PHRASING AND CONSTITUENT BOUNDARIES IN LIFOU FRENCH

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ABSTRACT

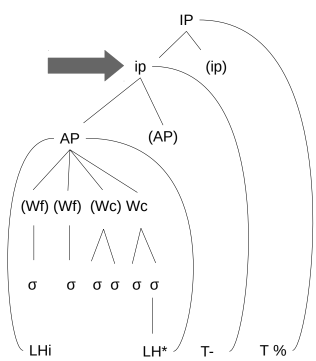
This study investigates intonational properties related to the marking of boundaries of different kinds of constituents of a French variety spoken in the South Pacific. Lifou French represents an understudied regional variety from New Caledonia and is spoken by bilingual speakers of French and Drehu, an Oceanic language. Within autosegmental metrical phonology the status of the intermediate phrase (ip) in French has been subject to debate. This study focuses on right boundary marking to examine whether phonetic cues can be related to the realisation of different types of prosodic breaks, namely the Accentual Phrase (AP) and the ip. Pitch scaling patterns within and across APs support the existence of the ip based on data from this largely undocumented variety. Interestingly, the phonetic realisation of right boundary marking shows differences from the Standard variety of French.

Keywords: Prosodic hierarchy, French varieties, Bilingualism, intermediate phrase, right boundary.

1. INTRODUCTION

This study focuses on pitch scaling phenomena related to the marking of the right boundary of accentual phrases (AP) in different positions. Lifou French is an understudied variety spoken in New Caledonia. Speakers of this variety are ususally bilinguals of French and Drehu, an Oceanic language from the Southern Melanesian linkage [5]. According to census data, in 2009 there were around 8600 inhabitants on the island [17]. Our current knowledge on the phonetics of prosody in Drehu is rather limited but a recent investigation on prominence realisation suggests that there is a preference for a phrasal prominence marking with a rising tone towards the right edge of constituents [19]. Similarly, little is known regarding the phonology and phonetics of Lifou French. Previous research [18] examining the AP indicates this variety shares phonological properties with Hexagonal French and that the AP shows very similar tonal patterns. The present study seeks to investigate boundary marking of the right edge of APs and so to identify whether there is a further prosodic level between the AP and the Intonational Phrase (IP) that could be identified phonetically, see Figure 1. More specifically, we are interested in H* tonal targets and their F0 level, to which we refer here as *scaling*, following [7]. Within the autosegmental-metrical model, it has been observed that scaling processes differ among languages, for instance in how the domain of downstep is defined. One way to define the downstep domain is to model it as the result of a global lowering of the pitch range level for a specific phrase. Another way in which downstep is said to operate, corresponds to a strictly local phenomenon, in which immediately adjacent pitch accents are targeted within the same intonational constituent [2, 11]. An investigation of intonation in French [7] found that pitch-scaling effects were related to the internal structuring of the IP and that recursive downstep, which would occur throughout an IP, is blocked phrase internally. More precisely, it is shown that the syntactic break between a complex noun phrase (NP) and a verb phrase (VP) triggers complete upwards pitch reset and so the blocking of recursive downstep of successive AP-final LH* rises in declarative utterances, as exemplified in Figure 2. The reason for this blocking has been associated with the existence of a further prosodic level, namely the intermediate phrase (ip). In addition to

Figure 1: Schematic representation of the French prosodic hierarchy, adapted from [6]. The intermediate phrase (ip) represents the here investigated prosodic level.



the blocking of downstep, pre-boundary lengthening

Figure 2: Schematic representation of *complete pitch reset* at the intermediate phrase (ip) boundary. The black dottet line indicates where the peak at the ip boundary is set to the level of the first peak.

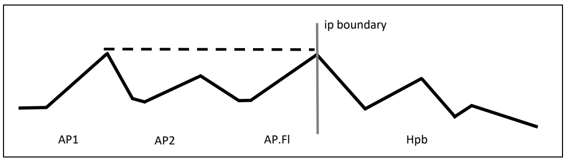
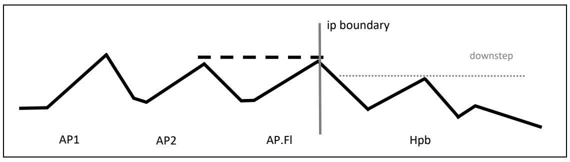


Figure 3: Schematic representation of *downstep blocking* at ip boundary. The black dottet line indicates where the peak at the ip boundary is blocked from downstepping. The grey line shows a dowstepped subsequent peak.



has also been described as acoustic cue in the demarcation of the ip in contrast to the AP [12]. This prosodic level has been controversial within the autosegmental metrical approach since there have been accounts which include it in the prosodic hierarchy [8, 7], while others exclude it [14, 9]. Although some studies suggest the existence of the ip as further prosodic level for French [12, 7], this issue remains largely undocumented in other varieties. Data from a previously unstudied variety of French based on an investigation of pitch scaling processes and the domain of downstep will add to the research body around this theoretical debate.

2. RESEARCH QUESTIONS

Previous research on Lifou French showed the AP shares the same tonal targets as Standard French [18]. In this study, we investigate whether the ip is also found in Lifou French. Therefore, we seek to determine if and what scaling effects could be involved in demarcating the right boundary at this level. We predict that if there is a further prosodic level between the AP and the IP, the right boundary of the ip should be phonetically distinguishable from boundaries at a lower level. Therefore, the following hypotheses will be tested:

- Complete Reset Hypothesis :

If the syntactic break triggers reset, we hypothesise that the pitch level of a LH* rising accent of the AP at this break will be reset and scaled at the level of the IP initial peak.

- Downstep blocking Hypothesis:

Alternatively, a further variation in pitch scaling that could be associated with a demarcation of a prosodic level is downstep blocking of F0. This would mean that the pitch level of a LH* rising accent immediately preceding the syntactic break is scaled at the same level as the preceding peak.

- Downstep Hypothesis:

Finally, we hypothesise there is successive lowering of F0 peaks at the right edge of APs, within an IP that is formed of a sequence of APs $[[AP][AP][AP]]^{\mathbf{IP}}$. This means the pitch level of a LH* rising accent immediately preceding an AP boundary is downstepped relative to the IP initial peak and the preceding peak. Within our experimental design, we predict that APs that do not coincide with the syntactic break will show downstep rather than reset.

3. METHOD

3.1. Participants

Seven female and six male teenage (14-19 years old) bilingual speakers of French and Drehu particpated in the experiment. Participants responded to an adapted version of the sociolinguistic questionnaire BLP [3]. They reported using both languages on a daily basis when being raised, and that they live in a bilingual French - Drehu speaking household. Additionally, all participants receive formal education in a French speaking environment.

3.2. Materials

Elicitation materials consisted of 12 utterances separated into a two or three AP condition. Target APs usually contained three syllables (apart from one token that had 4 syllables), which always ended in a vowel (either /i/ or /ã/); this vowel was preceded by a sonorant consonant (like the nasal /m/ or liquid /ʁ/). Materials were adapted from [7] and checked for comprehensibility prior to elicitation. There were two conditions and elicitation phrases contained a sequence of either two or three noun phrases. These noun phrases were followed by a verb phrase which contained Hpb (post boundary H* tone):

2-AP $[[NP]^{\mathbf{AP1}}[NP]^{\mathbf{AP.Fs}}\ |^{\mathbf{ip}}\ [VP]^{\mathbf{Hpb}}[NP]]^{\mathbf{IP}}$

3-AP $[[NP]^{\mathbf{AP1}}[NP]^{\mathbf{AP2}}[NP]^{\mathbf{AP.Fl}}\ |^{\mathbf{ip}}\ [VP]^{\mathbf{Hpb}}[NP]]^{\mathbf{IP}}$

Examples 1 and 2 show both conditions.

(1) [La mamie]^{1} [de Rémy]^{Fs} demandait Bruno.
Remy's grandma asked for Bruno.

(2) [La mamie]^{1} [des amis]^{2} [de Rémy]^{Fl} demandait Bruno.
Remy's friend's grandma asked for Bruno.

3.3. Procedure

The first author recorded all participants with a Zoom H6 recorder, using a head mounted-microphone, in a quiet room, in Lifou's high school Lycée Polyvalent des Îles. Stimuli were visually presented on Power point slides and participants were recorded at a self selected normal and fast speech rate (12 utterances x 2 speech rates x 13 speakers). Prior to recordings participants had time to read all utterances and familiarise themselves with the task.

3.4. Analysis

Coding and phonetic segmentation were carried out by the first author. First, sound files were manually transcribed and then force aligned with the WebMAUS interface, using a parameter model based on SAMPA [10]. Then, phonetic alignment was manually corrected in Praat [4]. Further, the target APs, position, and phones were marked. Subsequently, Tones were also manually annotated with labels used within autosegmental metrical phonology [8, 9]. Finally, a hierarchical database was constructed using the EMU Speech Database Management System [20]. It included tiers for the Tones, phonemic segments, words, and target token position. Fundamental frequency was queried using the emuR package in R [21, 15].

3.4.1. Statistical analyses

To provide a psycho-acoustic relevant measure F0 was converted into semi tones [13] (benchmark 100) and these values were then used for statistical analyses, carried out in R [16] with help of the package lme4 [1]. A linear mixed effects model investigated pitch scaling of the peak associated with LH* tones, with AP position, speech rate, and speaker sex as fixed factors, and speaker as random intercept (n=650). Further, ratio values of the LH* peaks were calculated in order to see the relationship between the peaks and the position in the utterance [7]. A ratio of 1 or higher between two peaks indicates that the tonal target is not downstepped relative to the IP initial peak.

4. RESULTS

Results show that there is variation in pitch scaling within the IP. Table 1 summarises the results for multiple comparisons between peaks. How the obtained ratio values relate to pitch scaling is discussed according to predictions made under point 2.

Table 1: Calculated ratio values of right edge H* peaks of APs in two conditions.

Ratio	Prediction	Result
	2 AP condition	
AP.Fs/AP1	=1	0.97
AP.Fs/AP2	>1	1.03
Hpb/AP1	<1	0.91
	3 AP condition	
AP.Fl/AP1	=1	0.94
AP.Fl/AP2	=1	0.99
AP.Fl/Hpb	>1	1.03
Hpb/AP1	<1	0.85

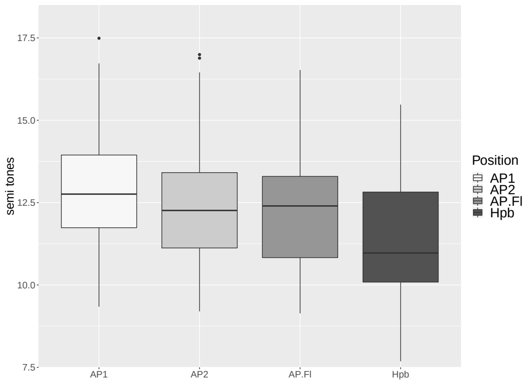
4.1. Complete reset

In case there is complete reset, it was predicted that the ratio value for H* at the syntactic break and AP1 should be equal to 1. To test this, the ratio between AP.Fs and AP1 (= 0.97) in the 2-AP condition and AP.Fl and AP1 (= 0.94) in the 3-AP condition was measured. Figure 4 shows that, in the 3-AP condition, the peak at the syntactic break is not reset to the exact same level of the ip initial AP (AP1) but rather to the level of the peak in the immediately preceding AP.

4.2. Downstep blocking

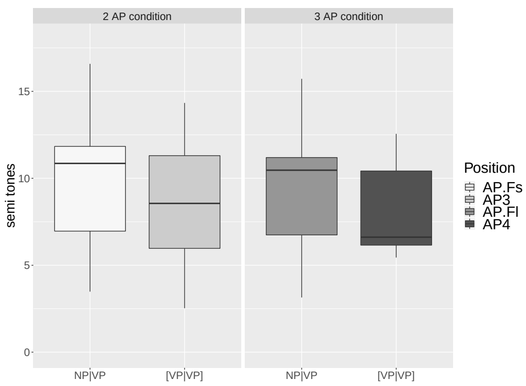
If pitch is blocked from downstep, we hypothesised that the peak at the syntactic break would be scaled at the level of the respectively preceding AP, with a ratio value of 1. To test this hypothesis, the ratio values between AP.Fs and AP1 (=0.97) and AP.Fl and AP2 (=0.99) were measured. Although the peaks are not at the exact same level, the ratio values are very close to one. Conversely, it is expected that, at the syntactic break, there is no downstep when compared to an AP in the same position but that does not precede the break. For this comparison, a ratio value > 1 is predicted. Results show there is a pitch upward movement at the syntactic break (AP.Fs / AP2 = 1.03, Est. 0.5 $\pm$ 0.01 semi-

Figure 4: Estimated semi tone values of LH* peaks of four successive APs of female speakers recorded at fast and normal speech rate.



tones, p <0.001. AP.Fl / Hpb = 1.03, Est. 0.5 ± 0.1 semitones, p <0.001). As shown in Figure 5, peaks immediately preceding the syntactic break are significantly higher than the peaks of APs after the boundary, the left boxplot in the two conditions. This suggests that H* peaks of AP.Fs and AP.Fl are blocked from downstep at the ip boundary, as shown in Figure 3.

Figure 5: Estimated semitone values for male speakers of LH* peaks at the ip boundary and the following AP in the 2 AP and the 3 AP condition.



4.3. Downstep

In cases where no ip boundary marking would be triggered, downstep across peaks of successive APs was predicted. To investigate whether there is downstep after the syntactic break the ratio was calculated between Hpb and AP1 (in the 2-AP condition) = 0.91 and Hpb and AP1 (in the 3-AP condition) = 0.85 (see Figure 5). Results for the 2-AP (Est. 1.3 ± 0.1 semitones, p <0.001) and 3-AP conditions (Est. 1.8 ± 0.2 semitones, p <0.001) show that the peaks after the syntactic break are lowered relative to the IP initial peak.

5. DISCUSSION AND CONCLUSION

This study aimed at investigating pitch scaling patterns of the right boundary of the AP in Lifou French in order to evaluate if there are phonetic cues distinguishing between two different prosodic levels, the AP and ip. Data from this previously undocumented variety investigates the existence of the intermediate phrase as further level in the prosodic hierarchy of Lifou French. Our analysis aimed specifically at examining pitch scaling properties within the IP. Therefore, we focused on the F0 level of peaks at the right edge of accentual phrases. In order to evaluate downstep trends, we were interested in how peaks at the right edge of APs were scaled relative to the peak of an IP-initial AP and to each other. It was found that the peak immediately preceding the syntactic break between a complex noun phrase and a verb phrase was blocked from downstep. Additional evidence supporting the pitch scaling effect is found at the right boundary of APs that occur after the syntactic break. In this case, it was found that the peak after the NP|VP break was consistently downstepped. Although the differences in the F0 level are of small magnitude, they appear to be consistent across speakers. The patterns observed in this study differ from what has been reported for the Standard variety. In that variety, complete pitch reset is used in the demarcation of an ip right boundary placed at a major syntactic break. Thus, we find differences in fundamental frequency that show that pitch is scaled differently. Although the effects on scaling are small in Lifou French the data show a consistent effect where it was predicted. Importantly, a strong downstep effect occurs after the syntactic break, hence after the ip boundary. These results seem to rather support the claim of the existence of the ip as a further prosodic level in Lifou French and are different from the Standard variety where there is ip internal downstep (prior to the ip boundary). This difference could be related to regional variation. However, we do not know yet how speakers of French process these fine grained phonetic differences. It remains an open question as to how exactly Lifou French speakers perceive downstep blocking and if speakers of the Standard variety would process this scaling effect in a similar way. Finally, it would be of interest to test the reported effects of scaling involved in ip boundary marking, for example in form of a perception experiment.

6. REFERENCES

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