The prosodic word as the domain of French accentuation - Empirical evidence

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French prosodic characteristics are particularly challenging for phonological theories. Our contribution aims at discussing some core issues in French prosodic phonology in the light of a series of results from production, perception and neuroimaging experiments.

Current models of French accentuation unanimously consider French accentuation as being post-lexical, with a primary final accent (FA) and a secondary initial accent (IA) marking the *ap* level. There is, however, no clear consensus as to the respective status of both FA and IA. Whereas only Post [1] considers IA as a pitch accent like FA, most authors describe IA (LHi) as a 'loose boundary marker' because its peak can be aligned with up to the third syllable of a word in a long *ap* [2; 3]. Only the L tone of LHi is consistently aligned with the beginning of the lexical word. IA is also secondary insofar as it is said to yield to FA in case of tonal crowding on shorter constituents, and essentially has a rhythmic function [2; 4]. The status of FA is not entirely clarified either: although it is clearly a *pitch accent* at the *ap* level for most current models, some descriptions suggest that it may survive at higher levels of prosodic constituency [1: LH*-H%; 4], while the most widespread view suggests that it looses its metric quality at the *IP* level in favour of the sole boundary tone H% [5; 2]. This latter proposition stems from a phonological phenomenon quite specific to French, *i.e.* the syncretism between accent (LH*) and intonation contours, which blurs the clear acoustic realization of FA at the surface level. Because stress is also not lexically distinctive, it has lead to the qualification of French as a 'boundary language' [6; 7] at the post-lexical level, or even as a 'language without accent' [5].

The main points we wish to make here are 1) that the essentially demarcative function of French accentuation does not preclude the *metrical* reality of both initial and final accents; and 2) that both accents surface in turn or concomitantly to mark prosodic constituency as early as the lexical/prosodic word level, just below the *ap* level. Because the powerful tonal formalism of *AM*, allowing the distinction between pitch accents (*) and boundary tones (%), is challenged by the peculiarities of French prosodic phonology, we argue that attempts to disentangle stress from boundary phenomena in French should also incorporate rhythmic and durational phenomena [8; 9]. We also argue that the transcription of tonal phenomena needs to be complemented with perceptual analysis by naïve listeners. Perception is viewed here as an interface between acoustic-phonetic cues and phonology [10]. We will present a series of experimental results accounting for the respective role of FA and IA in the marking of prosodic constituency. The focus will particularly be on perceptual results, which help shed light on several phonological issues of French prosody (Figure 1), showing that: 1) IA consistently marks the prosodic structure and more readily so than FA (as shown on production data: [11]); 2) IA's saliency is consistently perceived on the first syllable of the lexical word, irrespective of its peak's (Hi) alignment in the unit, thus further reinforcing the metric interpretation of IA [12]; 3) FA is perceived as metrically more salient than unstressed syllables even at higher levels of the prosodic hierarchy (typically, *IP*) and independently from boundary tones [12]; 4) FA metrical weight 'survives' above the *ap* level, whatever its tonal realization (rising, falling or downstepped) [12; 13]; 5) Downstepped realization of FA (!H) is accounted for at different levels of prosodic hierarchy: *within the ap* (at the *pw* level), it is perceived as metrically stronger than unstressed syllables, and when marking the *IP* level, !H modulates boundary strength perception [13]; 6) Finally, neuroimaging results show that French listeners process stress, indicating both the automaticity of stress extraction and an expectation for words to be stressed in the pre-lexical stage of speech processing [14].

Altogether, these results not only question the notion of French listeners' stress deafness [15], but also advocate for the metric quality of both IA and FA at all levels of prosodic

hierarchy. More importantly, they indicate that French prosodic phonology needs to integrate the level of the prosodic word [16] to encompass the whole extent of accentuation rules.

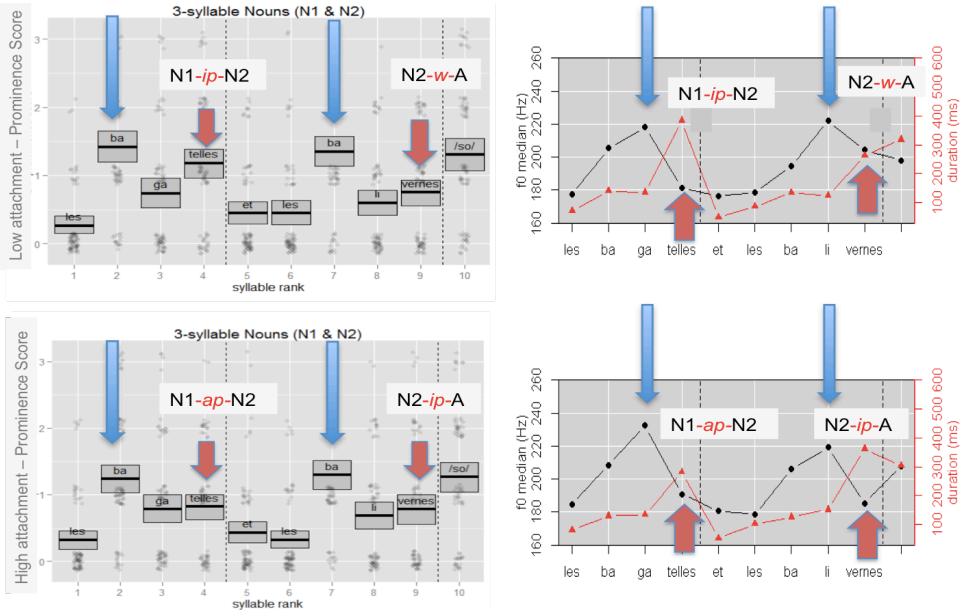

Figure 1. *Perception (left) and production (right : f0 in black and duration in red) of the same sentence in two syntactic conditions, yielding different levels of prosodic constituency. Blue arrows indicate IA and red arrows indicate FA.*

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