

PHONETIC CUES AT SENTENCE BOUNDARIES IN QUEBEC FRENCH: A SIDE EFFECT OF PENULTIMATE SYLLABLE DURATIONS?

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ABSTRACT

This study is concerned with the characteristics of long penultimate syllables in Quebec French spontaneous speech and the way this typical duration seems to model the realization and interpretation of phonetic cues at prosodic boundaries, that is in sentence-final and phrase-final position.

INTRODUCTION

It is an established fact that « pretonic lengthening » plays a part in the rhythmic patterning of Canadian French. [1,3,11]. Initially associated to an extended use of the *accent d'insistance* by Fouché for French from France, then by Boudreaux for Canadian French, the phenomenon of pretonic lengthening is now considered as ensuing from a more complex dynamic, involving segmental durations, syllable structure and morpheme boundaries [1,2,4,5,11].

One of the most important source of penultimate lengthening arises from vowel phonology. The vowel system of Canadian French has maintained eight intrinsically long vowels: /a o ø ɜ ɛ ẽ ã œ/. Those vowels can remain long in pretonic position, in a closed as well as in an opened syllable. Besides, lengthening rules, which systematically apply under stress, become optional otherwise [7]. Intrinsically short vowels which are obligatorily lengthened by /ʒ ʁ v z/ in closed stressed syllables sometimes stay lengthened in non-final position if they belong to a morpheme (*pire* [pi:ʁ], *empirer* [ɑ̃pi:ʁe]). Lengthening rules are, in fact, sensitive to the presence of morphological boundaries [4,7,10].

In this first part of a larger study dealing with interactions between high and low level of constraints in spontaneous Quebec French, we tried to define the nature of the phonological composition of long penultimate syllables. A second aim was to evaluate the repercussion of those long penultimate syllables on stress patterning of Quebec French, that is to say a possible stress shifting from final to penultimate syllable in spontaneous speech.

METHODS

Among the available data on the structure and the effect of long penultimate syllables, only few come from the acoustical analysis of spontaneous speech [8]. That is the reason why we gathered a corpus of 108 sentence-final and phrase-final excerpts, extracted from 8 sociolinguistic interviews (ref.[6]) in which long penultimate syllables were perceived by three trained listeners. We kept only sequences for which the three judges agreed on the presence of a long syllable. Sentences were digitized (20kHz) with CSL program. Duration and frequency measurements were performed on strings of six syllables, starting from the end of the sentence or phrase. Finally, the same listeners were asked to determine stress placement.

In order to describe the composition of long penultimate syllables, we examined factors such as intrinsic vowel duration, nature of neighboring consonants, syllable structure (closed or opened) and presence of a morpheme boundary. Comparisons between

penultimate and final syllables were based on syllable durations, vowel durations, relative duration of nucleus (syllable portion hold by the vowel expressed in percentages), number of phoneme per syllable, rising or falling pitch and intonational scope (flat intonation: less than 1.5 semitone; minor scope: between 1.5 and 3 semitones; and major scope: more than 3 semitones) [9]. Sentence-final or phrase-final position of the strings and stress placement were also examined.

RESULTS

Long Penultimate Syllable Composition

More than 65% of long penultimate syllables contained an intrinsically long vowel such as /a o ø ɜ ɛ ẽ ã œ/. An interesting aspect of those results is brought by the relatively high frequency of short vowels in long penultimate syllables. The short vowel lengthening rule implies /ʒ ʁ v z/ following the vowel in a closed syllable or inside a morpheme. This rule actually explained only 6 cases out of 43 in the sample. One might consider that, somehow, short vowels simply behave like long vowels in preserving their own durational quality in penultimate syllables. Moreover, lax allophones of high vowels [I Y U] never appeared as nucleus of long penultimate syllable. Laxed allophones of /i y u/ were produced in closed syllables, preceding all consonants but /ʒ ʁ v z/. [I Y U] can appear in non-final opened syllable according to an optional laxing harmony rule [7, 11].

Table 1. Distribution of vowels in penultimate long syllables

nasal	35,2%
long oral	30,6%
short oral	25,0%
tense [i y u]	9,3%
lax [I Y U]	0%

All long penultimate syllables but two had at least one consonant as onset (that consonant may come from preceding words or syllables). Out of that number, less than 20% were branching onsets. Even if the preceding consonant has only a weak influence on vowel durations in Quebec French, [4] we compiled a list of those, which appeared before the syllable nucleus.

Table 2. Preceding consonants

/l/ or /r/	28%
voiceless stop	25%
nasal	20%
voiceless fricative	9%
voiced stop	7,5%
voiced fricative	7,5%
approximant /j q w/	3%

Table 3. Following consonants

voiceless stop	32%
voiceless fricative	26%
voiced fricative	15%
/l/ or /r/	14%
voiced stop	6%
nasal	4%
approximant /j q w/	3%

According to the compilation of Table 3, only 29% of all vowels were followed by consonants which may promote vowel lengthening. However, the effect of the following consonant had to be evaluated according to the place of syllable boundary. Our data provided 90 opened syllables and 18 closed ones. Out of those 18 syllables, only two had a branching coda. The huge number of opened syllables indicates that structure ensuing from syllabification rules in French does not explain the production of long penultimate syllables: first, the lengthening effect of following consonants is mitigated if they belong to another syllable [4]; second, the long penultimate syllable should not be

conceived has including systematically a coda.

Nevertheless, a morpheme boundary was encountered in 57 syllables (including those 18 closed syllables already mentioned). Then, considering the morphological conditioning in syllabification, 53% of long penultimate syllables might be closed ones, structurally or morphologically.

Penultimate and final syllables

Difference in syllable durations cannot explain the perception of long penultimates since only half of them were, in fact, longer than final ones. On the basis of the number of phonemes per syllable, 19 penultimates were longer than final syllables. Again, this factor cannot explain the longer penultimates.

On the other hand, vowel absolute and relative durations might be a perceptual clue: 74% of penultimate vowels were longer than final vowels. If we consider the relative duration of vowels, this proportion goes up to 78%.

Intonational Patterning.

A rising movement of frequency seemed to characterize sentences and phrases containing a long penultimate syllable since that pattern was found for 79% of the sample. Intonational scopes in semitones were distributed as follows: less than 1.5 semitone 32%, minor scope 26%, major scope 42%. We found a falling frequency pattern on 23 strings. Intonational scopes were distributed as follows: less than 1.5 semitone 56%, minor scope 9% and major scope 35%. Now, regardless of rising or falling pattern, major scopes were the most frequent (41%), followed by flat intonation (37%), and by minor scopes (22%).

Stress Placement

Even though the entire corpus was made of long penultimates syllables, stress was perceived on final syllables

most of the time (78%). With the intent to identify the factors apt to provoke the placement of stress on final syllables, we performed a binomial variable rule analysis (Varbrul), including all independent variables but those relating to the identity of phonemes. The only significant factor was intonation (.000). Regardless of the intonational scope (non significant .592), rising intonation promoted stress perception on the final syllable (rule weight: .66). On the other hand, falling intonation was closely related to stress placement on penultimate syllables (significance: .000; rule weight: .92).

The sample gathered included 73 sentence-final strings and 35 phrase-final strings. Those proportions should be strictly attributed to the sampling since we looked first to gap sentence-final strings. Besides, the factors related to position of the string remained non-significant in binomial analysis.

DISCUSSION

The description of long penultimate syllables composition lead us to the conclusion that the most reliable and consistent indication seems to be absolute and relative vowel durations. As second factor, the influence of morphology might be considered as playing a part in the perception of syllable weight. These results raise further questions about the emergence of short vowels as nucleus of long penultimate syllables. Assumption of an expanding use of long vowel lengthening rule in non-final syllables is still to be investigated.

Cues may arise from the analysis of following consonant durations (Table 3). Penultimate long vowels are regularly followed by voiceless consonants which may play a part in penultimate perceived length, since they are usually longer than other consonants. If that perceived length results from an evaluation of the distance between penultimate and final nucleus

PCenters, the consonant duration might provoke an interpretation of penultimate as being a closed syllable.

The second part of this study referred to a possible stress shifting from final to penultimate syllable. Surprisingly, that shifting happens only when the intonation falls. At the opposite, stress is still perceived on final syllable with a rising pattern. This phenomenon already noticed in Quebec French seems to originate from a strategy developed to solve the problem brought by having two adjacent temporal cues: length in penultimate and final syllables [10]. Then, if duration cannot provide cues for stress placement, intonation does. Should we talk now of pitch shifting instead of stress shifting?

The results we obtained show clearly that phonological duration may interfere with prosodic constraints. The rising pattern could not be associated with social factors since there is no consistency between the social characteristics of the speakers and the distribution of that pattern, nor with the production of long penultimate syllables. It is possible that this inconsistency be attributed to an insufficient number of speakers. Actually, it is not possible to rule on the expanding nor on the recessive nature of penultimate lengthening phenomenon in Canadian French.

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