

# Prosodic boundary effect on the syntactic parsing of French utterance fragments

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A growing number of studies have shown that prosodic boundaries are obvious candidates for constraining the syntactic parsing of spoken utterances. For French, recent studies have suggested that the placement of phonological phrase boundaries might be employed by adult listeners to resolve temporary syntactic ambiguities (Millote et al., 2007, 2008).

French represents an anomaly among Romance languages because accentuation and phrasal boundaries always coincide. Stress always falls on the last full syllable of a phrasal domain smaller than the Intonation Phrase (the Accentual Phrase, AP) and its location is not contrastive. However, the issue of the number of prosodic units below the Intonation Phrase is still controversial in French. While the AP is widely accepted, recent studies provide evidence for an additional level of phrasing, which is intermediate between the AP and the IP levels (D'Imperio & Michelas, 2010; Michelas, 2011). Specifically, while the AP right boundary is cued through a typical (L)H\* final f<sub>0</sub> rise on the last syllable of the phrase (Fig. 1a), the ip right boundary appears to be marked by a H- phrase accent responsible for blocking downstep of subsequent accents within the ip (Fig. 1b). Moreover, the right edge of an ip shows greater preboundary lengthening than AP right edges.

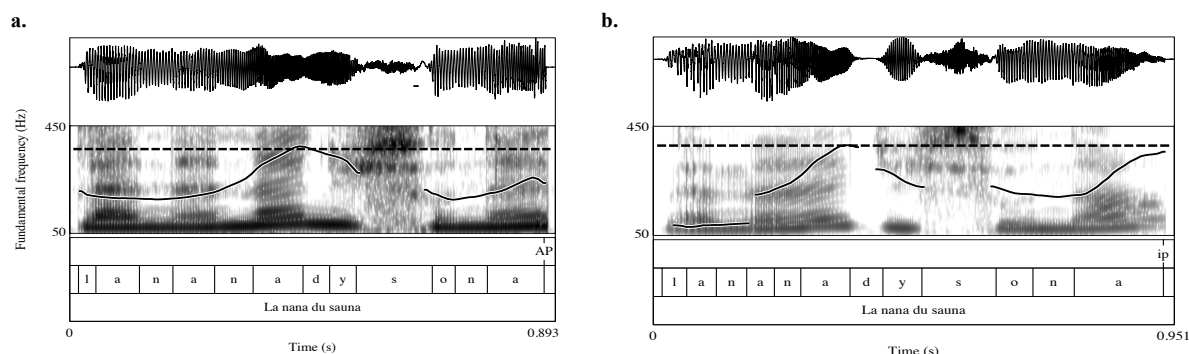
In the present study, we examined the influence of acoustic cues (tonal and duration cues) located at AP and ip boundaries in the syntactic parsing of spoken utterances. In a previous study (Michelas & D'Imperio, 2011), we used natural speech stimuli to test whether French listeners interpret an ip boundary as cueing a major syntactic break (Noun-Phrase/Verb-Phrase break, 1b) or a weaker syntactic break (Noun-Phrase internal Boundary, 1a).

- 1a.** *La nana]AP du sauna]AP d'Hélène]AP devenait vraiment méchante.*  
“The girl who managed Hélène’s sauna became really nasty”.
- 1b.** *La nana]AP du sauna]AP/ip devenait vraiment méchante.*  
“The girl who managed the sauna became really nasty”.

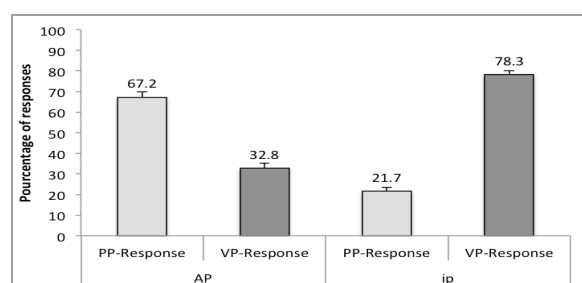
Participants gave more VP responses when an ip boundary was present in the stimuli relative to when an AP boundary was present showing that French listeners are able to differentiate prosodic cues at both AP and ip boundaries and exploit this difference to infer the morphosyntactic category of the upcoming syntactic phrase. However, since only natural stimuli were employed, we could not determine which specific cues intervene in the differential processing.

Hence, in this study we tested the specific contribution of tonal and duration cues of AP/ip boundaries. The acoustic cues located at the AP boundary of 20 NPs taken from our previous study were modified and resynthesized using PSOLA. We thus obtained a set of stimuli marked either by one type of cue (either tonal or duration cues) or by both indices (Table 1). Our prediction was that listeners would show greater values of PP-choice (minor break) when perceiving an AP boundary, even when cued by preboundary lengthening values alone. Likewise, we predicted that duration cues alone would help listeners identify an ip boundary, and hence show more VP choices for this level. The results confirmed the first prediction, in that participants gave more PP responses when an AP boundary was marked either by both cues or only by duration indices, (Fig. 3), while they did not confirm the second. Specifically, for an ip-boundary to be identified, the presence of both tonal and duration cues seems to be necessary. These results are line with previous studies (Delattre, 1966; Wenk & Wioland, 1982) suggesting that duration cues are more relevant than tonal cues in French prosodic boundaries marking. The findings have implication for current models of speech processing and provide a better understanding of the specific role of acoustic cues to prosodic edge marking in French.

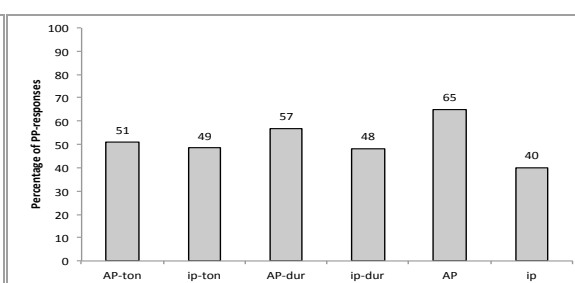
## Figures and Tables



**Fig. 1:** The two sequences La nana du sauna “The girl who managed the sauna” whose the last syllable is either associated to an AP (1a) or an ip (1b) boundary.



**Fig. 2:** Percentages of PP-responses and VP-responses for AP and ip-conditions



**Fig. 3:** Percentage of PP-responses for the six prosodic conditions (AP-ton, ip-ton, AP-dur, ip-dur, AP, ip).

	Tonal cues	Duration cues
AP-ton	H*	Ambiguous duration cues
ip-ton	H*H-	Ambiguous duration cues
AP-dur	Ambiguous tonal cues	AP preboundary lengthening
ap-dur	Ambiguous tonal cues	ip preboundary lengthening
AP	H*	AP preboundary lengthening

**Table 1:** Six types of resynthesized stimuli obtained by modification of tonal and duration cues.

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