

# VOWEL AND CONSONANT LENGTH CONTRASTS IN TELUGU

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## ABSTRACT

Telugu has been described as a two-way quantity language. However, the data indicates a need for reanalysis. Vowels as well as consonants have length opposition. The domain of vowel quantity is a segment and consonant quantity is disyllable. There are differences in duration of short and long ratios based on (1) final Vs. non-final contrasts and (2) phonological structure of word-pairs. Final vowel lengthening functions significantly as a marker of a variety of lexical, grammatical and suprasegmental features. Further, the functions manifested by stress in stress-languages are manifested by length in Telugu. There is an interaction and integration of length with emphasis, juncture and intonation. The present study is designed to describe length contrasts and constraints; and to determine the extent to which durational differences are employed distinctly at word level as well as beyond it in Telugu.

## 1. INTRODUCTION

The word spoken in isolation is generally taken as the basis of phonemic analysis, as complications such as variations across word boundaries arise if larger units are taken into consideration. But word analysis provides only a partial account of the functioning of units in a given language. The comprehension of spoken forms, the development of theoretical models, systems, etc., require knowledge of total functions of units at all levels. For instance, length as much as sound in Telugu distinguishes meaning at all levels of linguistic structure and in discourse. Furthermore the expressions like 'he will come' in Telangana /vastaḍu/ and in Rayalseema and Coastal dialects /vasta:ḍu/ show the use of short Vs. long vowel in verbal forms signalling the dialectal as well as sociolectal factors.

There have been several studies on duration of speech sounds and their perceptual importance in identification of linguistic units (for example see Fox and Lehiste, 1987) and implementation of duration models for text-to-speech system (Campbell and Isard, 1991). However, these studies are mostly on non-Indian languages. Strikingly, length in Telugu is a multifaceted phenomenon indicating a variety of linguistic functions other than just phonological. It functions both as a segmental as well as a suprasegmental feature. Further, several researchers have pointed out that lengthening of word-final segments in a pre-pausal position is a marker of boundary (i.e. juncture). Besides, a significant point to be noted is that there are many other linguistic functions manifested by word-final length in Telugu such as conjunction, disjunction, etc. Moreover, length in word initial segments/syllables too is a marker of emphatic stress in Telugu. The present paper deals with the distinctive use of vowel and consonant length at word level and beyond. It analyses a standard, educated, variety of Telugu as spoken by 10 speakers whose pronunciation can be regarded as typical representation of the language.

## 2. SHORT AND LONG VOWEL CONTRASTS

Following the traditional grammarians and the orthographic system of Telugu, almost all linguists include long vowels as a separate category in the inventory of vowel system and divide it into two subsystems, namely, (i) five short vowels (i,e,u,o,a) and (ii) five corresponding long vowels (i:,e:,u:,o:,a:). The short and long vowel pairs are differentiated mainly by length, rather than quality (Nagamma Reddy,1986).

All vowels can occur in all three positions of a word except /o/ which occurs only in non-final position. Long vowels occur word initially or in initial syllable, medially in second or third syllable and finally - as in /a:ru/ 'six', /pa:lu/ 'milk', /gula:bi/ 'a rose', /egata:i/ 'ridicule', /kitiki:/ 'window'. A long vowel can occur before or after a long consonant as in /ro:ḍḍu/ 'road' and /batta:yi/ 'an orange', but it is rare for a long vowel to follow a long consonant within monomorphemic native words. However, it is common to have a long vowel followed by long consonant in polymorphemic words.

Every long vowel can contrast with its corresponding short vowel in all positions in such examples as /ika/ 'hereafter' Vs. /i:ka/ 'feather', /nela/ 'month' Vs. /ne:la/ 'land', /anda/ 'protection' Vs. /anda:/ 'a large copper vessel'. Examples of contrasts for all vowels in all the three positions are given in Nagamma Reddy (1986).

A simple statement of contrast in word final position hides certain facts about the nature of occurrence of long vowels in Telugu. Unlike in other positions, the long vowel in final position indicates mostly a borrowed word or a grammatical element added to a monomorphemic word. Hence the contrast between vowels in final position is that of a phonological word and a grammatical word. For instance, /po:tu/ 'he-goat' and /po:tu:/ 'while leaving'. Thus, the distribution and contrast of short and long vowels differ from final to non-final and linguistic analysis of phonemic to morphophonemic or higher levels.

However, the occurrence of length in a vowel is not conditioned by or restricted to surrounding segments. Hence the domain of length may be considered as a segment rather than a syllable. Word-final length functions as a higher level phonological feature, whereas in initial syllable length functions as a phonological feature.

Since minimal contrasts are available for all vowels in all positions, irrespective of size of the unit, and short and long vowel system is symmetrical, a feature of length can be abstracted and assigned a phonemic status. We can treat the extracted length as prosodeme (Haugen, 1949), or co-vowel (Kelley, 1959), or a distinctive feature of [+length] as has been the practice in generative phonology (Chomsky and Halle, 1968). This analysis will be appropriate as the diphthongs have been treated as vowel + consonant glide.

### 2.1. Distinctive Degrees of Vowel Length

All writers distinguish two degrees of vowel length in Telugu, short

and long. Kelley (1959), however, considers two more degrees of length, but in final position only (i.e. lengthened short and lengthened long) at word boundary. Based on the observation of Telugu data it is now proposed to set up six degrees of length even at the initial position, as exemplified below:

(i) /idi/ 'this', (ii) /idi/ 'this one', (iii) /i:di/ 'having swum', (iv) /i:di/ 'after having swum (with emphasis)', (v) /i: di/ 'the letter di' and (vi) /i: di/ 'this very letter di'. The order of increase in length of these forms is: i > i̇ > i: > i:̇ > i: + > i: + (plus indicates juncture or pause). These six degrees of length play a significant role in distinguishing stressed from unstressed, immediate pause and its absence. Perceptual experiments need to be conducted to determine whether length alone functions as a perceptual cue.

## 2.2. Measurement of Vowel Duration

It has been demonstrated in literature that when there is a contrast in length of vowels, the long ones are approximately twice as long as the corresponding short ones. Evidence from Telugu also supports this (Nagamma Reddy, 1986). Initial and medial vowels in disyllabic pairs have a short to long ratio of more than 2:1, whereas for final vowels the ratio is only 1.5:1. Differences between short and long vowels in non-final positions is always greater than the duration of short vowels. In final position the duration of the short vowels is larger than the difference, the reason being that vowels in final position tend to be lengthened. Final vowel pairs show a long: short ratio of less than 2:1 and non-final vowels more than 2:1. There are also differences in ratio between the short and long vowel pairs depending on the phonological structure in which they occur. **Table 1.** shows mean durations in centiseconds (cs) of short and long vowel pairs (in italics and bold) in different positions and structures.

**Table 1**

Vowel in isolated words:				Ratio	Word-structure
Short	Long	Diff.	Ratio		
11.	28.1	16.1	2.4	(C) VCV - (C) V:C (eg. /ika/ - /i:ka/; /nela/ - /ne:la/).	
8.8	27.1	18.3	3.0	CVCCV - CV:CV (eg. /pikka/ - /pi:ka/)	
9.5	21.0	11.5	2.2	CVVCV - CV:VCV (eg. /nalugu/ - /na:lugu/)	
8.8	22.0	13.2	2.5	(C)VCCVCV - (C)VCCV:C (eg. /addalu/ - /adda:lu/; /mukkalu/ - /mukka:lu/)	
21.0	38.7	17.7	1.8	CV:CV: (eg. /pi/ - /pi:/)	
29.7	36.0	6.3	1.2	(C)VCV - (C)VCV: (eg. /anu/ - /anu:/) (C)VCCV - (C)VCCV: (eg. /anni/ - /anni:/) CV:CV - CV:CV: (eg. /po:tu/ - /po:tu:/)	

In connected speech:

5.3      11.4      6.1      2.2

The long vowels have one to one and a half to three times of duration

of corresponding short ones. The relationships are very similar to those described by Abramson (1962) for Thai, and Velayudhan and Hawie (1974) for Malayalam, but different from those revealed by the American studies of English where the length difference is less pronounced, the ratio of short and long pairs being 1:1.5 at its maximum, instead of minimum as noticed for Telugu. However, letters of Telugu alphabet for short and long vowels (in citation forms) such as /pa/ Vs. /pa:/ or /pi/ Vs. /pi:/ show that the long vowels are one and a half to two times as long as the corresponding short ones.

There is, thus, a significant difference between the final vowel pairs and non-final vowel pairs which could be interpreted as a pre-pausal phenomenon in accordance with Campbell and Isard (1991). The lengthening of vowels before voiced consonants, however, has no significance in Telugu, inspite of the fact that there is always a consistent difference in duration between voiced and voiceless pairs (Nagamma Reddy, 1988).

## 3. LONG AND SHORT CONSONANT CONTRASTS

All consonants except a few aspirated plosives and fricatives /f,ʃ and h/ occur as long in Telugu and contrast with their short counterparts in minimal/sub-minimal pairs as in /gudi/ 'temple' - /guddi/ 'blind'; /mona/ 'a sharp tip' - /monna/ 'day before yesterday'; /kala/ 'dream' - /kalla/ 'false'; /ara/ 'half' - /arra/ 'a room', etc. The contrast between /d/ and /dd/ and /r/ and /rr/ has accompanying quality difference as well. Unlike vowels, the contrast is limited to word-medial position. The contrast has been viewed as an opposition between single and double or geminate consonant. Whatever may be the phonological treatment of long consonants, phonetically it is simply the difference in duration that distinguishes short from the long. For instance, long affricates and aspirated plosives involve prolongation of closure followed by frication or aspiration. But they are not a combination of affricate + affricate or aspirated + aspirated consonant. Since all consonants do not contrast in length and the system is asymmetrical, length can neither be abstracted and assigned a phonemic status, nor can it be treated as [± long].

Distributionally, short consonants occur initially and medially, whereas long consonants occur only medially. Long consonants appear in disyllabic, trisyllabic and tetrasyllabic structures and before or after a long vowel as in /akka/ 'elder sister'; /me:natta/ 'father's sister', /talakattu/ 'the crest'; /ro:ddu/ 'a road' and /batta:yi/ 'an orange'. They also occur at word or morpheme boundary as a result of sandhi, as in /ta:ta/ + /to:/ → /ta:tto:/ 'with grand father'; /ka:ki/ + /ki/ → /ka:kki/ 'for the crow'. Instrumental records do not provide any evidence of rearticulation. Examples such as /atta/+ /to:/ → /at.to:/ 'with mother-in-law' and /mokka+ku/ → /mok.ku/ 'to (the) plant' involve re-articulation of the consonant as in Estonian (Lehiste, 1970). This needs further research.

### 3.1. Distinctive Degrees of Consonant Length

The question of whether Telugu has more than two distinctive quantities in examples such as /ta:ta/, /ta:tto:/, and /att(a)to:/ needs experimental investigation. It is observed that within the short (i.e. single) consonant group durational differences exist among a trill, an unaspirated plosive and an aspirated plosive. A trill (pronounced as tap) tends to be overshoot and aspirated phoneme tends to be overlong. There are also lengthened short consonants, at least one

and a half times longer than the same occurring before another consonant (cf. 3.2.)

### 3.2. Measurement of Consonant Duration

The duration difference between short and long consonants is greater than the duration of short consonant. The size of the consonant ratio can be as long as 1:4. On an average the ratio between short and corresponding long consonant is 1:2.8 in disyllabic and 1:2.2 in trisyllabic pairs. Furthermore, the duration of a particular consonant varies depending on the context of occurrence. For instance, /t/ in /pa:ta/ 'old' has approximately 94 msec. and same /t/ in /pa:tra/ 'dish' has approximately 162 msec. duration. The same tendency is observed for /n/ in /manda/ 'a flock of cattle' and /mana/ 'our'. Short, extrashort, long and overlong need to be recognised in distinguishing duration of consonants, as for vowels.

## 4. FUNCTIONS OF LENGTH BEYOND WORD LEVEL

Duration in Telugu functions as stress does across languages. However, there are more functions than indicated by Fischer - Jorgensen (1948), as discussed below.

### 4.1. Distinctive Function:

Telugu uses length as a distinctive feature both in consonants (3) and in vowels (2) to denote meaning difference of not only one word forms such as /a:ta/ 'it is so', /a:ta/ 'play', and /a:ta/ 'wrapper', but also in grammatical utterances such as /inenu/ 'he/she ate' and /ine:nu/ 'may he not eat'.

### 4.2. Boundary Function:

Boundaries of words or phrases are delimited by the lengthening of even a long vowel. Observe the following minimal triplets showing contrast between short, long and extra long vowels: (1) /aka:ram/ 'the letter a'; (2) /a:ka:ram/ 'shape' and (3) /a:ka:ram/ 'that hotness of taste'. The first vowel in (1) is 68 msec, in (2) it is 168 msec and in (3) it is 195 msec. The difference in duration between short (1) and long (2) is greater than between long (2) and lengthened (3) vowel. In the last item, it is extra length of the first vowel that functions as the significant boundary (i.e. juncture) marker. In English or French, glottal stop functions as a special junctural signal. However, in Telugu word boundary is manifested generally by lengthening of the pre-pausal vowel. The durational difference among the triplets is strikingly shown on spectrograms in terms of extension of formants in time. Duration of the vowel is used to signal the presence of phrase and sentence boundaries also. The last syllable of a word, phrase, clause or sentence are pronounced with a greater duration than the same syllables in non-final position of the utterances. It is noted that the duration of the word final vowel is longer than the phrase final, and phrase final (the short vowel being 160 msec. and the long vowel 200 msec.) is longer than the sentence final segment (which is approximately 80 msec. long).

### 4.3. Emphasizing Function:

A consonant or a vowel is lengthened under the effect of emphasis to indicate attitude of the speaker or focus, eg. /goppa/ 'great'

pronounced as /go:pppa/ or /go:ppha/ 'very great'. This lengthening is restricted to certain segment types only and to certain places in a word depending on its phonological structure and semantic context. To cite an example, in /kona/ 'a tip', the /k/ is the only segment which can be lengthened without altering basic meaning. If /o/ is lengthened it results in /ko:na/ 'a valley'. If /n/ is prolonged it gives rise to konna/ 'having bought', and if /a/ is lengthened it will become an interrogative /kona:/ 'is it a tip?'. A short vowel when prolonged becomes a long vowel, a totally different phoneme, whereas a long vowel can be prolonged without changing its identity. Hence the only way to emphasise the word /kona/ is to prolong the first consonant as /kkona/ 'only the tip'. If there were no initial consonant then a glottal stop would be inserted at the beginning as is the case with /a:ta/ 'it is said so', which changes to /ʔa:ta/ in emphasis.

A phonologically long vowel or a consonant is further lengthened to express emphasis, e.g. /o:/ in /ko:na/ and /nn/ in /konna/. (For details of emphasising rules and hierarchy see Nagamma Reddy, 1981). Different means are employed to emphasise words of different structures. The rules are simple, in that if there is a phonologically long vowel or a long consonant, the emphasis falls on that segment, and if there is no long segment in a sequence, then if the word has no consonant clusters or sequences, the emphasis falls on the initial segment. If this initial segment is a consonant it will be prolonged, and if it is a vowel, a glottal stop occurs as an onset of the initial vowel. If, in the absence of any long consonant, there is a non-identical consonant sequence, then the first element of that sequence in the medial position will be prolonged. In the case of a word containing both a long vowel and a long consonant and/or cluster, it is the vowel which will be prolonged, and if there are two long vowels the first one will be prolonged. For instance, if in the case of a word such as /ko:na/, in this sequence it is the long vowel which is prolonged when emphasised, but this makes no difference in basic meaning. what this amounts to is that, to avoid confusion where there is a contrast with other possible segments, the emphasis is carried only on such segments as do not change the lexical meaning. The same rule applies to consonants as to vowels, with the difference that since an initial long consonant never occurs in an unemphasised word, an initial short consonant is prolonged without changing the meaning.

The account given above applies to simple emphasis which merely makes the word clearer. If we wish to single out a word from a possible set of alternatives, we must use the (grammatical) emphatic particle /e:/ in place of the final vowel as in /kona+/e:/ → /kone:/ 'only the tip', /a:me+/e:/ → /a:me:/ 'she herself'.

### 4.4. Uniting and Separating Function:

Lengthening of vowel plays a grammatical role by marking the difference between close-knit compound expressions and loose-knit phrases. Contrast the pairs such as /gudi/ 'temple' and /ganta/ 'bell' in (a) and (b) -

(a) /gudiganta/ 'bell of a temple' (b) /gudi: ganta/ 'temple and bell'. The short vowel at the end of first word in (a) indicates union of two words, whereas its lengthening in (b) denotes separation thereby functioning as a conjunctive marker of coordination.

### 4.5. Continuity Function:

Lengthening of noun final vowel in a multiple compound representing

names or numerals indicates continuity or non-finality as in

a) /okati: renḍu: mu:ḍu: na:lugu/ 'one, two, three and four'

b) /paḍmini: si:ta: saro:ja/ 'Padmini, Sita and Saroja'.

Here lengthening is a marker of multiple conjunction and anticipation of continuity.

#### 4.6. Some Other Morphosyntactic Functions of Word Final Lengthening:

Utterance final vowel lengthening in Telugu designates the following morphosyntactic functions: (1) Coordination or conjunction (2) Additive or accompaniment (3) Copulative compounds or lexical doublets (4) Disjunctive with negative constructions (5) Negative concessive (6) Totaling or summation with numerals and quantifiers (7) Vocative or calling attention (8) Dubitative and (9) Reduplication and echo formation. (A detailed description with examples from Telugu is provided elsewhere in Nagamma Reddy, 1994).

#### 4.7. Suprasegmental Function:

Length functioning as marker of juncture (4.2) and emphatic stress (4.3) have been discussed above. Prolongation of vowels also corresponds to certain pitch patterns. Sjoberg (1957) discusses four degrees of length associated with different intonation patterns. The raising pitch is always accompanied by lengthening of a vowel, short or long. For example /e:di/ 'which one' Vs. /e:di/ 'show which one is it?' and /si:ta/ 'Sita' Vs. /si:ta/ 'Sita (vocative)'. In /si:ta/ the vowel /a/ is approximately 175 msec. and in /si:ta:/ the /a:/ is approximately 284 msec. The difference in fundamental is very small. Such functioning of duration requires a separate indepth investigation into suprasegmental dependencies and hierarchies.

### 5. CONCLUDING REMARKS

An attempt is made here to describe the significance of distinctive length from different perspectives and its interaction with levels of linguistic hierarchy confirming to a synchronic account. Length is shown not only as a phonologically distinct segmental feature, but also as a grammatical and suprasegmental feature. The durational difference and ratio between short and long segments vary considerably in different positions and structures. There is a need to conduct duration-discrimination tests for Telugu as was done for Estonian and English by Fox and Lehiste (1987).

The word final long vowels occur when there is some sort of difference in the meaning introduced by the addition of grammatical particles. These grammatical particles are usually long vowels such as /e:/, /o:/, /a:/, etc. /e:/ denotes emphasis, /o:/ doubtfulness and /a:/ an interrogative. The final short vowel cannot be lengthened, for example in /kona/, for the purpose of emphasis because of the interference with the above mentioned long vowels which are grammatical particles. Thus, if the final vowel /a/ is lengthened, we in fact introduce the interrogative particle /a:/ so that we get an example like /kona/ 'a tip' and /kona:/ 'is it a tip?'. In Tswana, a question can be distinguished from a statement by shortening the very long penultimate syllable, whereas by contrast, in Telugu one must do the opposite and lengthen a short vowel in the ultimate position as shown in the above example.

There are both phonologically and morphologically conditioned rules of length as indicated for stress (Chomsky and Halle, 1968) -

(1) Length alternation (e.g. /okati/ ~ /okkati/ 'one'; (2) Length adjustment rule (as a marker of compensation, e.g. /kalamu/ 'pen' + /lu/ 'plural suffix' → /kala:lu/ 'pens', and (3) Mixed pattern of alternating and adjustment rule such as /ceyyi/ ~ /ce:yi/ 'hand'. Unlike stress in English (Lehiste, 1970), it is length pattern that turns the sequence of nouns into a compound in Telugu, as for example /pulipilla/ 'a cub' in contrast with /puli: pilla/ 'a tiger and its youngone', or /pillipilla/ 'a kitten', in contrast with /pilli: pilla:/ 'a cat and its youngone'. Length, thus manifests semantic difference in lexical items beyond word (i.e. phrasal/sentential) level too. There are many other issues worth discussing regarding length adjustments in terms of shortening and lengthening of segments/syllables and their constraints (e.g. hypocoristics).

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#### REFERENCES

- [1] Abramson, A.S. 1962. *The Vowels and Tones of Standard Thai : Acoustical Measurements and Experiments*. Bloomington : Indiana University.
- [2] Campbell, W.N. and Isard, S.D. 1991. Segment Duration in a Syllable Frame. *Journal of Phonetics*, 19 : 37-47.
- [3] Chomsky, N. and Halle, M. 1968. *The Sound Pattern of English*. New York : Harpet.
- [4] Fischer-Jorgensen, E. 1948, 1961. Some Remarks on the Function of Stress with Special Reference to Germanic Languages. In *Twentyfive years of Phonological Comments*. Munchen : Wilhelm finle.
- [5] Fox, R.A. and Lehiste, I. 1987. Discrimination of Duration Ratios by Native English and Estonian Listeners. *Journal of Phonetics*, 15: 349-363.
- [6] Haugen, Einar. 1949. Phoneme or Prosodeme. *Language*, 25: 278-282.
- [7] Jones, D. 1948. Chronemes and Tonemes. *Acta Linguistica*, 1: 1-10.
- [8] Kelley, G. 1959. Telugu Vowel Phonemes. *Indian Linguistics*, 19 : 146-158.
- [9] Lehiste, I. 1970. *Suprasegmentals*. Cambridge, Mass: MIT press.
- [10] Nagamma Reddy, K. 1981. *Consonants and Vowels in Telugu: An Instrumental Study*. Ph.D. Thesis. Edinburgh University, Edinburgh.
- [11] Nagamma Reddy, K. 1986. An Instrumental Phonetic Study of Long and Short Vowels in Telugu. *Proceedings of the XIII All India Conference of Linguists*, Poona, 127-148.
- [12] Nagamma Reddy, K. 1988. The Duration of Telugu Speech Sounds : An Acoustic Study. *Journal of Institution of Electronics and Telecommunication Engineers*, Special Issue of JIETE on Speech Processing, New Delhi, 34, No.1: 36-57.
- [13] Nagamma Reddy, K. 1994. Phonetic, Phonological and Morpho-syntactic Functions of Duration in Spoken Telugu. *International Conference on Spoken Language Processing*, Yokohama, Japan. 379-382.
- [14] Sjoberg, A.F. 1957. *The Phonology of a Telugu dialect*. Unpublished Ph.D. Thesis. University of Texas.
- [15] Velayudhan, S. and Howie, J.M. 1974. Acoustical Measurements of Distinctive Vowel Quantity in Malayalam. *Language and Speech*, 17 : 95-101.