

# A PRELIMINARY STUDY OF PITCH AND RHYTHM IN PITJANTJATJARA.

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Pitjantjatjara is a dialect of the greater Western Desert language, spoken mainly in the north-west of South Australia, but extending north into the Northern Territory, and west into Western Australia (Douglas 1964). Like most Australian languages, Pitjantjatjara has been analysed as a stress language (trochaic); however relatively little is known about the intonational system of this language. We present a preliminary analysis of the prosodic structure of Pitjantjatjara based on three female speakers reading two different texts – the Walpa U<sub>l</sub>pariranya munu Tjintunya (South Wind and the Sun) passage, and the Nanikuta (Three Billy Goats) text.

Our first result suggests that the shape and temporal alignment of major pitch movements perform a largely demarcative function, aligning with the metrically strong first syllable in a word. There is mixed evidence, however, that strong syllables are longer or have more "peripheral" vowels: differences in strong vs. weak syllable duration are text-dependent, while the formant patterns for the three vowel phonemes /i, a, u/ suggest subtle formant differences, rather than categorical changes in vowel quality, according to strong vs. weak syllable.

We also consider the traditional rhythm metrics (e.g. vocalic nPVI and intervocalic rPVI). These suggest that Pitjantjatjara is a stress-based language. However, as noted above, Pitjantjatjara does not have vowel reduction in weak syllables, and in addition, it has a predominantly CV syllable structure. Moreover, Australian languages such as Pitjantjatjara have a high proportion of sonorants in their phoneme inventory (Butcher 2006), and despite the mainly CV syllable structure, sonorant coda consonants are possible and not infrequent. Given Selkirk's (1982) discussion of the possibility of sonorant codas aligning with the syllable peak/nucleus, it is not clear that an analysis that treats all sonorant consonants as part of the consonant stream is a fortuitous one in the present case.

We conclude that the most consistent phonetic cue to prosodic prominence – and by extension a source of the perceived trochaic stress-based rhythm in Pitjantjatjara – is a strong pitch movement that is phonetically aligned with the left edge of a phonological word.

## References

- Butcher, A.R. 2006. Australian Aboriginal Languages: Consonant-Salient Phonologies and the 'Place-of-Articulation Imperative'. In *Speech Production: Models, Phonetic Processes, and Techniques*. New York, USA: Psychology Press. pp. 187-210.
- Douglas, W.H. 1964. *An Introduction to the Western Desert Language of Australia*. Sydney: Oceania Linguistic Monographs, 4.
- Selkirk, Elisabeth O. 1982. The syllable. In Harry van der Hulst & Norval Smith (eds) *The Structure of Phonological Representations* vol. II. Dordrecht: Foris. pp. 337-83.

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### *Intonational labeling criteria.*

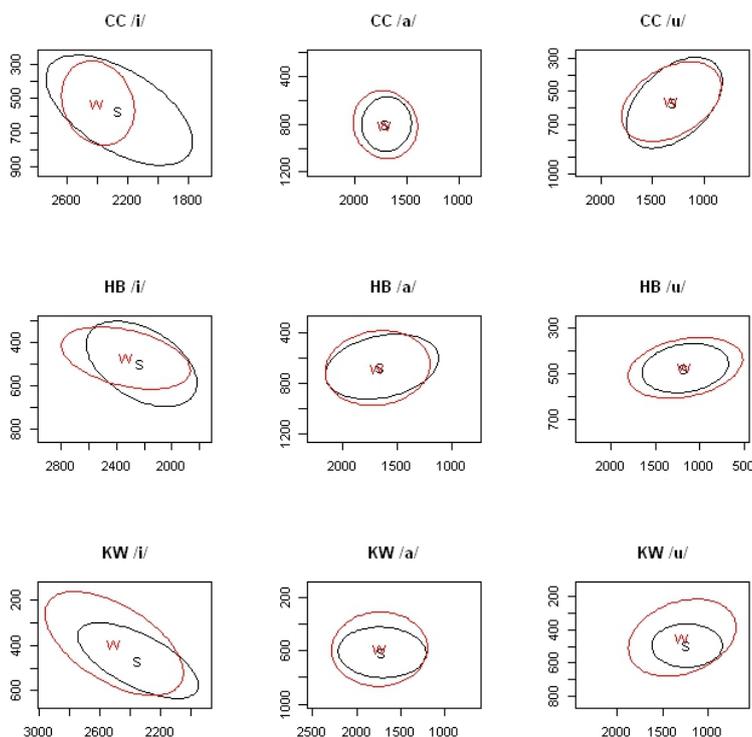
Label	Criteria for use
-H	This marks <u>the main pitch peak on the first strong syllable of a word</u> . It is placed at the highest point on the f0 pitch trace which is usually realized towards the edge of the syllable nucleus. <u>The most common tone.</u>
-L	Also marking the first strong syllable, this label is used if the word begins at a low pitch. As this does not usually appear as a dip (thereby excluding the possibility of marking the lowest pitch point), this label is placed at the centre (if pitch trace is level) or left edge (if pitch trace is sloping) of the syllable nucleus.
H-	Used as required to mark a word which does not decline but stays level* or increases in pitch. Placed toward the right edge of the final syllable nucleus.
del-H	Used to mark the main pitch peak of the first strong syllable when it falls somewhat to the right of the nucleus boundary. This is used regardless of whether the label crosses a syllable boundary; in many instances it falls into the coda of the same syllable or the sonorant onset of a following syllable.
L%	This marks the right phrase boundary and is used when the phrase ends with a low pitch, as in most instances.**
H%	This is a less common boundary tone label used when the phrase ends on a level* or raised pitch.

\*Due to declination, a level pitch over time is perceived as rising and is therefore labeled as H.

\*\* There may also be an optional L- tone that is an additional boundary tone aligning with either the right word edge or an intermediate phrase.

X% is used as a final phrasal tone, and -X is used as a word-level tone – crucially, -X appears to occur in the first metrically strong syllable of a word and also is a site of pitch reset for the following word or phrase.

A left-headed binary foot structure was assumed, with an extra weak syllable at the end of the word containing an odd number of syllables – that is, a word such as ngu.ru was labeled as SW, mu.la.pa as SWW, pi.tja.nyan.ka as SWSW, and ul.pa.ri.ra.nya as SWSWW.



Vowel plots of the three short vowels (by column) for each of the three speakers (by row), with Strong and Weak syllable data plotted separately on each panel. Data points represent means, and ellipses represent two standard deviations. A Linear Mixed Effects analysis showed that /i/ was higher and more front in Weak syllables, and that /u/ was higher in Weak syllables. In addition, /a/ showed an effect on F3, which is higher in Weak syllables.

Tone	Coefficient	t	d.f.	95% C.I.	
-H	0.71	34.69	1177	0.66	0.74

Pearson's product-moment correlation coefficient for syllable duration and timing of –H (aligned with start of word).

Text 1	Speaker	Syllable	Mean	S.D.	N	t-test
	CC	S	249	65.0	332	n.s.
		W	243	86.6	190	
	HB	S	224	74.0	238	p<0.001
		W	194	52.4	352	
	KW	S	203	61.5	283	p < 0.001
		W	185	53.8	415	
	<b>All</b>	<b>S</b>	<b>222</b>	<b>69.2</b>	<b>711</b>	<b>p &lt; 0.001</b>
		<b>W</b>	<b>205</b>	<b>69.6</b>	<b>1099</b>	

Text 2	Speaker	Syllable	Mean	S.D.	N	t-test
	CC	S	231	80.1	169	n.s.
		W	242	79.4	270	
	HB	S	223	80.0	199	p < 0.01
		W	203	71.1	314	
	KW	S	184	57.0	183	n.s.
		W	185	56.8	287	
	<b>All</b>	<b>S</b>	<b>213</b>	<b>75.8</b>	<b>551</b>	<b>n.s.</b>
		<b>W</b>	<b>209</b>	<b>73.3</b>	<b>871</b>	

Duration (in milliseconds) of Strong and Weak syllables, not initial or final in phrase – differences between speakers and texts.

#### APPENDIX – TEXTS (UNDERLINED CONSONANT DENOTES A RETROFLEX)

##### WALPA ULPARIRANYA MUNU TJINTUNYA. (SOUTH WIND AND SUN)

Walpa Ulpariranya pula tjintunya pikaringangi.

Paluru pula nyangu yanngatja pitjanyangka, pulangkita unytjunpangka tjutura. Paluru pulanku ngaparku tjapiningi, "Nganalu puṭa yanngatja palumpa pulangkita unytjunpa waniku kuuṅpu ngarala."

Ka walpa ulpariratjalu puunu. Paluru pulkara puunu.

Ka yanngatjalu panya pulangkita unytjunpa palumpa pulkarangku witira tjutunu.

Walpa panya ulparira nguru puunu pulkarangku mulapa. Ka tjintungku irnyaṅu. Ka unytjunpa mulaparingu. Ka yangatjalu mapalku mulapa pulangkita unytjunpa palumpa waningu. Ka Walpa Ulpariratjalu wangkangu "Tjintu nyuntu nintipuka mulapa ngayuku."

##### NANIKUTA (BILLY GOATS)

Iriti kunyu panya nanikuta mankurpa nyinangi. Panya paluru tjana nyitayira mankurpa, panya pula ngankurpatjara, ka pulampa malanypa ngankurpawiya. Palu pulampa kuṭa panya pulka mulapa. Munuya kunyu nyinangi panya tjanampa ngurangka. Palu panya tjana ngura nyanga palula iriti mulapa nyinangi. Ka kunyu ngura panya nyangangka mai ukiri inuntji wiyaringu.

Kaya kulinigi, "Yaaltjikutula ankuku? Panya nganampa ngurangka mai wiyaringu."

Ka kuṭangu watjanu, "Nyarangkala ara!"

Ka mamungku watjanu, "Yaaltjikutun ananyi? Kuwarinanta ngalkula wiyani!"

Ka nanikutangu watjanu, "Wiya, ngayulu panya malatja mulapa, panya tjukutjuku mulapa, mununa nyurkanyurka mulapa. Panya ngura nyarangka nganampa mai wiya mulapa. Kaṅa kuwari nyanga mukuringanyi mai pulkakutu ankuntjikitja. Wanyu patala panya ngayuku kuṭaku ini panya nanikuta pulkanya."

Ka watjanu mamungku, "Uwa, palya, ara!"