Prominence and Boundary are two distinct phenomena in French: perceptual evidence

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French prosodic characteristics are particularly challenging for phonological theories. Despite a wide body of literature, some central issues are still discussed such as the existence of stress at the word level, the existence of one or two pitch accents and at which level of prosodic constituency they surface [1]. 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 [2] considers IA as a pitch accent like FA (H*), 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* [3; 4]. 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 [3; 5]. Recent accounts however show speakers' use of IA as a more consistent marker of prosodic structure than FA, and quite independent from rhythmic constraints [6]. 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 [2: LH*-H%; 5], while the most widespread view suggests that it looses its metric quality at the *IP* level in favour of the sole boundary tone H% [7; 3]. This latter proposition stems from a phonological phenomenon quite specific to French, *i.e.* the syncretism between accent (LH*) and intonation contours (L% or H%), which blurs the clear acoustic realization of FA. Because stress is also not lexically distinctive, it has lead to the qualification of French as a 'boundary language' [8; 9] at the post-lexical level, or even as a 'language without accent' [7].

In the present study, perception is used to help shed light on those core issues by accounting for those prosodic parameters that are actually processed by listeners. It also helps answer some issues that are difficult to account for by the sole tonal annotation of the speech signal. As exemplified by [10], calling upon the postlexicality of French accentuation, it is well believed that French listeners are "deaf" to prominence. The present study aims at more specifically testing the ability of French listeners to both perceive *and* distinguish prominence and boundaries. We hypothesize that listeners are capable of perceiving different levels of boundaries and prominence, and are able to dissociate these two phonological phenomena, even in the case of syncretism between accentuation and intonation. We also test the level of prosodic structure preferentially marked by IA and/or FA.

The perception experiment was carried out on a corpus of syntactically ambiguous sentences that can be disambiguated via prosodic cues (sub-corpus taken from [6]). Syntactic ambiguity is created by manipulating the adjective scope (low or high syntactic attachment of the adjective *A* to one or two Nouns *N1* and *N2*), yielding 4 prosodic sites and 3 prosodic boundary strengths: *w*-boundary; *ap*-boundary and *ip*-boundary (see **Figure 1**). The prosodic structure is also manipulated with regards to constituents' length (one to four syllables), resulting in 16 original scripts. 32 sentences uttered by one female speaker were used for the present experiment. 18 naive listeners had to perform two separate perception tasks (counterbalanced between listeners): a task where they had to evaluate the level of *boundary* between the words, on a scale from 0 to 3; a task where they had to evaluate the level of *prominence* on each syllable of the sentences, on a scale from 0 to 3. Ordinal logistic mixed models [11] were used to account for 1) the perception of IA and FA prominences; 2) the perception of boundary strengths; 3) the links between boundary and prominence perception.

Results indicate that 1) both IA and FA prominence are perceived as significantly more salient than surrounding syllables, with a stronger perception of IA than FA, and as early as the word level. Moreover, FA at *ip* boundaries is perceived as metrically strong despite the syncretism between accentuation and intonation contours, indicative of a phonological representation of stress. These two results question the notion of stress deafness, at least in the native linguistic system (**Figure 2**). 2) Prosodic boundaries' strengths are not perceived as predicted by syntactic structure. Rather, if stronger (*ip*) boundaries are indeed perceived as stronger than *w* and *ap* boundaries, the N1-*ip*-N2 is perceived as stronger than N2-*ip*-A. Also, *w* and *ap* boundaries are perceived as equally strong. These results will be further discussed with regards to the literature on prosodic constituency in French. 3) Dissociation between boundary and prominence is observed insofar as the same prominence score can

be found in association with any of the 3 boundary strengths. More precisely, IA is always perceived with the same strength independently from boundary strength, while FA is also perceived with the same strength at the *w*, the *ap* and the N2-*ip*-A level. It only is correlated with boundary strength at the N1-*ip*-N2 boundary site. Altogether, these results indicate that FA *and* IA are equally important markers of the prosodic structure, and that both accents surface in turn or concomitantly to mark prosodic constituency, potentially as early as the prosodic word level [12], just below the *ap* level. They thus question both the notions of stress deafness and post-lexicality in French. They will be discussed in depth also with regards to ongoing acoustic and neuroimaging data.

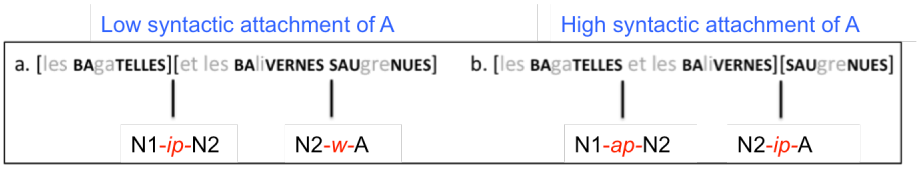

Figure 1*: The 4 prosodic sites of interest on trisyllabic words in 'Les bagatelles et les balivernes saugrenues' ('Crazy trifles and nonsense') in both syntactic conditions. Bold syllables indicate where FA and IA can potentially occur to mark prosodic structure.*

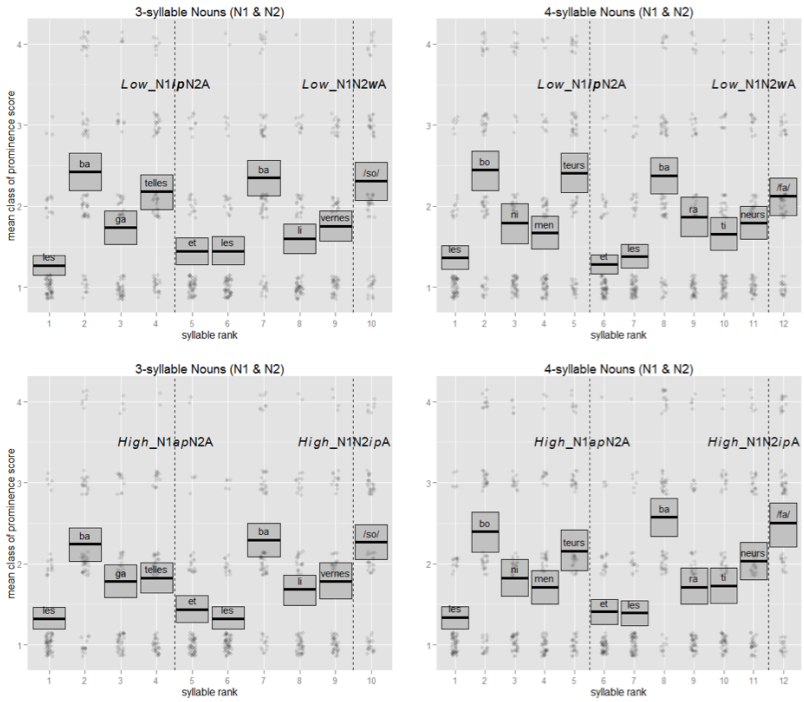

Figure 2*: Perception score of syllables in both high (bottom) and low (top) syntactic attachment conditions for three- (left) and four-syllable (right) words N1s and N2s (with A length collided). Boxes indicate the confidence interval of the mean score. Dots indicate individual responses (with jitter). Dotted lines indicate the boundary sites. Left: Syllables 2 and 7 show perception of IA; syllables 4 and 9 show perception of FA. Right: Syllables 2 and 8 show perception of IA; syllables 5 and 11 show perception of FA.*

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