

CONSTRAINTS ON DURATIONAL INCREASE IN BOUNDARY POSITIONS : A CROSS-LINGUISTIC STUDY OF LANGUAGES WITH CONTRASTIVE QUANTITY

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1. INTRODUCTION

The objective of this study is to explore boundary signaling in languages with contrastive quantity. In particular, the role of duration is examined, for segmental quantity tends to constrain the degree of durational increase in boundary positions. This constraint on lengthening coincides with a lesser degree of durational variation within the grammatical unit in comparison with languages where duration is not contrastive.

The phenomenon of preboundary lengthening has been the focus of extensive research for over three decades; a recent summary is found in Rao, 2010. It has been observed in a great variety of languages and the assumption that final segment lengthening is universal (Vaissière, 1983) continues to be the focus of ongoing research. However, while the lengthening phenomenon may be universal, a wide variety associated with its realization has to be acknowledged.

It has been widely accepted that while the lengthening in boundary positions is phonological, the phonological constituents are not independent from the morphology and syntax of the language on the one hand and rhythmic factors on the other, resulting in different degrees of lengthening Gussenhover & Rietveld, 1992. The authors argue that “prosody driven durational effects... should be kept distinct from preboundary lengthening”. In the present study, the analysis of durational variations in relation to preboundary lengthening provides support to this assumption.

2. METHOD

Recordings of six paragraphs by 24 speakers of eight languages were acoustically analyzed. 398 paragraphs were analyzed in this study. The experiment was designed to enable comparison between languages with contrastive vs. non-contrastive quantity; Finnish, Hungarian, Hindi and Latvian representing the former type, Brazilian Portuguese, English, Cantonese and Russian the latter. Each paragraph consists of three sentences (hereafter A, B and C); the sentences in the six paragraphs were the same, except their ordering. The paragraphs were constructed in such a way that all sentence orderings were possible. It is assumed that paragraphs have a linguistically determined structure and their suprasegmental characteristics are strongly bound to the realization of this structure Lehiste, 1975.

3. DISCUSSION

The mean durations of paragraphs cluster around similar values implying a tendency to maintain a durational target. Measurements of sentence and pause and segment durations were obtained in order to identify durational variations in relation to their position in the paragraph. Further, paragraph-final syllable durations were examined.

3.1. Sentence and Pause Durations

Sentence durations regardless of their ordering were compared with durations in different positions. The tendencies observed point to greater durational variations in languages with non-contrastive quantity. In first position the maximum durational difference from the mean sentence duration is 0.11s in languages with contrastive durations (0.09s in Hungarian, 0.07s in Finnish, 0.06 in Hindi and 0.11s in Latvian); the maximum durational difference from the mean sentence duration is 0.17s in languages with non-contrastive duration (0.2s in Brazilian Portuguese, 0.16s in English, 0.12s in Cantonese and 0.17s in Russian. In the second position the maximum durational difference from the mean sentence duration is 0.12s in languages with contrastive durations (0.09s in Hungarian, 0.11s in Finnish, 0.08 in Hindi and 0.12s in Latvian); the maximum durational difference from the mean sentence duration is 0.18s (0.17s in Brazilian Portuguese, 0.18s in English, 0.9s in Cantonese and 0.12s in Russian). In the third position the maximum durational difference from the mean sentence duration is 0.14s in languages with contrastive durations (0.08s in Hungarian, 0.13s in Finnish, 0.07 in Hindi and 0.14s in Latvian); the maximum durational difference from the mean sentence duration is 0.21s (0.21s in Brazilian Portuguese, 0.16s in English, 0.14s in Cantonese and 0.19s in Russian).

The durational patterns emerging from the measurements as presented above evidence a tendency for durational variations to be greater in languages with where quantity is non-distinctive. Durational variations appear to be greatest for sentences in third position in both language types. Measurements of paragraph durations, however, show little effect of sentence duration variations – a fact pointing to a tendency on the part of the speakers to maintain a durational target. In examining sentence duration variations relating to pause durations it may be hypothesized that intersentential pauses play a role in the keeping to a target duration associated with the grammatical unit. The tendency is summarized in Figure 1.

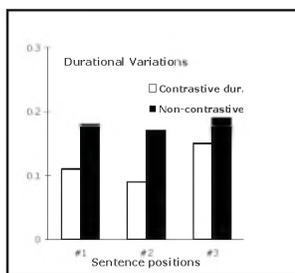


Fig. 1. Sentence-level duration variations

3.2 Paragraph-final syllable durations

Syllable durations in paragraph-final positions were examined in order to establish the degree of preboundary lengthening (while acknowledging the relevance of lengthening before the final syllable (Swerts *et al.* (1994), Hakohari *et al.* 2007), it is assumed that the greatest increase occurs in the last syllable). The hypothesis tested here argues that, while durational variations occur in all position at the word and syllable levels, it is the paragraph-final syllabic position that durational variations occur as increases. It is further hypothesized that although durational increases occur in both language types the increase is significantly greater in languages with non-contrastive quantity. This pattern is presented in Figure 2.

3.3 Segment durations

In examining segmental durations the hypothesis tested was that there is a constraint in the degree of variation languages with contrastive quantity stemming from the necessity of maintaining the phonemic role of length distinctions. In accordance with this hypothesis it was further assumed that durational variations at the segmental level would be of lesser degree in comparison with non-quantity languages. The analysis of vowel duration variation supports this assumption (Fig. 3).

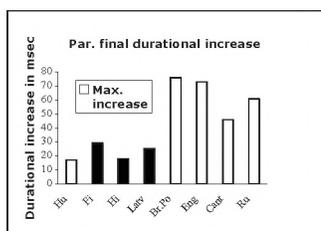


Fig. 2. Durational increase in the final syllable

In connection with durational variations at the segmental level in languages with contrastive duration, the following tendencies could be identified: (i) long stressed vowels occur with the greatest degree of durational variation, and (ii) the smallest degree of variation occurs in connection with short unstressed vowels.

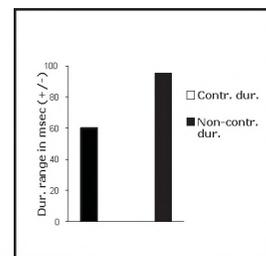


Fig. 3. Differences in vowel durational variations

4. SUMMARY

The results presented above are comparable to those obtained in a pilot study working with a smaller data base (McRobbie-Utasi, 2003) confirming the two findings reported there: (i) durational variations associated with the temporal structure of the paragraph and durations associated with boundary signaling represent two separate mechanisms, (ii) the realizations of the two tendencies are dependent on language types, i.e., there is a constraint on the degree of variation in languages with contrastive quantity.

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