

RHYTHMIC PATTERNS OF THE DISCOURSE IN MEXICAN SPANISH AND BRAZILIAN PORTUGUESE

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ABSTRACT

The notion of syllabic foot is commonly used by investigators in determining the rhythmic patterns of languages, in terms of perception. Following this notion, Spanish and English are said to be, respectively, the typical cases of syllable-time and stress-time languages. It is very difficult, however, to confirm these rhythmic patterns empirically [7, 8, 9, 10, 11, 12, 15, 16, 23, 28]. Taking into consideration the recent discussions about P-centers, i.e. "perceptual centers" [7, 12, 16], an acoustical analysis was performed indicating that in Spanish, syllables may in fact have very similar temporal patterns, although Brazilian Portuguese (BP) may combine both the characteristics of syllable and stress-time.

1. INTRODUCTION

Linguistic studies have attempted to place natural languages into classes according to characteristic rhythmic patterns [3]. This notion is desirable because it has explanatory power for phonological processes in English, for example. Pike [26] explains that a reduction of the kind "If Tom'll do it I will" (cf. "If Tom will do it I will") may be explained if the notion of stress-time rhythm in English is used. And in fact, knowledge of the so-called "chopping" characteristic of the sentences in English is an enormous help to the foreign student in the classroom. In terms of the Spanish language, this author holds that the notion of vowel stability is more adequate than the notion of syllable-time. Syllable-time or staccato are perceptual impressions and a consequence of vowel stability in Spanish. BP can be said to have both the stress-time characteristics similar to English and vowel stability depending on dialectal variation as well as intra-speaker variation. And this may be true of Spanish as well.

It may be that discussions concerning these notions are purely a matter of point of view. Although investigators suggest that BP has a stress-time rhythm, attempts to apply these perceptual notions to BP, not Peninsular

Portuguese, seemingly have proved difficult as well [1, 2, 17, 20, 21, 27, 28, 29].

The notion of syllable and stress-time is a perceptual or impressionistic notion. Once we carry this notion to the physical measurements of syllables in sentences, the expected isochrony cannot be found. More recently the developments around the notion of P-centers [7, 9, 10, 12] may explain why subjects may have this perceptual knowledge of regularity although acoustically we find no correspondence. The regularity seems to be present in an underlying form which cannot be reflected acoustically. The works of Parker and Diehl [23] had already pointed out the possibility that the duration of a vowel may be greater than the acoustical signal tends to show.

The present study is a continuation of former investigation in the area of temporal patterns and their relation to rhythmic patterns. There will be no attempt to give a description of the structure of BP in this investigation for lack of space. Detailed and brief descriptive analyses of Portuguese and Spanish can be found in some of the works cited here [1, 5, 6, 13, 14, 17, 21, 22, 23, 24].

2. EXPERIMENTAL PROTOCOL

The experimental protocol was organized according to three major procedures: the production of the recordings, the production of the spectrograms for sound segment segmentation, and data analysis. In the production of the recordings, passages from Mexican and Brazilian television broadcasts were recorded in the language laboratory at the University of Kansas by a laboratory technician. Recorded passages containing dialogues and news broadcasts were used randomly. Over one-hundred spectrograms were produced for analysis and measurement.

Segmentation procedures used in this study use Klatt's [18] way of segmenting, combined with the works of Lehiste and Peterson [19, 25] which deal with the notions of onglides,

offglides, steady state, and simple and complex nuclei, the work of Parker and Diehl [23], and the more recent notion of P-centers [7, 9, 10, 11, 12, 15, 16] as well. Detailed explanations as to the segmentation rules are given by the author elsewhere [27].

Two different methods of measurement were used. In the first method, only the vowel nucleus was measured, and in the second method, the vowel nucleus and the preceding consonant were measured when there was a preceding consonant. Otherwise only the vowel was measured. The statistical package SPSS 4.1 for IBM VM/CMS at the University of Kansas was used to run several different tests on segment(s) duration according to method, language, and relative position of the (consonant)-vowel to the stressed (consonant)-vowel. Before using parametric tests such as ANOVA, a comparison was done of the distribution of values using the median and the mean. Since no skewed distribution nor significant differences in values were observed, either the mean or the median could be used in this study. There were missing values in our data, but these were taken care of by techniques already existing inside the ANOVA program.

3. RESULTS AND DISCUSSION

The present results show for Mexican Spanish (MSP) a significant regularity of the temporal patterns of the sounds studied, regardless of the method. In the case of BP, different results will be obtained depending on the method used. Table 1 summarizes these results where MSP stands for "Mexican Spanish", BP for "Brazilian Portuguese", PR for "pretonic", ST "stressed",

and PST "posttonic". The values were kept in centimeters, but it suffices to multiply any value by 8, to obtain the corresponding value in milliseconds.

Preliminary analysis of the spectrograms containing samples of speech from MSP in this study have shown to be common for a vowel or a sequence of consonant and vowel in unstressed posttonic position to have longer duration than their stressed equivalents. This becomes even more evident when the word is in a prepausal position, confirming similar findings in what Klatt [18] called "prepausal lengthening". In the present study this syntactic or prepausal cue is not observed in BP which confirms results from an earlier study already undertaken [27]. This lengthening in MSP makes posttonic syllables longer than the stressed syllables in a discourse. This lengthening can also be observed by simply listening to a dialogue in Spanish in general, in any context. BP in this study confirms again results from Simões [27] done with the extreme vowels [i,a,u] where stressed vowels are twice as big as the unstressed vowel. The great posttonic reduction observed in that study was lessened in this study due perhaps to the great number of linking processes between words, more observable here. Prepausal lengthening, however, has not been observed here.

Other statistical tests were made, in an attempt to observe the relation between positions according to language and method as seen in Figure 1.

Table 1: ANOVA results of-cell means and standard deviations by language, position and method.

MSP	(C)V	Mean	Std Dev	BP	(C)V	Mean	Std Dev
	PR4	13.18	3.		PR4	12.	5.2
	PR3	13.39	3.35		PR3	13.64	5.95
	PR2	14.79	4.9		PR2	14.35	4.43
	PR1	14.96	3.63		PR1	16.73	4.14
	ST	17.97	5.63		ST	24.95	6.53
	PST1	17.63	4.19		PST1	17.94	4.87
	PST2	24.	1.92		PST2	16.38	4.92
MSP	V	Mean	Std Dev	BP	V	Mean	Std Dev
	PR4	7.75	1.2		PR4	12.	6.36
	PR3	7.61	2.61		PR3	7.38	1.16
	PR2	8.22	3.10		PR2	8.58	2.83
	PR1	8.09	2.19		PR1	9.66	2.91
	ST	10.49	3.22		ST	15.78	5.59
	PST1	9.8	3.15		PST1	10.29	3.96
	PST2	14.14	2.01		PST2	9.75	4.29

Figure 1: ANOVA results of multiple range test. The symbol + denotes pairs that are significantly different at the .05 level. Method-1 is indicated by (C)V and method-2, by V.

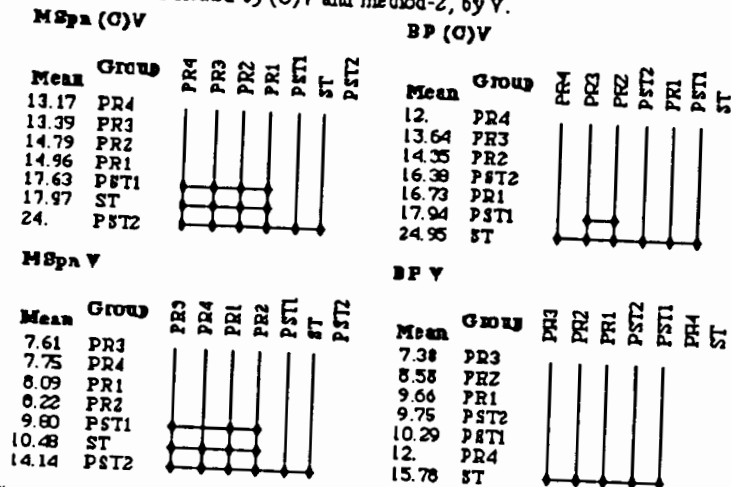


Figure 1 suggests a much greater regularity in temporal patterns in MSp than in BP. The pairing of groups (syllables) as seen in Figure 1 indicate quite a different behavior in MSp. In BP the stressed syllable seems to be a reference for the other syllables. In MSp the end of the word position, namely stressed and posttonic syllables seem to have a function of reference similar to the stressed position in BP. In other words, strong positions in MSp are more evenly distributed among syllables, especially the stressed and posttonic ones. This may be a result of syllables in general having relatively similar duration. Of course, the fact that pretonic, stressed and posttonic are different groups is still maintained in both languages as these results show. Figure 1 suggests that besides the inter-major group differences, there are intra-major group differences as well. Since these are statistical differences, definite conclusion will need perceptual analysis for validity and correct interpretation.

The notion of P-centers [7, 12, 16] has given the present analysis a clearer view of the temporal patterns observed. Although a perceptual analysis is necessary in the continuation of this study, the present results in Figure 1 from measurements at the acoustical level suggest that an increase in the number of measurements will provide a greater regularity in the temporal patterns of MSp. In the case of BP, the present results confirms the possibility of finding both types of rhythm. The possibility of finding both stress- and syllable-time rhythm in BP is not new. Abaurre-Gnerre [1, 2] explained this phenomenon in terms of "style", and Major [2],

[22] in terms of a possible rhythmic change BP is undergoing presently. Major, however, concludes that BP is a stress-time language. Abaurre-Gnerre [2] suggests a more attractive explanation in terms of a rhythmic-stylistic criterion. Abaurre-Gnerre's solution is based on a scale that includes variation in language rhythm as one goes from a formal style (slow rate of speech) to a colloquial style (fast rate of speech). Paralleling this scale on style, the rhythm varies from syllable-time (formal) to stress-time (informal). Spanish and English are examples of languages on the extremes of the scale, i.e. syllable-time and stress-time respectively. It should be noted that in this scale, Peninsular Portuguese is placed between BP and English, namely with more stress-time characteristics, but still less than English. Another interesting aspect of Abaurre-Gnerre study is her attempt to link phonological processes to a type of rhythm. Vowel harmony, for example, may be related to a syllable-time rhythm. This can be extremely useful if such a relation can be established. If vowel harmony characterizes a syllable-time rhythm, this should not be a surprise because very often it indicates a more evenly distributed number of strong positions in a word. In other words, open vowels in BP only appear in strong position, i.e. stressed position. Vowel harmony in BP very often involves open vowels indicating a strengthening of the position where a closed vowel is realized as open.

In terms of a general theory of phonetics, the present study claims that rhythmic patterns may coexist in a given language and it is not limited

to stylistic variation. Other factors may be present. Dialectical variation, for instance, may explain why one of the informants in Major [22], from Minas Gerais, may have the so-called syllable-time rhythm, or in terms of the present analysis, "vowel stability". This is my interpretation of the results in that work, which in a closer analysis suggest syllable-time characteristics instead of the proposed stress-time characteristic. The explanation presented here for these rhythmic alternations within the same language and intra-speaker, is that the speaker also manipulates rhythm at his/her will. The reasons are of a pragmatic nature where sometimes in the speaker-hearer interaction the speaker may feel a need for a clearer message.

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