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Piapoco: The Phonological Word

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0. Introduction

0.1. Orientation. Although the major topic and focus of this paper on the Piapoco¹ language is the phonological word, it is necessary first to provide background giving information on the phoneme and other lower-level units of the phonological hierarchy, namely, syllable and foot. The phonological word is then discussed, followed by a few comments on morphophonemic phenomena and one higher-level unit of the hierarchy, the phonological phrase. For several years the suprasegmental features (especially pitch and stress) in Piapoco resisted analysis. This study seeks to clarify a number of problems in that area.

0.2. Notes on Segmental Phonemes. Here we present Sudo's chart of phonemes showing major variants in parentheses (Sudo 1976).

Consonants

		Labial	Interdental	Alveolar	Palatal	Velar	Glottal
Stops	vl	p		t		k	
	vd	b		d			
Fricatives			s	ʔ(ts, tš)			h
Nasals		m		n			
Vibrant				r(ř, l)			
Semivowels		w(b,w)			y		

Vowels

	Front	Central	Back
High	i		u
Mid	e		
Low		a	

The phoneme /s/ in the present data shows some variants not mentioned by Sudo. Free variants [s], [s̺], and [θ] have been recorded, but Piapoco who speak some Spanish use [s] more often than the other two varieties. Bilinguals also favor [tʃ] over the [ts], variant of /c/.

Although /r/ is a rare phoneme, there are instances of contrast with /l/: *charàpibàa* 'site of the stream Charapí'; *ála* 'mud turtle'; *cachàlawiiri* 'barbed arrowhead'; *quiliquili* 'parakeet'; *quielete* 'wild cherry'; *éeréta* 'slowly'; *quíracá* 'it is red'; *chilanási* 'ornament of yarn'.

There is an optional palatalization of the voiceless velar stop /k/ whenever it occurs between [i] and [a]: *nuiká* [nui^hká ~ nui^hk^yá] 'I see'; *itànika* [i^htà:^hníka ~ i^htà:^hník^ya] 'he is conversing'.

In the remainder of this article, we will be using Sudo's practical orthography in which /ch/ and /j/ are substituted for /c/ and /h/ respectively, with the addition of /l/ and the grave accent (/V/) which indicates lenis phonemic stress.

0.3. Syllable. Sudo defined two contrasting syllable types: Syl₁ = ± Margin:C₁ + Nucleus: V; and Syl₂ = +Margin: C₂ + Nucleus: V, where C₁ is any consonant except the phoneme /r/, and C₂ is the phoneme /r/ (with variants [ř] and [ř̺]). In Sudo's description, either type of syllable may occur in medial or final position in a word, but only Syl₁ may occur initially in a word. Since the time of Sudo's analysis, one word has been found with initial /r/, *ráunamáita* 'rapidly'. For this reason, it seems convenient to simplify the description as having one syllable type, Syl = (C)V, which may occur in initial, medial, or final position in the word, with the added note that /r/ is rare initially. Any syllable is a unit of potential stress placement.

0.4. Phonological Foot. A study of Piapoco stress reveals that all stressed morphemes have either heavy or lenis stress on their nuclear syllables, but not a mixed selection. Many morphemes (principally stems) combine with one or more clitics (unstressed morphemes) to form utterances which are at the same time both phonological and grammatical words (although, according to a different analysis, it might be preferable to write some clitics as separate grammatical words). There are also stressed affixes, which cannot be pronounced in isolation, so that although they have some features of phonological words (i.e., stress and pitch), they lack potential pause as a signal of border.

Consequently, we have chosen to postulate a phonological "foot" between syllable and word, for which potential pause is not an identifying (obligatory) feature, reserving the term phonological word for the

units having potential pause at their borders. One foot is a phonological correlate of one stressed morpheme (with or without clitics). Two contrastive types of feet are the all-heavy stress foot versus the all-lenis stressed one. At the word level, there are also two contrastive types of words, i.e., the simple phonological word, having a homogeneous selection of stress (containing one or more feet with all-heavy or all-lenis nuclei, and the complex phonological word, having a heterogeneous selection of stress. Phonological feet contrast via type of stress; phonological words contrast via combinations of stress. This solution allows the borders of the hierarchies to coincide as in the following chart:

PHONOLOGICAL	GRAMMATICAL
word (simple or complex)	stems \pm affixes \pm clitics
foot	a) stems \pm clitics b) stressed affixes \pm clitics
syllable	—
segment	—

1. Phonological Word

The phonological word has one or more nuclear syllables bearing stress and potential pause at its final border.

1.1. Simple Phonological Words. A simple phonological word has from one to four nuclear syllables, which bear either all heavy or all lenis stresses.

1.1.1. Stress. One class of simple phonological words carries heavy stress on all nuclear syllables (\check{V} indicates heavy stress in the following examples): *álitali* 'a small armadillo'; *cawámai* 'chicken'; *báawéeri* 'bad'; *nuénánái* 'my relatives'; *ucúaca* 'she toasts (cassava)'; *quíranaméeyéi* 'all the red ones'.

A second class carries lenis stress on nuclear syllables (\tilde{V} indicates lenis stress in the following examples): *wirìchu* 'grasshopper'; *bàlutàmi* 'a small frog'; *cumàta* 'duck'; *nuchàwidàaca* 'I shoot'; *ibèeri* 'his older brother'; *sumàu* 'girl'; *yèepùacawa* 'he returns'.

1.1.2. Pitch. A nuclear syllable with heavy stress carries a high pitch,² while a nuclear syllable with lenis stress carries low pitch. The pitch of

unstressed marginal syllables is noncontrastive and fluctuating, tending to be influenced by the pitch of contiguous nuclear syllables. For instance, immediately preceding a heavy stress, a marginal syllable usually sounds a bit higher than the same marginal syllable when it precedes a lenis stress. Similarly, pitch may fall gradually following a heavy stress, then begin to rise again through a string of unstressed syllables to reach the next heavy stress. However, in Piapoco, as in other "word-tone" languages, pitch is a significant feature of stressed syllables only. Stress and pitch on nuclear syllables are highlighted in the following contrastive examples in which heavy stress and high pitch are indicated by [ˈV̆], and lenis stress and low pitch are indicated by [ˈV̇]:

[nuˈcùaca]	<i>nucùaca</i>	'I wait for'
[nuˈcúaca]	<i>nucúaca</i>	'I toast (cassava)'
[iˈtèerica]	<i>itèerica</i>	'he who crows'
[iˈtéerica]	<i>itéerica</i>	'he who carries'
[piˈùcaca]	<i>piùcaca</i>	'you chop down'
[piˈúcaca]	<i>piúcaca</i>	'you throw out'
[ˈpiini]	<i>piini</i>	'your breast'
[ˈpiíni]	<i>piíni</i>	'your urine'
[ˈúuwi]	<i>úuwi</i>	'her ear'
[ˈúúwi]	<i>úúwi</i>	'battle'
[ˈnàuˈlùaca]	<i>nàulùaca</i>	'they thresh'
[ˈnáuˈlúaca]	<i>náulúaca</i>	'they hang things on a pole'
[ˈyùuba]	<i>yùuba</i>	'his fingernail'
[ˈyúuba]	<i>yúuba</i>	'yopo (a drug)'
[wiˈsìri]	<i>wisiri</i>	'a palm'
[ˈwíˈsíiri]	<i>wíisíiri</i>	'lucky in hunting'

1.1.3. Voice Quality. A simple phonological word carrying heavy stress and high pitch on the nuclear syllables is pervaded by a clear or tense voice quality; a word carrying lenis stress and low pitch on the nuclear syllables is characterized by a husky or "hollow timbre," similar to voice quality reported for Fore (Pike and Scott 1963:183).

1.1.4. Vowel Length. Vowel length is an important feature in Piapoco phonology and operates independently of stress and pitch as the following examples indicate, where [V] is short, [V̆] is intermediate, and [V:] is long:

[ɪwali]	<i>ɪwali</i>	'about him'
[iwa:lɪ]	<i>iwaali</i>	'his loin (animal)'
[pi:cáca]	<i>piicáca</i>	'you look'
[pí:caca]	<i>piícaca</i>	'you dig'
[ye:máca]	<i>yeemáca</i>	'he burns something'

[yé:miaca]	<i>yéemiaca</i>	'he understands'
[wachàwidà:ca]	<i>wachàwidàaca</i>	'we shoot'
[icu:chuíca]	<i>icuuchuíca</i>	'his thigh'
[cabalè:ri]	<i>cabalèeri</i>	'white'
[quí:ré:ri]	<i>quíiréeri</i>	'red'
[nalí:]	<i>nalí</i>	'to them'
[dabé:]	<i>dabé</i>	'medicine'
[cuwé:]	<i>cuwée</i>	'an edible ant'
[é:ma]	<i>éma</i>	'tapir'
[í:ri]	<i>íri</i>	'mouse'
[né:ri]	<i>néeri</i>	'deer'

Phonetic comparisons of combinations of distinct vowels with the long geminate vowels, [V:], indicate geminate vowels should be interpreted as vowel clusters. The [a:] of [yá:pi] 'his bone' is equal in length to the [áu] of [áuli] 'dog'; and the [i:] of [capi:] 'house', is equal in length to the [à] of [adài] 'sloth'. In addition, geminates occur in environments similar to those of single vowels, and the phonology would be vastly complicated were all to be interpreted as single vowels.

The intermediate length [V·], found only on the stressed syllable in two-syllable words when said in isolation, is interpreted as nonphonemic lengthening due to the position of the word in the nucleus of a higher level unit (see 0.1). Thus, [é:ma] in isolation is interpreted as *éma* 'tapir', but [né:ri] as *néeri* 'deer'; and [nalí:] as *nalí* 'to them', but [sapi:] as *sapii* 'incantation'.

1.1.5. Syllable-timed Rhythm. Piapoco is characterized by syllable-timed rhythm in which "the syllables themselves tend to be more or less equally spaced and come at approximately even recurrent intervals. As a result of the syllable timing, the vowels are likely to be clear-cut and precisely articulated" (Pike 1947:13a). Thus, just as in Spanish, there is no jamming of marginal syllables, nor is vowel quality altered in unstressed syllables. Clear articulation is not dependable as a signal of the presence of stress in Piapoco.

1.1.6. Vowel Loudness. The high vowels /i/ and /u/ are more lenis than the low vowels /e/ and /a/ when compared in similar environments. Thus, the /á/ of *áca* 'sapuara fish' is louder than the /ú/ of *úcu* 'stork' and the /é/ of *épi* 'rainbow' is louder than the /í/ of *sípi* 'hummingbird'; the /è/ of *cuwèesi* 'animals' is louder than the /i/ of *wirùichu* 'grasshopper' and the /à/ of *bacàa* 'gourd' is louder than the /ù/ of *chamùu* 'wild pig'.

However, aside from this difference in loudness which can be detected by ear and by measurement, stress placement within each phonological word must be determined by comparing the syllables of that word alone.

Syllable-timed rhythm and relative differences in vowel loudness make stress placement difficult in citations which lack high pitch (a reliable signal of heavy stress). For this reason, there exists a very large group of simple phonological words containing only low pitch where syllable-timed rhythm and vowel loudness create the impression of either nearly equal stress on each syllable, as in Culina citations (Pike 1975:206), or unstable stress which shifts in succeeding pronunciations of the same word. It is most probable that the shift of stress is due to the position of the word in a higher-level unit—i.e., whether in the nucleus or margin of that unit.

1.2. Complex Phonological Words. While a simple phonological word has nuclear syllables carrying either only heavy or only lenis stress, a complex phonological word carries both heavy and lenis stress, illustrated by the following examples: *ìriculé* 'into'; *nutànàacaténá* 'that I might write'; *nuénásàatúaná* 'my parallel cousin'; *ichàwidàacaalí* 'if he shoots'; *asiánái* 'men'.

2. Morphophonemics

Various combinations of morphemes result in changes at their -V + V-borders, including segmental phoneme alteration and stress perturbation. The following examples show morphemic composition of grammatical words. (The morphophonemic rule in operation is somewhat regularized for the sake of illustration. Hyphens indicate obligatory affixation.)

2.1. Vowel Alteration.

- Rules: a) $i + V_1 > yV_1V_1$
 b) $a/aa + i > ee$

i- + *-èpùaca* > *yèepùaca* 'yes, he returns'
 3m return, aspect

achúma + *-ichúa* > *achúméechúa* 'the small female'
 small fem sg

i- + *-ùba* > *yùuba* 'his fingernail'
 3m fingernail

2.2. Stress Perturbation.

Rule: V + \acute{V}/\check{V} > $\acute{V}V/\check{V}V$

wa- + *-álicawa* > *wáalicawa* 'yes, we know'
1pl know, aspect, intrans

na- + *-úwi* > *náuwí* 'their ear(s)'
3pl ear

2.3. Vowel Alteration and Stress Perturbation.

Rule: à/àa, è/èe + í > èe

masacàa + *-ichúa* > *masaquèechúa* 'the clean female'
clean fem sg

cabalèe- + *-iri* > *cabalèeri* 'the white male'
white masc sg

i- + *-à-* + *-iyéi* > *yèeyéi* 'they who go'
3m go pl

The relative clause suffixes *-iri*, *-ichúa*, and *-iyéi* are among the most common vowel-initial affixes which occur post-stem (Klumpp and Burquest 1980). As several of the preceding examples indicate, wherever stress perturbs to the first vowel of a cluster, lenis stress takes precedence over heavy stress (i.e., lenis stress remains). This highlights an interesting paradox: although lenis stress may seem "weak" in phonological terms, it seems to be more stable at grammatical (morpheme) boundaries.

3. Phonological Phrase

Phonological words are the components of the phrase level. A phrase consists of one or more words, has pause at its borders, and obligatorily carries an intonation contour. At this point, only two phrase types have been noted, although informal observations indicate that other phrase types may be isolated.

3.1. Narrative Phrase. Narrative phrases generally have an intonation contour that starts high and drifts downward without loss of the heavy/lenis distinctions at the word level. Frames used for identifying word-level stress also brought to light the fact that the substitution item, presumably in focus in the mind of the speaker, can raise or lower the entire intonation contour of the phrase, depending on

whether the predominant stress of the substitution item is heavy or lenis. Narrative phrases usually have loud onsets and quiet final syllables, fading into voicelessness, a feature also observed by Sudo (1976:11). Nuclei of these narrative phrases occur at or near the beginning of the phrase.

3.2. Interrogative Phrase. In interrogative phrases, the final vowel or vowel cluster has a high rising intonation. This creates a sharp contrast in pitch whenever the penultimate syllable carries lenis stress. A more thorough investigation of phrase and utterance intonation should in the future yield finer details.

4. Conclusion

When contrastive pitch at the word (rather than syllable) level has been reported for a given language, the terms *word-tone* or *pitch-accent* have frequently been used to identify the phonetic features (e.g., Pike and Scott 1963:173). However, for several reasons, the contrasts found in Piapoco have been called heavy and lenis stress rather than high and low pitch-accent.

Within the Arawak linguistic family, stress has been shown to be outstandingly important in both phonological and grammatical analyses. Campa was one of the first indigenous languages for which multiple stress has been reported (Pike and Kindberg 1956). Terena exhibits what has been called the most intricate known system of stress; not only is the phonological description of stress very complex, but it also has important grammatical implications (Bendor-Samuel 1963). The investigators of Yucuna and Guajiro report multiple stress, and in addition, Yucuna has a complicated system of stress perturbation. The central place which stress occupies in these Arawak languages makes it preferable to maintain the emphasis upon stress for Piapoco also.

Secondly, since Piapoco has two degrees of stress, heavy and lenis, we have considered stress the focal point of the phonological description. We might have chosen to highlight contrastive pitch, making stress variations simply phonetic features of the pitch phonemes, except for the history of emphasis upon stress in Arawak languages (with the absence of contrastive pitch there).

Also, there is some precedent for assigning pitch as a component of stress at the word level. Using Fore (Papua New Guinea) data (Pike and Scott 1975) along with observations on Swedish and Norwegian, Pilch illustrates that some languages have *distinctive* stress (contrastive phonetic exponents) as opposed to the more familiar *culminative* stress (contrastive placement). This distinctive word stress may be manifested by any number and type of phonetic features in a specific language. He

mentions some such as pitch, duration, acoustic intensity, and glottal stricture (Pilch 1975:191-92).

Thus, in summary, Piapoco stress, distinctive at the phonological foot level, is trichotomous: heavy stress and lenis stress are each manifested by three types of phonetic parameters: (1) relative prominence or loudness, focused on the contrast between nucleus and margin, (2) pitch, focused mainly on the nucleus itself, and (3) voice quality, a feature spread over the entire phonological foot.

It has been very gratifying to have our analysis of stress, sometimes based upon artificially contrived or elicited data, corroborated by observations in the field: once we have identified the stress of a particular word, we focus on it in everyday conversation in the village and find stress distinctions remaining constant throughout a variety of situations—excitement, questioning, anger, slow speech, shouting. What we once puzzled over as odd, unpredictable intonation patterns, we now recognize as rapid transitions from heavy to lenis to heavy stress.

There are definite patterns of intonation imposed over foot-level stress within larger segments of speech, i.e., the phrase and the utterance, deserving of further study. We expect to discover that distinctive stress, carried by whatever unit appears in a certain focal position in an utterance, will have a close relationship to the intonation of the entire utterance.

If future studies bear this out, then phonological foot stress should turn out to be one major force in the dynamics of Piapoco phonology.

Notes

1 According to Čestmír Loukotka (1968), the Piapoco language belongs to the Arawak linguistic family. It is spoken by approximately three thousand people who live along the rivers Vichada and Guaviare in the eastern plains of Colombia. The material for this analysis was collected in the village of Caño Cedro during a period of sixty-nine weeks of fieldwork in the years 1976 through 1979. The following members of the Piapoco community have been principal language assistants: Antonio Gaitán, Rosalena Cumanáica, Francisco Cumanáica, Colino Cumanáica, Ignacio Cumanáica, Catalina Cumanáica, Pedro Cumanáica, Martín Gaitán, Juan Pablo Cumanáica, and Francisco Gaitán.

The field work of Timothy Sudo during the years 1966-70 culminated in a description of the segmental phonemes (Sudo 1976). His preliminary observations regarding stress gave impetus to a more intensive investigation of suprasegmental features when the present author, together with James Klumpp, entered the Piapoco area in order to continue the analysis of the language. We wish to express our thanks to Florence Gerdel, Kenneth Pike, Eunice Pike and Donald Burquest for their help in phonological analysis. For guidance in the presentation of the solution, we are grateful to Ruth Brend.

Four other languages of the same family (Arawak) provide interesting comparisons with Piapoco: Campa (Pike and Kindberg 1956); Terena (Bendor-Samuel 1963); Yucuna (Schauer and Schauer 1967); and Guajiro (Mansen 1967).

2 Various non-Arawak languages have contrastive pitch at the word level, but each phonological word carries either one pitch or the other on a single nucleus: Pame (Gibson 1956): Fasú (May and Loeweke 1965). However, in Piapoco, *multiple* nuclei may carry all high pitches, all low pitches, or a combination of high and low in one phonological word.

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