

COMPRESSION IN POST-VERBAL SEQUENCES IN FRENCH

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ABSTRACT

This paper sheds light on the question of whether French resorts to post-focal compression (a reduction of pitch range), and the conditions under which it can do so. We present evidence from a production task in which thirteen native speakers of Standard French read scripted material; i.e. canonical sentences in which we manipulated the type of constituent found in post-verbal position (argument/adjunct), its prosodic length and complexity (short/simple or long/complex) and its informational status (focused/given). The study reveals two main findings: (i) arguments and adjuncts are phrased differently, and (ii) length and information structure exert a significant influence on the realization of “verb + adjunct” sequences. In the sequence “verb + argument”, only a slight compression of the argument is found. We formalize these results by arguing that compression in French is more restricted than in Germanic languages; it can only take place at the level of the prosodic phrase.

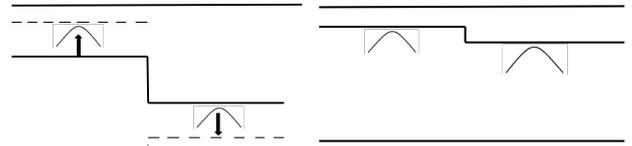
Keywords: post-focal compression, givenness, arguments, adjuncts, French, production experiment.

1. BACKGROUND

Across natural languages, a growing body of theoretical and experimental work has investigated the effect of information structure on the prosodic realization of syntactic constituents. The issue is well-documented in Germanic languages, and especially in English where a focused element (i.e. the part of the sentence that evokes alternatives, see [10]) is typically characterized by being prosodically prominent: It is realized with a raised fundamental frequency (F_0), lengthened duration and increased intensity. By contrast a given element (i.e. the part of the sentence already mentioned in the discourse) is signalled with a reduction of pitch range or even without a pitch accent—a phenomenon known as *deaccenting* or *post-focal compression* [6]. Germanic languages are reported to be fairly flexible with respect to this latter phenomenon in that any prosodic constituent can be compressed as long as it is the size of a syllable, see Fig.1, left panel.

Romance languages, on the other hand, have often been assumed to resort to prosody to a much lesser extent than Germanic languages [7], [11].

Fig.1: Compression in a prosodic phrase is possible in Germanic languages (left panel), but not in French (right panel): only downstep takes place.



French, a language without lexical stress, is regularly described as using syntactic strategies rather than prosodic prominence, notably in focus-related contexts where cleft constructions are taken to be the default marking strategy [7]. But the literature on French prosody has also shown that information structure does exert an influence on prosody, as demonstrated in a few recent and influential studies (see [2] and [5] among others). One remaining question concerns whether *givenness* (i.e. information that has already been mentioned in the preceding discourse) is realized by post-focal compression. Researchers have argued both in favour of and against the claim that post-focal compression exists in French [5],[8]. Furthermore, if we assume that compression does exist in French, then a related issue concerns the level at which it occurs, that is, if any prosodic constituent can be compressed like in Germanic languages or if there is a restriction on the prosodic domain affected, see [4] for results showing that there is no post-focal compression in the noun phrase, which does not constitute a prosodic domain. Following most studies on prosody ([2],[5],[8]), we assume that Φ is an important prosodic constituent of French. We further assume that the prosodic phrase (Φ in the following) is syntax-based and that it is recursive (see [9], and many more for recursive prosodic structure in different languages), and take the high tone ending a non-final Φ in French as a prominent and demarcative tone. Following [4], it is assumed here that no compression is possible inside of Φ in French, see Fig.1, right panel.

The present paper aims to shed light on these issues, and seeks to experimentally investigate two specific questions: (i) do post-focal arguments and adjuncts behave differently with respect to post-focal compression in French? and (ii) do factors like prosodic length and information structure affect the way in which prosodic phrases are built?

We present a newly conducted production task, in which speakers of Standard French read scripted material that varied across three factors: kind of

post-verbal constituent, prosodic length of the constituent and information structure. Results provide positive evidence to both questions. More generally, our findings will contribute to a better understanding of typological issues at the interface between information-structure and prosody.

2. THE PRODUCTION EXPERIMENT

2.1. Methodology

In this production task, target phrases were placed in the answer component of constructed question-answer pairs. The answer component of the pairs was always a canonical sentence (SVO) in which three factors were varied: (i) the type of post-verbal CONSTITUENT (arg(ument) or adj(unct)), see (1) and (2), (ii) its prosodic LENGTH (short and simple with 3 syllables, or long and complex with 7 syllables), and (iii) its INFORMATIONAL STATUS (focus or given). Additionally, we created two types of sentences; sentences in which the post-verbal sequence contained only one constituent (either arg or adj), or both.

(1) Arg: Jérémy a reconnu le voleur/le voleur de caramels.

'Jeremy recognized the thief/the caramel thief.'

(2) Adj: Jérémy l'a reconnu dans la rue/à la sortie du village.

'Jeremy recognized him on the street/when leaving the village.'

In sentences in which the post-verbal sequence contains an adjunct alone, the argument was realized pre-verbally as a clitic, and this in order to preserve the exact same lexicalizations of our stimuli, as shown in (2). The material was recorded on a Tascam DR-100 digital audio recorder, in a soundproof booth. The experimenter read the questions, and the participants responded by reading the associated answers. Through this method, we elicited a total of 1352 sentences (4 lexicalizations x 26 conditions x 13 speakers) but discarded 10 that contained disfluencies and hesitations.

2.2 Analysis

The data collected were annotated for the words of interest by using the automatic phonetic alignment tool EasyAlign of PRAAT [3]. To obtain measurements on the target phrase, we used scripts to extract measures of duration (word duration in msec) and pitch (lowest and highest F_0) on the verb and every following constituent independently. For long constituents, F_0 measurements were taken on

syllable #3 and #6. All data were statistically analysed using mixed-effects models with participants and items as random effects (using the *lmer* function of the *lme4* package in R [1]). We computed models with maximum random effects structures that would converge. To assess for significance of inclusion of a specific factor, likelihood-ratio tests were performed between two minimally different models. We report on estimates, standard errors and t-values for all models, as well as χ^2 and *p*-value from the likelihood-ratio tests for individual factors.

2.3. Hypotheses

The main goal of the experiment was to test the prosodic realization of post-verbal constituents under the effect of length and information-structure. The following four research questions and related hypotheses are formulated in Ha to Hd in the form of OT constraints.

Ha. Within the post-verbal sequence, arguments and adjuncts are systematically phrased differently. The first post-verbal argument is phrased with the verb, adjuncts are phrased separately.

Due to the syntactic structure of the sentences, MATCHPHRASE [9] predicts that an argument is phrased with the verb, and an adjunct is in a separate Φ from the verb. Furthermore, MATCHPHRASE assumes a recursive phrasing corresponding to the syntax, as shown in (4).

() Φ ((() Φ) Φ) Φ

(4) Jérémy a reconnu le voleur de caramel
'Jeremy recognized the caramel's thief.'

Hb. The length of a particular constituent affects its prosodic realization: regardless of their syntactic structure, a long constituent may be phrased separately and a short constituent may be phrased with an adjacent ϕ -phrase.

MINIMALBINARITY is a well-formedness constraint acting on the weight and length of a Φ . If it is ranked highly, it should be able to change the phrasing obtained by syntax.

Hc. The information status of a particular constituent has an independent effect on its prosodic realization. In particular, post-focal constituents have a lower F_0 range than focused ones.

GIVEN predicts that post-focal given constituents are compressed.

Hd. Post-focal compression in French affects entire Φ , and this is expressed with REGISTERCHANGE,

which expresses that register change may only affect entire Φ s. If only part of Φ is given, compression does not occur, see Fig.1, right panel.

This constraint mitigates the results of GIVEN. Thus, post-focal adjuncts are subject to compression, but arguments are not.

2.4. Results

Three main results emerge from the experimental data.

First, hypothesis Ha was tested by investigating the effect of the factor Constituent on the phrasing of the post-verbal sequence. We examined the F_0 maximum (F_{0max}) and duration of the verb (V) in sentences containing a single post-verbal constituent, and elicited in comparable all-new focus conditions to prevent any confounding effects from the information structure factor. If the verb and the following constituent are phrased separately, the presence of a high boundary tone should lead to a higher F_{0max} and a slightly longer duration on V. Results provided evidence supporting hypothesis Ha: Verb's F_{0max} was consistently lower ($\beta=-8.62$, $SE=4.24$, $t=-2.03$) and its duration was consistently shorter ($\beta=-0.09$, $SE=0.01$, $t=-5.79$) when followed by an argument than when followed by an adjunct.

Another indicator of phrasing was the potential breaks that occurred between V and the following constituent. Across all relevant trials, there were 24 breaks between V and adj, but not a single one between V and arg. Fig.2 illustrates the separate phrasing into “[V] $_{\Phi}$ + [adj] $_{\Phi}$ ” with a long adjunct (small break, nearly no downstep between V and adj), and Fig.3 illustrate the phrasing of [V + arg] $_{\Phi}$.

In sum, Ha is confirmed. Post-verbal constituent affects how phrases are built: arguments are systematically phrased together with the verb, but adjuncts are not. They form an independent Φ .

Second, hypothesis (Hb) was tested: A long constituent is expected to be more apt to form a separate phrase than a short one given the prosodic constraints on phrase well-formedness (due to MINBIN). If this is the case, the verb is expected to end on a higher tone and to be lengthened when it precedes a longer constituent. When V was followed by a short adj as opposed to a long one, there was a significant decrease in the V's F_{0max} ($\beta=-10.80$, $SE=3.79$, $t=-2.85$) and duration ($\beta=-0.04$, $SE=0.02$, $t=-2.45$). No effect was found for V + arguments ($t=-1.37$ for V F_{0max} , and $t=-1.54$ for V duration).

Fig. 2: Realization of “V + long adj” in all-new condition

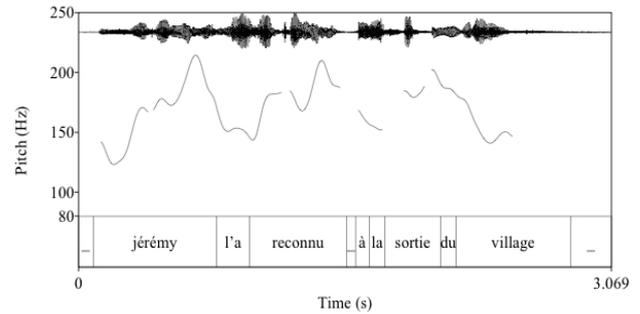
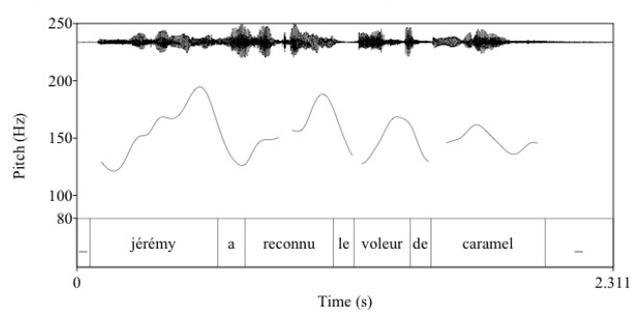


Fig. 3: Realization of “V + long arg” in all-new condition



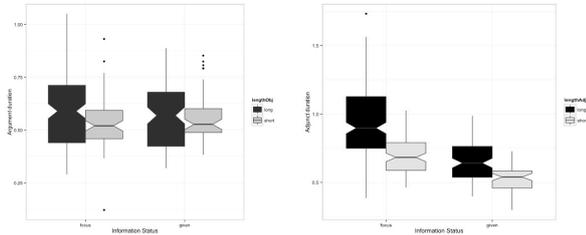
Here again, similar results were found when considering sentences with V+arg+adj. To summarize, our second finding only partially supports hypothesis Hb. Unlike what we predicted, arguments, regardless of how prosodically heavy they are, remained phrased with the verb.

Third, we tested hypotheses Hc and Hd: a post-focal constituent should have a lower F_0 than a focused one, but if we are correct in arguing that post-focal compression is phrase-based in French, only adjuncts—that form their own Φ —should be apt to compress. In the case of adjuncts, results clearly indicate an effect of information structure on both its F_{0max} ($\beta=-20.09$, $SE=4.94$, $t=-4.06$) and duration ($\beta=-0.03$, $SE=0.009$, $t=-3.66$). The strongest effects were found by adding the factor Length to the model ($\chi^2(2)=7.36$, $p<0.05$ for F_0 and $\chi^2(2)=20.72$, $p<0.001$ for duration), but there was no interaction. In sum, a short given adj is significantly different from a short focused one, which is equally true for long adjuncts. The lower value of F_{0max} found on the verb when the adjunct was given as compared to when it was focused is explained by the tonal contour of the verb, which was often falling (HL) when the adjunct was given, but rising (LH) when the adjunct was focused.

Concerning arguments, there is no main effect of givenness on duration, regardless of its prosodic length ($\beta=-0.0003$, $SE=0.0184$, $t=-0.02$ for short arg, $\beta=-0.025$, $SE=0.0161$, $t=-1.59$ for long ones). Fig.4 illustrates the results for the duration of arguments (left panel) as opposed to adjuncts (right panel) per length and information structure. However, the F_{0max} of arguments was affected; a long given argument systematically ended on a lower tone than a long

focused one ($\beta=-15.61$, $SE=6.52$, $t=-2.39$), and similarly for short ones ($\beta=-21.949$, $SE=6.177$, $t=-3.55$).

Fig.4: Duration for Arg (left) and Adj (right) per IS and Length



3. DISCUSSION AND CONCLUSION

All three factors investigated had an effect on prosodic phrases within V + post-V sequences. First, the effect of syntax is pervasive: the constraint MATCHPHRASE (MP) is active in the French data examined here. A verb and an argument are always phrased together and this is not changed under the influence of length or of information structure (Tableau 1). And similarly, the prosodic phrasing of a verb plus an adjunct is invariant as well: they are always in different Φ s (Tableau 2). Thus the well-formedness constraint MINBIN is not really at stake in the data, although the phonetic cues separating a long adjunct from its preceding verb were larger than in the case of a short one. This can be analysed as a gradient phonetic effect: if there is a prosodic separation, phonetic correlates increase when the following Φ is longer, although more data are needed to confirm this prediction.

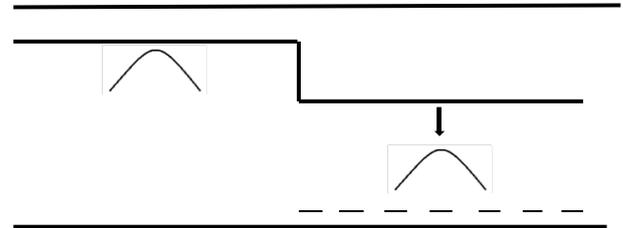
Tableau 1. V + long Argument	MP	MINBIN
☞ a. (Jérémy) $_{\Phi}$ (a reconnu le voleur de caramels) $_{\Phi}$		
b. (Jérémy) $_{\Phi}$ (a reconnu) $_{\Phi}$ (le voleur de caramels) $_{\Phi}$	*!	*

Tableau 2. V + long Adjunct	MP	MINBIN
a. (Jérémy) $_{\Phi}$ (l'a reconnu à la sortie du village) $_{\Phi}$ $_{\Phi}$	*!	
☞ b. (Jérémy) $_{\Phi}$ (l'a reconnu) $_{\Phi}$ (à la sortie du village) $_{\Phi}$ $_{\Phi}$		*

Second, the experiment revealed a difference between the effect of information structure in adjuncts and in arguments. Adjuncts were systematically affected by givenness, their F_0 was lower, and they were of shorter duration when given than when focused. Arguments, by contrast, only changed their F_0 , though less than the adjuncts. Duration was not affected by information structure.

This result is explained by the recursive structure of Φ , see example (4). In Fig.5, it is shown that an argument forms its own Φ inside the larger Φ of the VP. This triggers the slight compression observed, which is less than in the case of adjuncts, but more than givenness inside of a single Φ .

Fig.5: Compression of a Φ embedded into a larger Φ



This result is compatible with the results found in [4], where it was shown that inside of a Φ , no post-focal compression was present. The data used there consisted of a nominal phrase, a sequence of a noun and an adjective, and contrary to the data of the present paper, no recursive structure of Φ was present.

In conclusion, this paper has investigated post-focal compression in arguments and adjuncts in French. It has shown that arguments and adjuncts behave differently, in that adjuncts are much more subject to post-focal compression than arguments. We have also proposed an explanation for the difference between French and Germanic languages located at the syntax-prosody interface, see figure 1. This result may explain the different accounts about post-focal compression in French found in the literature, and confirm the phrase-based prosody of this language as compared to the pitch-accent prosody of Germanic languages. Finally, an optimality-theoretic analysis is used to illustrate the experimental results.

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