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## ► To cite this version:

Cristel Portes, Uwe Reyle. Combining syntax and prosody to signal information structure: the case of French. Speech Prosody 2022, May 2022, Lisbon, Portugal. [https://www.isca-speech.org/archive/speechprosody\\_2022/index.html](https://www.isca-speech.org/archive/speechprosody_2022/index.html), 10.21437/SpeechProsody.2022 . hal-03964706

**HAL Id: hal-03964706**

**<https://hal.science/hal-03964706>**

Submitted on 14 Feb 2023

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# Combining syntax and prosody to signal information structure: the case of French

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## Abstract

The work on informational structure (IS) in French highlights two types of markers: syntactic constructions and prosody, but often without looking at their interactions. The only studies that focus on both aspects have studied the prosody of syntactic constructions themselves without conceiving the complementarity of syntax and prosody. Our perspective is different and shows that syntax and prosody operate both independently and jointly to shape the informational structure of French.

This paper relies on the extensive analysis of a 45 min radio debate, entirely annotated for IS, syntax and prosody. For IS, we used an annotation procedure that retrieves the implicit question under discussion (QUD) for each utterance, and defines its focus, focus domain, potential contrastive topic, topic and not-at-issue contents [1]. For syntax, we identified the constructions that have been proposed to encode IS: clefts, left and right dislocation, presentationals and subject-verb inversion [2]. For prosody, we used a phonological approach and the French ToBI framework [3].

The intersection of syntactic, prosodic and QUD analyses show that, indeed the syntactic constructions cited above encode topic, focus and background, that prosody alone encodes IS in sentences without these constructions, but crucially, that syntax and prosody interplay in conveying more subtle IS organization.

**Index Terms:** information structure, Question Under Discussion, syntactic constructions, prosody, French

## 1. Introduction

In flexible accent languages like English or German focus is marked by a shift in prominence and givenness is signaled by deaccenting [4]. Conversely, in Romance languages, prominence shift is rare and restricted to a few contexts, i.e., emphatic stress or correction [5, 6], and syntax plays a major role [7]: word order in Italian and Spanish and special syntactic constructions in French. In French, each of these constructions have been proposed to preferentially associate with one of the following IS articulation [7, 2]: left (1a) and right (1b) dislocations convey “predicate-focus articulation” by dislocating a topic and focusing the predicate, cleft (2) conveys “argument-focus articulation” by isolating the focused expression, and presentational constructions (3) convey “sentence-focus articulation” in building all-focus utterances.

(1) What about a job?

a. Du travail, Pierre en cherche. *Peter is seeking a job.*

b. Pierre en cherche, du travail. *Peter is seeking a job.*

(2) How does Julie travel?

C’est en train que Julie voyage. *Julie travels by train.*

(3) What is going on?

Il y a le taxi qui arrive. *The taxi’s arriving.*

Consequently, many theoretical and corpus studies investigated the prosodic properties of these constructions. Hence, right dislocation has been said to be realized mostly with prosodic compression to signal background, except in questions where it can be phrased in a high plateau [8, 9, 10]. Left dislocation is mostly phrased in a major prosodic constituent with a rising intonation contour which may be asserting or questioning [11], or with a rise-fall signaling disagreement between the interlocutors [9]. As for clefts, they were said to bear the nuclear pitch accent followed by pitch range compression when focusing the clefted argument, or to have the clefted constituent in a major phrase with a rising contour in all focus utterances [10, 12].

Finally, non-clitic subject-verb inversion has been claimed to focus the subject and background the verb phrase, at least in some constructions like free inversion [13].

Furthermore, experimental approaches have investigated the role of prosody alone in marking IS in French. For instance, [14] claimed that phrasing is the main reflex of information structure with the consequence that only constituents that are not embedded and at least the size of the Phonological Phrase (PP) can be compressed as a correlate of givenness. In support of this argument, [15] found no compression on post-focal adjectives in noun + adjective segments, and [16] found compression on adjuncts but not on arguments in verb + complement segments. This is compatible with the claim that French accentuation is governed by a bipolarization principle, which explains the formation of accentual arcs deemed to indicate focus on constituents of various length [17]. These arcs are bordered by the realization of both the initial rise (IR) and the final accent (FA) that characterize French accentual phrase (AP, see section 2.2 below) [18]. Indeed, the enhancement of both IR [19] and FA [20] have been shown to contribute to focus marking. Nevertheless, and contra the phrasing hypothesis, [21] showed that accent shift within the PP was empirically attested in adjective-noun/noun-adjective constituents, and that this is the case in corrective context only, but neither in contrastive nor in parallelism contexts because the scope of the focus domain is minimally the clause in French (the scope hypothesis).

The present study investigates the articulation between the semantic dimension of IS and its syntactic and prosodic transmission through the detailed analysis of 45 minutes of conversation. It aims at empirically verifying in corpus data what has been claimed about IS in French in theoretical and experimental studies.

## 2. Material and method

### 2.1. Data

We used a corpus of radio debate in French, of 45 minutes length, confronting 6 interlocutors among which 2 interviewers and 4 invited speakers (2 politicians and 2 scholars).

The corpus was automatically annotated for phones, syllables and words [22]. It was manually annotated for discourse units, syntactic constructions, intonation and IS.

Concerning syntactic constructions, we manually identified the various constructions that have been proposed to encode IS, i.e. clefts, left and right dislocation, presentational constructions and subject verb inversion, using detailed descriptions mostly provided by [2, 9, 10, 12 and 13].

Concerning intonation and IS, we detail our approach in the following sections.

### 2.2. French intonation in the ToBI framework (F\_ToBI)

Within the autosegmental-metrical (AM) approach, French intonation is characterized by a mandatory final accent (FA) occurring on the last full syllable of the accentual phrase (AP) and an optional initial rise (IR) occurring on the first syllable of the first content word of the AP. In F\_ToBI [3], IR is coded as (L)Hi while FA can be implemented by various pitch accents: H\*, L\* and H+!H\*.

In addition to the AP, French intonation has two prosodic constituents: the intermediate phrase (ip) and the intonational phrase (IP). Most clauses are phrased as an independent IP ending with H%, L% or !H% boundary tones. Long branching, incidental or detached constituents, as well as non-final focus constituents may be phrased as ips ending with H- or L- phrasal tones.

The intonation of the entire corpus has been manually annotated by the first author using F\_ToBI. A counter-coding on a part of the corpus is planned but not yet available.

### 2.3. The QUD annotation scheme for IS

The principle of the QUD annotation framework for discourse analysis is to retrieve the implicit question to which each discourse unit is an answer to [23, 24, 25]. These QUDs organize into a QUD tree, like the example in Figure 1 below.

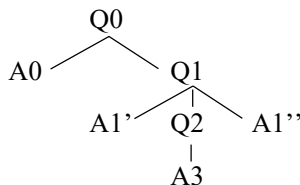


Figure 1: Discourse tree with elementary discourse units (As) and QUDs (Qs).

QUD trees reveal both the IS of each elementary discourse unit and the discourse structure of the analyzed sample. QUD reconstruction relies on clearly defined principles [1, 26] and has been applied to typologically different languages [27, 28].

The IS categories used for the annotation are the following: Focus (F: Answer to the current QUD), Focus Domain (~: parallel piece of discourse that consists of obligatory Focus and optional Background [29]), Aboutness Topic (T: referential entity in the background [30]), Contrastive Topic (CT: focused topic which signals a discourse strategy [23]), Not-at-issue content (NAI: optional material w.r.t. the QUD [26, 31]).

## 3. Analysis

The QUD analysis of the corpus defined 593 assertive utterances and 11 explicit interrogative utterances. We therefore reconstructed 582 implicit questions (Qs) to which the 582 assertions that don't answer to the 11 explicit questions are answers (As).

### 3.1. Syntactic constructions and their prosodic realization

#### 3.1.1. Left and right dislocation

We found 34 occurrences of left dislocation, all conveying a topic and phrased in their own prosodic constituent, most of which were major phrases ending in H\*H- or H\*H% as previously described [9]. Unexpectedly, 10 occurrences were phrased in a simple AP ending with H\*: a possible explanation is the stronger degree of salience of these topics, and another is the shorter length of the constituent. An interesting but unique occurrence bears a major fall with LHiL\*L% on the detached constituent as shown in Figure 2 below.

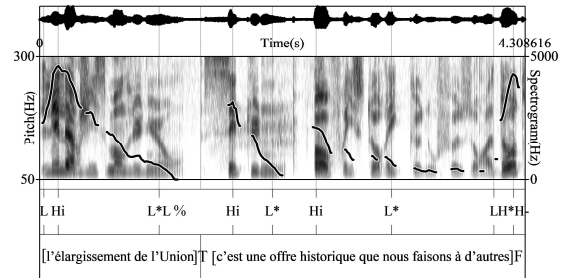


Figure 2: The falling contour LHiL\*L% on the left dislocated constituent 'l'élargissement de l'Union' the enlargement of the Union.

The unique occurrence of right dislocation is also interesting because the dislocated constituent is neither deaccented nor compressed as expected, but its givenness is marked by a faster speech rate.

#### 3.1.2. Cleft

We found 12 clefted utterances, among which 10 correspond to [2]'s argument-focus articulation. The remaining 2 are all focus utterances. The clefted elements are generally positioned to the left of their matrix clause, but they can also occur to the right (2 occurrences). Their intonational patterns are heterogeneous (rises, falls, rise-falls), but the prosodic realization of the backgrounded clause is regular: it is never completely deaccented but rather and systematically compressed. Indeed, none of these clauses have a content which is overtly given in the context. Rather, their givenness

is implicit and corresponds to the rule “maximize anaphoricity” [23] in the QUD analysis. Figure 3 shows an utterance where even the given part of the clefted constituent is prosodically compressed, showing that prosody alone can shape a focus within the cleft.

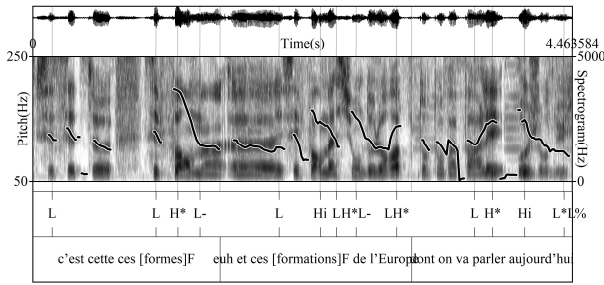


Figure 3: Parallelism of the focused ‘ces formes/ces formations’ these forms/these formations within the clefted constituent, each phrased in an ip with a LH\*L- rise-fall. The post-focal ‘de l’Europe’ of Europe has a compressed pitch range within the clefted element.

### 3.1.3. Presentational with ‘avoir’

Secondary predication constructed with the verb ‘avoir’ to have, is the most common form of presentational constructions in French. We found 17 occurrences, 11 of which using ‘il y a’ like in example (4) below.

(4) [[il y avait un autre point / en / de / Alain Lamassour / que vous mettiez en évidence / dans votre euh dans votre article]F]~

there was another aspect / in / by / Alain Lamassour / that you emphasized in your article

Like (4), most of these constructions are all focus utterances, except the one presented in Figure 4 below which shows an utterance with both a contrastive topic (CT) and a focus (F) revealing a strategy [23].

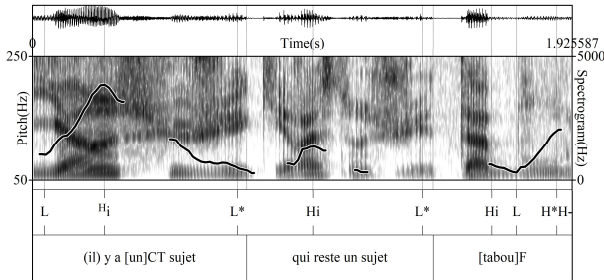


Figure 4: Presentational construction with a CT internal to the 1<sup>st</sup> predicate ‘il y a un sujet’ there is one issue, and a focus final of the 2d predicate ‘qui reste un sujet tabou’ which remains a tabu issue.

Note that, in the 1<sup>st</sup> predicate, the focused ‘un’ one is prosodically marked by a very high initial rise (Hi) while ‘sujet’ issue is backgrounded through the choice of a low pitch accent L\*. We will come back to this LHil\*L\* pattern below.

### 3.1.4. Non-clitic subject-verb inversion

There are only 3 occurrences of non-clitic subject-verb inversions in our corpus: 1 with all focus, 1 with broad focus on the verb-phrase with a backgrounded inverted subject and 1 with a focused inverted subject. This variety of IS status is compatible with [13]’s observations. The focused inverted subject case is especially interesting since its focus constituent

contains a smaller prosodically marked embedded focus as shown in Figure 5.

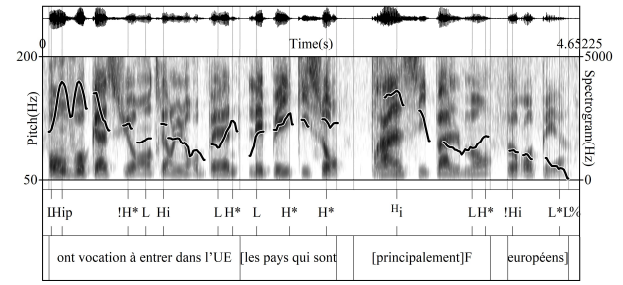


Figure 5: The prosodically marked focus ‘principalement’ mainly, phrased alone between silent pauses, with a HiLH\* intonation pattern and a lengthened speech rate is embedded in the syntactically marked focus, i.e. the inverted subject ‘les pays qui sont principalement européens’ the countries which are mainly european.

## 3.2. Prosodic marking of IS

In this section, we report the main and/or most interesting prosodic realizations of focus and background in our corpus.

A first interesting observation is that the majority of focus domains (at the end of the As) end in a major phrase bounded by a major pitch movement that can be falling (Fig. 3), but which is most often rising (Fig. 2 and 4). This is in line with the fact that, for 73% of the As, the end of the focused constituent corresponds to the end of the focus domain like in example (4) above, so that their right boundary easily corresponds to a major prosodic boundary [16]. The remaining 27% of the As, as illustrated by example (5) below, have additional material between the end of the focus and the end of the focus domain. In most of these cases, the illocutionary pitch contour should be shifted to the left as proposed by [32] and the post-focus constituent should be prosodically compressed. This is the case for (5) where the prosodic compression is achieved in the high level of the pitch range after a rising illocutionary pitch contour.

(5) [il est [l’auteur [également]NAI de de deux ouvrages]F sur l’Europe]~

As for the prosodic marking of the focused constituent, it is different in short and long occurrences. When the verbal material is short (1 to 5 syllables) like in most experimental studies, the prosodic marks are quite similar to what has been found in experiments. As often reported [17, 18, 19, 32], we found more occurrences of the initial rise (L)Hi promoted by a higher pitch range like in Fig. 4 and 5. Our data also confirm the role of the insertion of an ip boundary through a phrasal tone. This can be H- as experimentally attested by [20] and shown in Figure 6 below, or L- as first proposed by [18] and illustrated in Fig. 3 above.

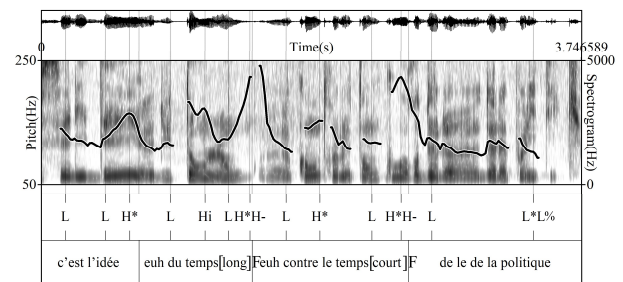


Figure 6: Two parallel foci on ‘long’ long and ‘court’ short within the comparative structure ‘c’est l’idée du temps long contre le temps court de la politique’ that is the idea of the long run against the short run of politics, both prosodically marked by the insertion of a H- phrasal tone on their right edge, enhancing the H\* pitch accent.

As for longer focused constituents (more than 5 syllables), three well-defined strategies can be identified: the accentual arc, the proliferation of accents and the prosodic promotion of chosen words within the focused phrase.

The accentual arc has been defined by [33] and proposed to be a marker of focus by [17]. It combines the promotion of Hi with that of H\* with pitch range compression in between. Figure 7 shows a representative example from our corpus. Note that, contrary to what is usually assumed, AP boundaries and accents (L\*, Hi) may occur in the middle of the arc, provided that pitch range is compressed. The AP pattern (L)HiL\* is very common to initiate accentual arcs in our data.

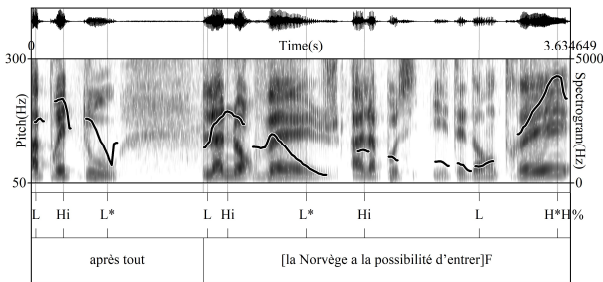


Figure 7: The all focus sentence ‘la Norvège a la possibilité d’entrer’ Norway has the possibility to join in, is phrased with an enhanced initial rise LHi on its 1st syllable and a final major rise on its right boundary, forming an accentual arc.

As far as we know, the proliferation/densification of accents has not been identified as a marker of focus in previous literature, although several speakers use it several times in our corpus. Figure 8 displays a typical example where almost all syllables of the focused constituent bear an accent (Hi or H\*), contrasting with the pre-focal backgrounded segment.

The occurrence shown in Figure 2 above illustrates the 3d strategy where the speaker highlights several words within a long focused constituent to indicate their more relevant contribution to his communicative intention. In this case, within the focus ‘c’est une offre historique que nous faisons à d’autres’ it’s a historical offer that we are making towards others framed in an accentual arc, both ‘offre’ offer and ‘historique’ historical are highlighted by an enhanced Hi.

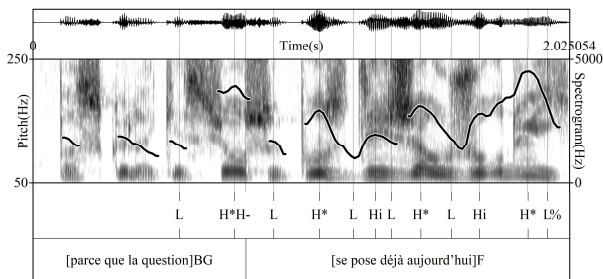


Figure 8: The broad focus VP ‘se pose déjà aujourd’hui’ arises already today is realized with a high density of Hi and H\* while the backgrounded ‘parce que la question’ because the question is realized with a unique pitch accent H\*.

## 4. Discussion and perspectives

Our examination of 45 minutes of natural conversation empirically confirms many claims of previous literature about the syntactic and prosodic marking of IS in French. Indeed, dislocations mostly signal topics, clefted constituents are focalized and presentational constructions convey sentence-focus articulation. Moreover, most detached constituents are phrased in major prosodic phrases, even if we found left dislocated elements phrased in a simple AP. Future research should determine if it is because of the stronger degree of salience of the associated topics or because of the shorter length of the constituent. Our corpus data also confirm that the promotion of the IR (L)Hi and the insertion of an H- or L- ip boundary both regularly contribute to prosodic focus marking as well as their combination into an accentual arc. We also confirm that pitch range compression rather than total deaccenting is the most common way to mark givenness, and that speakers also manipulate speech rate to mark focus through lengthening, and background through accelerating. However, we also brought out undocumented prosodic marking of focus, especially through the highlighting of crucial words (Fig. 2) or the densification of accents (Fig. 8) in long constituents.

Another original contribution is attested by the many cases where prosody marks embedded foci within prosodic constructions, like within the clefted constituent in Fig. 3 or the inverted subject in Fig. 5, or the 1<sup>st</sup> predicate in the presentational construction in Fig. 4. Many such examples in our corpus attest how speakers combine syntactic and prosodic strategies to convey IS, achieving nice fine grained marking.

Finally, our data also allow us to discuss the phrasing hypothesis (PH) [14] and the scope hypothesis (SH) [21] that have been confronted in the literature. Concerning PH, several observations confirm that phrasing is central in focus marking in French: i) the placement of the focused constituent at the end of the focus domain in 70% of the As favors the cooccurrence of the nuclear intonation contour with the right boundary of the focus; ii) the role of Hi and H\* enhancement; and iii) the related role of the accentual arc in focus marking also give evidence in this direction. However, the claim by [15] and [16] that only constituents which are not embedded and at least the size of the PP can be compressed as a correlate of givenness is contradicted by our data. For instance, in Fig. 3, the post-focal embedded argument ‘de l’Europe’ is compressed because given. Likewise, in line with [21], we could analyze the f0 value on the noun ‘sujet’ after the very high f0 value on the determinant ‘un’ in Fig. 2 as an equivalent of the accent shift on the focused element in English, and a way to compress the pitch range on the given element. However, this example also shows that accent shift can occur not only on corrective focus, but also on contrast, against SH. As illustrated by this example and several others, the role of the (L)HiL\* intonation pattern in IS marking is obviously an important topic to investigate in future research.

## 5. Acknowledgements

This work was carried out within the Labex BLRI (ANR-11-LABX-0036) and the Institut Convergence ILCB (ANR-16-CONV-0002). We thank Arndt Riester and Nadia Schäffer for their invaluable contribution, especially to the QUD annotation of the corpus.



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