perfectly well formed when heard by human listeners (and read with appropriate punctuation), their written transcription shows many syntactic “errors”, often due to the lack of some key categories (verbs, conjunctions, etc.). In order to avoid traditional views which often consider spontaneous productions as deviant from the standard, we will follow another approach, namely macrosyntax, pioneered by linguists such as Blanche-Benveniste (2000), J. Deulofeu (2003), Berendonner (1991) or others for French.

In a macrosyntactic approach, sentences appear as sequences of macrosegments, well formed in the classical sense (although this constrain may have to be lifted at some point), in relations of parataxis or rection with each other (parataxis equals a relation of combination - i.e. independence -, and rection corresponds to a relation of selection in a
dependency model). The absence or reversing of a direct or indirect dependency relation towards another syntactic element in a sequence would then indicate a boundary between macrosegments.

Among other markers (for instance of semantic nature) indicating the structure of the macrosegments in the sentence, it can be shown that intonation plays a key role with the same prosodic mechanism found in prepared speech sentences (Boulakia, Deulofeu, Martin, 2001). In French for example, the contrast of melodic slope is typical in organizing long sequences of macrosegments in non prepared speech (see lesson 1). Figure 1 illustrates this mechanism for French.

![Fig. 1. Contrast of melodic slope in French. The upper part of the figure gives the fundamental frequency contour of the declarative sentence Agneau ou veau il faut que le beau rôti soit chaud. The stressed syllables of the prosodic groups Agneau ou veau and il faut que le beau rôti soit chaud are ended by melodic contours of opposite slope placed on the respective stressed syllables of each group. The lower part of the figure corresponds to the same sentence but with an interrogative modality indicated only by intonation. The melodic slopes on the same stressed syllables are inverted.

In spontaneous speech, the sentence is organized in a sequence of macrosegments well formed syntactically. One of these macrosegments can be extracted from the others and form a complete well formed sentence both on the syntactic and prosodic levels: the Noyau. The macrosegments placed before the Noyau in the sentence are called Prefixes, the one inside Parentheses (or Imbedded), and two kinds of macrosegments may appear after the Noyau: the Postfixes and the Suffixes. The Postfix corresponds to the classical theme in a rheme-theme organization of the sentence, whereas the Suffix bears an independent prosody and is linked to the Noyau by a syntactic or semantic relation.
In summary, we have thus on the syntactic level:

\[
\text{Prefix} \quad \text{Noyau1} \quad \text{Parenthesis} \quad \text{Noyau2} \quad \text{Postfix} \\
\text{Suffix}
\]

These various macrosegments, Prefixes, Parentheses, Noyau, Postfixes and Suffixes are syntactically independent from each other in the sentence, but are glued together in the sentence thanks to the prosodic structure, which assembles the different macrosyntactic elements. By the same token, prosodic macrosegments organized by well formed prosodic structures can also exist in spontaneous speech, and are this time assembled by syntactic relations. This is the case for Suffixes, and can be the case for Parentheses as macrosegments with independent prosodic structures.

The assembling of macrosegments by prosody in the sentence uses the same mechanisms that the one used in simple read sentences to indicate the prosodic structure organizing stress groups. In French for example, these mechanisms involve contrasts of melodic slope (i.e. rising vs. falling or falling vs. rising) placed on effectively stressed syllables (defining the stress groups as minimal prosodic units) (Martin, 1975, 1987).

![Classical association prosody syntax](image)

Figure 2. An example of read sentences, showing a prosodic structure congruent to syntax. The contrast in melodic slope is, in French, the key mechanism which encodes this structure.

Figure 3 summarizes gives some examples of the various macrosegments before, inside and after the Noyau.
Figure 3. Various configurations of syntactic macrosegments before, inside and after the Noyau.

Figure 4 gives an example of a prefix with an acoustical analysis showing melodic rises on the stressed part of the fundamental frequency curve (highlighted in red).

Figure 4. A sentence with the Noyau preceded by three Prefixes.
The example of figure 5 illustrates the case of an imbedded macrosegment with an independent prosodic structure (ending with a declarative falling contour highlighted in red).

Figure 5. A sentence with a Parenthesis (Imbedded) macrosegment inside the Noyau.

Figure 6 shows a postfix with a somewhat flat melodic curve following the Noyau final falling melodic contour. The Postfix, equivalent to the theme in a classical Theme-Rheme organization, has no syntactic relation with the Noyau.

Figure 6. An example of a Noyau followed with a Postfix. This configuration corresponds to the classic broad focus.
By contrast, figure 7 is an example of a macrosegment following the Noyau, but with an independent prosodic structure (ending with a declarative falling melodic contour), and a semantic relation with the Noyau.

![Figure 7](image)

Figure 7. A sentence with a Noyau followed by a Suffix. Both macrosegments bear independent prosodic structures, ended with a falling declarative melodic contour.

Figure 8 summarizes the overall organization of the macrosyntactic model, showing the interaction between (macro) syntax and prosody. Syntactic macrosegments appear floating in the sentence and are glued together by the prosodic structure, whereas sentence prosodic macrosegments, floating in the overall prosodic macrosegments may be glued together by syntactic relations (in the case of a Suffix).

![Figure 8](image)

Figure 8. Overall macrosyntactic configuration of a sentence.
PROSODIC ORGANIZATION OF SYNTACTIC MACROSEGMENTS

The following figures illustrate the prosodic system linking together various types of syntactic macrosegments to form the whole sentence.

Figure 9. An example of a Prefix+Noyau structure for the sentence *le lendemain grande surprise* (Next day big surprise). The Prefix *le lendemain* is made part of the sentence thanks to the prosodic structure, and bears a rising melodic contour, of inverse slope of the sentence final declarative falling contour.

Figure 10. An example of Noyau+Postfix structure (broad focus): *à la caisse ils se pèsent* (at the cash register they are weighted). The Noyau ends with a falling melodic contour of high amplitude of fundamental frequency variation, whereas the Postfix shows a falling contour with a much more restrained variation (very often this contour is flat). Both of these melodic contours are necessary to indicate such a structure, which is clearly different from a Noyau+Suffix as shown figure x.
Figure 11. A Noyau+Suffix structure: *j’achète beaucoup de médicaments qui ne sont pas remboursés* (I buy a lot of prescription which are not reimbursed). The sentence has two independent prosodic structures ending with declarative falling terminal contours, the cohesion being realized by a syntactic relation instantiated by the relative pronoun *qui*.

The distinction between Noyau+Postfix and Noyau+Suffix appears more clearly in interrogative cases. In an example such as *à la caisse ils se pèsent ?* (are they weighted at the cash register), two rising contours appear on the last syllables of both the Noyau and the Postfix, whereas when an interrogative Noyau is followed by a Suffix, the Noyau will bear an rising contour and the Suffix a falling one. In *tu vas souvent en Hollande parce que je voudrais y aller aussi ?* the Noyau *tu vas souvent en Hollande* ends with a rising contour marking the interrogative modality, but the Suffix *parce que je voudrais y aller aussi* linked syntactically with the Noyau by the conjunction parce que ends with a declarative falling contour.

Figure 12. An example of Parenthesis (imbedded macrosegment) *tout le monde faisait j’en ai fait moi-même de l’aviron* (everybody was rowings I was myself rowings). Both sections of the Noyau *tout le monde faisait* and *de l’aviron* are separated by the Parenthesis *j’en ai fait moi-même*, which has an independent prosodic structure (ended by a falling contour on *même*) imbedded in the prosodic structure of the Noyau.
COMBINING MACROSEGMENTS

By definition the Noyau is syntactically and prosodically well formed. It is thus possible with a signal processor to experimentally extract the Noyau from the complete sequence and obtain a new, shorter, well formed complete sentence. The following configurations of the Noyau syntactic and prosodic structures are possible:

a. The Noyau prosodic and syntactic structures do correspond to each other on the time line;

b. The Noyau prosodic and syntactic structures of the do NOT correspond to each other. The prosodic structure incorporates other macrosegments than the Noyau, such as Prefix(es) and / or Postfix(es). The prosodic structure covers a larger domain than the Noyau syntactic structure;

c. The Noyau prosodic and syntactic structures of the do NOT correspond to each other. The syntactic structure encompasses the prosodic Noyau and one or more prosodic structures attached to Suffixes.

Both syntactic and prosodic Noyau contain modality markers. A change in modality of a macrosegment can thus establish it as a Noyau, as the other macrosegments prefixes and postfixes cannot have their modality changed independently from the Noyau.

Two independent prosodic structures exist in a Noyau + Suffix configuration. Therefore, the change of modality of the Noyau by the substitution of the final falling declarative
melodic contour by an interrogative rising contour will not involve a change in the final melodic contour of the Suffix.

The Noyau can be preceded by Prefix(es), followed by postfixe(s) and suffixe(s) and contain one ore more embedded, syntactic or prosodic.

In summary:

Syntactic level

{Prefix} Noyau1 {Embedded} Noyau2 {Postfix}
{Suffix}

1. Postfixes and suffixes can coexist in the sentence. To the question il habite dans le Midi ? the answer Oui, il y habite dans le Midi, à Marseille with Oui as Prefix, dans le Midi as Postfix, and à Marseille as Suffix.

2. Prefixes, Postfixes et Suffixes being permutable, necessarily belong to the first level of the (surface) syntactic structure. We can have De sa poche il sort une pince de jardinier (Sabio), Il sort une pince de jardinier de sa poche, but not *De jardinier il sort de sa poche une pince.

Prosodic level

Noyau1 {Embedded} Noyau2 {Postfix}
{Suffix}

There is apparently no prosodic Prefix, as no specific prosodic marker exists in French to oppose the end of a prosodic prefix to the end of a Noyau first level (continuation contour). This specific boundary prosodic marker is not necessary for embedded prosodic segments, as they are contained inside the overall prosodic structure of the Noyau (as syntactic embedded macrosegments are contained inside the syntactic Noyau).

Since Prefixes, Embedded, Postfixes and Suffixes can be removed from the sentence to leave a well formed Noyau, alignment necessarily exists between the final syntactic and prosodic elements. The final prosodic marker is as well, in French, a marker of the declarative or interrogative modality.

Numerous studies on macrosyntax (C. Blanche-Benveniste, Berendonner, Deulofeu,….) did investigate the constrains (essentially of semantic nature) governing the role of macrosegments as Prefixes, Postfixes or Suffixes. It seems nevertheless that any prefix can become a Postfix if it is the only Prefix in the sentence.
Références

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