Telugu

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Telugu (tel) belongs to the Dravidian family of languages and is spoken by 7.19% of the population of India[1] (Census of India 2001b). At different stages of its development over centuries, the vocabulary of Telugu has been considerably influenced by various languages, such as Sanskrit, Prakrit,[2] Perso-Arabic and English. A major consequence of this influence is that the phonemic system of Telugu has been extended by additional sets of sounds. Thus, the aspirates /pʰ bʱ tʰ dʱ ʈʰ ɖʱ ʧʰ ʤʱ kʰ gʱ/ and fricatives /ʃ ʂ h/, absent in the native phonemic system, entered the language through Sanskrit borrowings. Similarly, /f/ entered the language through Perso-Arabic and English borrowings. Some of the sounds from Perso-Arabic and English sources were nativized, for example, Perso-Arabic and English phoneme /ʃ/ was rendered as /ʂ/, which had already entered the language through borrowings from Sanskrit/Prakrit; Perso-Arabic phonemes /q x ɣ z/ were rendered as /k kʰ g ʤ/ respectively; and the English phoneme /θ/ was rendered as /tʰ/. English borrowings also resulted in re-phonemicization. In native Telugu vocabulary, [ɛ] and [æː] are allophones of /e/ and /eː/ respectively, but they acquire phonemic status when words borrowed from English are included in the total vocabulary of the language.

This extended phonemic system came to be reflected in the formal speech style of well-educated people, while the native phonemic system, devoid of the additional phonemes, is reflected in the speech of the uneducated (Krishnamurti & Gwynn 1985). Sjoberg (1962) observes that while the educated speakers (of the 'East Godavari dialect') use the full set of the extended phonemic system in formal domains like 'public lectures, over the radio, in worship, occasionally by professors in classroom' Sjoberg (1962: 270); in informal domains

[1] Census of India (2001a) reports that the total population of India was 1,028,737,436. A majority of Telugu speakers reside in two states of India – Andhra Pradesh and Telangana.

[2] Words borrowed from Sanskrit are traditionally called 'Tatsama' words and words borrowed from Prakrits are called 'Tadbhava' words. We use the conventional abbreviation 'Skt.' for Sanskrit (instead of the ISO 639-3 code: 'san').

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like 'at home, in conversation with friends, relatives and inferiors' they make use of a rather smaller set which exclude some aspirate sounds like /pʰ ʧʰ ʤʱ kʰ gʱ/, thereby establishing the 'coexistence of two distinctive phonemic systems' Sjoberg (1962: 269).

From the above sources (Sjoberg 1962, Krishnamurti & Gwynn 1985) it can be deduced that the formal speech of educated speakers would provide the maximal inventory of phonemes of the language. Hence, the present analysis is based on the phonemic system as reflected in the formal speech of an educated Telugu speaker from the eastern dialect area,[3] specifically from the Vizianagaram area.

Consonants

	Bilabial	Labio-dental	Denti-alveolar	Alveo-lar	Retro-flex	Palato-alveolar	Palatal	Velar	Glottal
Plosive	p b		t d		ʈ ɖ			k g	
	pʰ bʱ		tʰ dʱ		ʈʰ ɖʱ			kʰ gʱ	
Nasal	m			n	ɳ				
Trill				r					
Fricative		f	s		ʂ	ʃ			h
Affricate			ʦ ʣ			ʧ ʤ			
						ʧʰ ʤʱ			
Approximant		ʋ					j		
Lateral approximant				l	ɭ				

An explanation of two of the above places of articulation is necessary. The stricture for denti-alveolars is formed by laminal contact across the alveolar region and touching the base of the upper front teeth. In the case of palato-alveolars, the closure stricture is formed over a wide area comprising the postalveolar region, whereas for the palatal approximant, the stricture is palatal.

/p/	/pɐʧɐ/	'tree bark'
/b/	/bɐʧɐ/	'cloth'
/t/	/tɐnnu/	'to kick'
/d/	/dɐnnu/	'support'
/ʈ/	/pɐːʈu/	'suffering'
/ɖ/	/pɐːɖu/	'to sing'
/k/	/kɐːʈu/	'a bite'
/g/	/gɐːʈu/	'dent'
/pʰ/	/pʰɐlɐm/	'result'
/bʱ/	/bʱɐːrɐm/	'weight'
/tʰ/	/tʰiːrɐm/	'theorem'[4]
/dʱ/	/dʱiːrɐ/	'valorous'
/ʈʰ/	/ʃonʈʰi/	'dried ginger'
/ɖʱ/	/muːɖʱuɖu/	'foolish man'
/kʰ/	/kʰɐːliː/	'empty'

[3] Krishnamurti & Gwynn (1985) delineate four regional dialect areas for modern Telugu: Northern, Southern, Eastern, and Central.

[4] /tʰiːrɐm/ 'theorem' (<Eng.) contrasts with the Tatsama word /tiːrɑm/ 'bank of a large water body'.

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/gʱ/	/gʱɐɖijɐ/	'*ghaṭi* (unit of 24 minutes)'
/m/	/ʊɐːmi/	'haystack'
/n/	/ʊɐːni/	'his'
/ɳ/	/ʊɐːɳiː/	'tippet'
/r/	/rɐːlu/	'to fall'
/f/	/fɐːlu/	'hemcloth of saree'
/s/	/kɐsɐːji/	'butcher'
/ʂ/	/kɐːʂɐːji/	'ochre-coloured'
/ʃ/	/kɐːʃi/	'Varanasi (city in India)'
/h/	/hɐːji/	'pleasantness'
/ʦ/	/ʦɐːpu/	'man's skirt'
/ʣ/	/ʣɐːpu/	'to stretch'
/ʧ/	/ʧɐːpɐm/	'bow'
/ʤ/	/ʤɐpɐm/	'prayer'
/ʧʰ/	/ʧʰɐndɐm/	'poetic meter'
/ʤʱ/	/ʤʱɐnkɐːrɐm/	'jingling sound'
/ʊ/	/ɐːʊu/	'cow'
/j/	/ɐːju/	'life'
/l/	/kɐlɐ/	'dream'
/ɭ/	/kɐɭɐ/	'art'

Phonotactics of consonants

Aspirates are available mostly in Tatsama (Sanskrit borrowings) and Tadbhava (Prakrits borrowings) words. In addition, /tʰ/ as a reflex of source /θ/ is available in words borrowed from English, as in the case of Eng. /θɪn/ 'thin' > Tel. /tʰinnu/. The only aspirated plosive that is found in native words is /dʱ/ which is limited to just a couple of compound numerals[5] in careful speech, e.g. /pɐddʱenimidi/ 'eighteen' and /pɐdʱnɐːlugu/ 'fourteen'. Of the other aspirates, /ʈʰ ɖʱ ʤʱ/ occur very rarely.[6] A majority of the occurrences of /dʱ/ are reflexes of the source /tʰ/ in Tatsama words e.g. Skt. /pɑntʰ/ 'to travel' is realized as /pɐndʱɐː/ 'method' in Telugu. This change is reflected in writing as well (except by those who are well-versed in Sanskrit) and it often makes it difficult to recover the original /tʰ/ in words like /ɐrdʱɐ/ 'meaning' (< Skt. /ɑrtʰɑ/) as opposed to /ɐrdʱɐ/ 'half' (= Skt. /ɑrdʱɑ/). Source /tʰ/ is retained when it occurs as the second member of a cluster beginning with /s/, as in /stʰɐlɐm/ 'place' and /prɐstʰɐːnɐm/ 'departure'.

Among the fricatives, /f/, /ʃ/, and /ʂ/ are available only in borrowed vocabulary e.g. /kɐːfiː/ 'coffee', /fɐlɐːnɐː/ 'particular'; /ʃɐkti/ 'energy', /ɐːʃɐ/ 'desire'; /kɐːʂɐːji/ 'ochre-coloured'. In addition, Tatsama source /pʰ/ is often realized as /f/ in 'anglicized' pronunciation, e.g. Skt. /pʰɑlitɑm/ 'result' > Tel. /fɐlitɐm/.

A few native words such as /hɐːji/ 'pleasantness' and interjections /ɐːhɐː/ 'expressing appreciation', /oːhoː/ 'expressing surprise' contain /h/. All the other words having the phoneme /h/ are borrowed. Of the affricates, /ʦ/ and /ʣ/ are available only in native words. Since only the native vocabulary allows these two affricates, their aspirated counterparts are not available in the language as aspiration is essentially a feature found in borrowed vocabulary.

[5] The historical origin of this aspirated phoneme is traced back to hypothetical Proto-Dravidian 'Laryngeal H', which has its reflex in Early Tamil as 'āytam' (Krishnamurti 2003: 154ff.).

[6] A few Tadbhava words which contain /ʤʱ/, which is derived from Tatsama cluster of /dʱj/, provide cases of /ʤʱ/ in Telugu e.g. /ʤʱɐːnɐm/ 'meditation', /mɐʤʱɐ/ 'middle'.

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Among the retroflexes, /ɳ/ and /ɭ/ do not occur word-initially. They occur in intervocalic position and when adjacent to a retroflex consonant, e.g. /ʋɛːɳiː/ 'tippet', /kɛʈɳɛm/ 'dowry', /pɛɳɖu/ 'fruit'; /kɛlɐ/ 'art', /bɛːlʈi/ 'bucket'.

However, the rest of the retroflex sounds are attested in word-initial position in a few words, e.g. /ʈɛkku/ 'pretence', /ʈʰiːʋi/ 'grandeur', /ɖippɐ/ 'half of a spherical object', /ɖⁿoːkɛː/ 'danger', /ʂoːku/ 'fashionable appearance'.

/j/ occurs in word-initial position only in borrowed words, e.g. /jɛngu/ < Eng.'young', /jɛʃɐssu/ < Skt. /jɑʃɑs/ 'fame'.

Consonant clusters are more common in borrowed than in native vocabulary. In borrowed vocabulary, most of the consonant clusters of the source language are retained in formal educated speech. The fricatives /f ʂ ʃ h/ and the nasal /ɳ/ do not contrast for gemination. Contrast for gemination is limited to words of the syllabic structure #(C_1)VC_2V . . . , where C_1 is optional and C_2 contrasts for gemination. A few examples include /gɐdi/ 'room' – /gɐddi/ 'throne', /ɐʈu/ 'that side' – /ɐʈʈu/ 'pancake', /mogɐ/ 'male' – /moggɐ/ 'bud', /nɐmɐkɐm/ 'a vedic hymn' – /nɐmmɐkɐm/ 'belief', /kɐnu/ 'to give birth to' – /kɐnnu/ 'eye', /kɐlɐ/ 'dream' – /kɐllɐ/ 'falsehood', /mɐri/ 'again' – /mɐrri/ 'banyan tree'. In geminated plosives (including affricates), the first component has no audible release and as a result, in that position, aspiration and affrication are not realized since these two features are dependent upon release; for example, /kʰkʰɐ/ is realized as [kˀkʰɐ] and /ʤʤi/ is realized as [ʧˀʤi] and /ʤʤɐ/ as [dˀʤɐ]. A few native words have intra-word consonant sequences, e.g. /ɐːsti/ 'wealth', /kɐːstɐ/ 'a little', /gurtu/ 'mark'. Several derived verbal bases contain consonant sequences formed by the addition of the causative suffix /tsu/, e.g. /peːltsu/ 'to burst (something)', /dintsu/ 'to bring down'. A syllable boundary separates all these consonant sequences. Similarly, as detailed in Bhaskararao (1982), within the native vocabulary, several consonantal clusters arise out of extensive morphophonemic processes such as short vowel deletion and consonant assimilation, e.g. /ʋɛːɳlo:pɛliki pilʧeːnu/ (<ʋɛːɖi-ni loːpɛlɐ-ki pili-ʧeː-nu) 'I called him in'.

The only consonants that can occur word-finally in the native vocabulary are /m/ and /j/. Otherwise words in native vocabulary end in vowels. /j/ occurs word-finally in non-polite imperative verbs, e.g. /koj/ '(you SG) cut it!', /ʧej/ '(you SG) do it!'. In emphasized or careful speech these two words may be rendered as /kojji/, /ʧejji/ respectively. As explained later, /m/ is phonetically [ṽ] in word-final position. It is interesting to note that the phonetic representation of both /j/ and /m/ (i.e. [j] and [ṽ]) are basically vocoids. Hence, one can generalize that at phonetic level all native words in Telugu end in vocoids.

Allophones of consonants

Phonetic realization of /m/ as [m] and [ṽ] has been noted by Lisker (1963: 6), Bhaskararao (1972: 76), Subrahmanyam (1974: 12), and Krishnamurti & Gwynn (1985: 9). /m/ is realized as [ṽ] or [m]. In intervocalic position, both the realizations vary freely, e.g. [ʧɪːṽɐ] 'ant', [ʋɛːmi] 'haystack'. In word-final position, its preferred realization is [ṽ], e.g. [pɔlɐṽ] 'agricultural field'. In addition, [ṽ] is the preferred pronunciation of /m/ when it occurs before the consonants /r f s ʃ h l ʋ/: [saṽrakʂaɳɐṽ] 'protection', [pæːṽfleʈʈu] 'pamphlet', [maːṽsɐṽ] 'meat', [ʋɑṽʃɐṽ] 'lineage', [sɪṽhɐṽ] 'lion', [saṽlɑgnɐ] 'well-joined', [saṽṽatsɑrɐṽ] 'year' (</sɐmʋɐtsɐrɐṽ/). /m/ is realized as [j̃] before /j/ in words like [sɐj̃j̃oːgɐṽ] 'combination'(</sɐmjoːgɐm/).[7]

Elsewhere /m/ is realized as [m], e.g. [maːʈɐ] 'word', [ɑmmɐ] 'mother', [gumpu] 'crowd', [ɑːtmɐ] 'soul', [kɐmʧiː] 'whip', [ʧɐmkiː] 'glittering embroidery', [ʧɪmʈɐː] 'tongs', [ʧɑmʈɐː] 'leather'.

/n/ has a palatal allophone [ɲ] when it is adjacent to a palato-alveolar consonant, a velar allophone [ŋ] before a velar consonant and a dental allophone [n] elsewhere: [sɐɲʧiː]

[7] The final phonetic realizations of the sequences of /mʋ/ and /mj/ are [ṽṽ] and [j̃j̃] respectively, involving assimilation of the concerned segments for nasalization and approximation.

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Table 1 Distribution of the allophones of /ʤ/ and /ʣ/.

Phonemes	Allophones	
	Intervocalic position	Other positions
/ʤ/	[ʒ]	[ʤ]
	[rɐːʒiː] 'truce'	[ʤɪːtɐ̃] 'salary', [ʤeːbu] 'pocket', [mɐɟˀʤɪɪgɐ] 'butter milk'
/ʣ/	[z]	[ʣ]
	[rɐːzu] 'king'	[ʣuːlu] 'mane', [ʣoːli] 'shoulder bag', [gudˀʣu] 'pulp'

'bag', [mʊɲʤɐ] 'tender jelly like kernel of palm fruit', [aːʤɲɐ] 'command'; [ɐŋke] 'number', [rɐŋgu] 'colour'; [ɑndɐ̃] 'beauty', [nippu] 'fire', [neːnu] 'I', [kɐnnu] 'eye'.

In intervocalic position the pronunciation of singleton /ɳ/ is that of a flap, e.g. [ʊɐːɽ̃iː] 'tippet'. Intervocalic singleton /ɖ/, /ɖ^{ɦ}/ and /ɭ/ also have flap pronunciation, e.g. [ʊɐːɽu] 'he', [muːɽ^{ɦ}uɽu] 'foolish man', [tɑːɻɐ̃] 'lock'.[8] /ɖ/ occurs after the nasal /m/ in a few borrowed words, where it is realized as a flap, e.g. [ʧɑmɽɐː] 'leather'.

/r/ has two allophones, tap [ɾ] in intervocalic position and trill [r] elsewhere e.g. [peːɾu] 'name', [reːpu] 'tomorrow', [kɑrrɐ] 'stick'.

If only native vocabulary is considered, [ʦ] and [ʧ] stand as allophones of /ʦ/, and [ʣ] and [ʤ] as allophones of /ʣ/. While [ʧ] and [ʤ] occur before front vowels, [ʦ] and [ʣ] occur before non-front vowels. However the influx of Tatsama words brought [ʦ] and [ʣ] (in native words) into phonemic contrast with [ʧ] and [ʤ] (in Tatsama words) respectively (Sjoberg 1962), as is evident in pairs like /ʦɐːpɐ/ 'mat' – /ʧɐːpɐm/ 'bow' and /ʣɐːɾu/ 'sharpness' – /ʤɐːti/ 'race'.

Each of the voiced phonemes /ʤ/ and /ʣ/ have a fricative allophone and an affricate allophone. Their distribution is shown in Table 1.

The phonetic realizations of /ʊ/ are [ʊ] and [w], which freely vary in many contexts. However, [w] is the preferred realization when it is adjacent to a rounded vowel. It should be pointed out that this allophone, [w], may not possess the velar approximation to qualify to be an archetypical 'labial-velar approximant' but may be rendered as [β̞], a 'voiced bilabial approximant'.

/ʊ/ is realized as [ʊ̃] when it is preceded by the allophone [ʊ̃] of /m/, e.g. /sɐmʊɐtsɐrɐm/ > [sɑʊ̃ʊ̃ɑtsɑrɐʊ̃] 'year'. Similarly, /j/ is realized as [j̃] when preceded by the allophone [j̃] of /m/, e.g. /sɐmjoːgɐm/ > [sɐj̃j̃ɔːgɐʊ̃] 'combination'.

Vowels

Figure 1 enumerates the vowels of Telugu pronounced in isolation by a single speaker. All the vowel phonemes except /ɛ/ and /æː/ contrast for length.

/i/	/ikɐ/	'in future'	/u/	/urɛkɐ/	'leaping'
/iː/	/iːkɐ/	'feather'	/uː/	/uːrɛkɐ/	'unnecessarily'
/e/	/terutsu/	'to open'	/o/	/koɖi/	'burnt tip of a wick'
/eː/	/teːrutsu/	'to clarify'	/oː/	/koːɖi/	'hen'
/ɛ/	/bɛɳɖu/	'to bend'	/ɐ/	/ɐnu/	'to say'
/æː/	/bæːɳɖu/	'band'	/ɐː/	/ɐːnu/	'to lean on'

[8] The symbol for 'voiced alveolar lateral flap' [ɺ] is combined with the diacritic 'retracted' [̠] to obtain the symbol for 'voiced retroflex lateral flap' [ɻ]. Similarly, the 'nasalized' diacritic [˜] is placed over the 'retroflex flap' symbol [ɽ] to obtain the symbol for 'voiced retroflex nasal flap' [ɽ̃].

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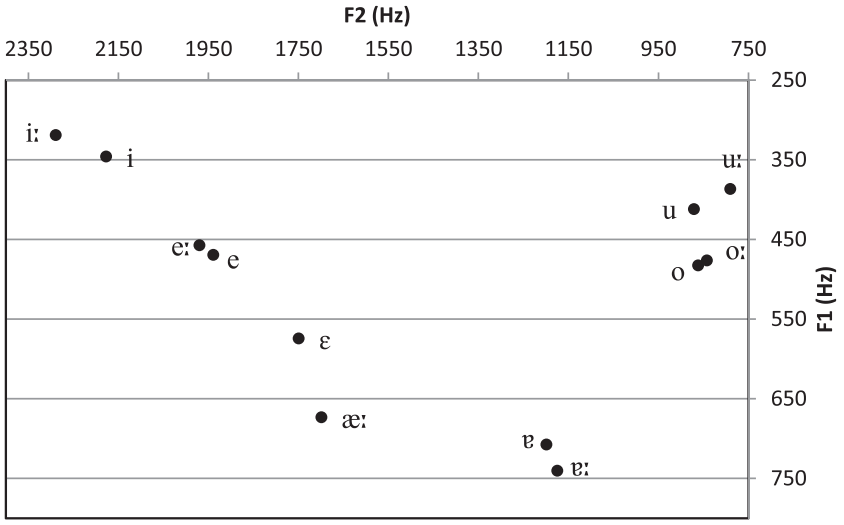

Figure 1 Vowels pronounced in isolation.

Phonotactics of vowels

All short vowels occur in all positions of a word, with the exception of /o/, which does not occur word-finally. Native lexical items do not end in a long vowel. However, native words ending in certain particles (that are represented solely by a long vowel) contain long vowels in the final position. The long vowel of the particles in turn causes elision of the original final short vowel of the base, e.g. /ɐdæː/ 'is that?' (</ɐdi/ 'this'+/ɐː/ 'interrogative particle'), /ɐdoː/ 'possibly it' (</ɐdi/ 'this'+/oː/ 'dubitative particle'), /ɐdeː/ 'it only' (</ɐdi/ 'this'+/eː/ 'emphatic particle').

Some borrowed words can contain word-final long vowels. These long vowels are optionally but preferably replaced by their short counterparts when the word is pronounced in isolation. However, the underlying final long vowel is recalled in pronunciation when the word is inflected by the addition of a suffix, e.g. /ʊɐːʧiː/ ~ /ʊɐːʧi/ 'wrist watch' but /ʊɐːʧiːlu/, not /ʊɐːʧilu/ for 'wrist watches'. Had the underlying form been /ʊɐːʧi/, with a short final vowel, its plural would have wrongly become /ʊɐːtsulu/ by the application of a morphophonemic rule which converts final short /i/ to /u/ before the plural suffix /lu/. Similarly, /hiːroː/ ~ /hiːro/ 'hero' – /hiːroːlu/ 'heroes' (not /hiːrolu/).

An underlying final /e/ of a word preferably alternates with /i/ when it is pronounced in isolation. However, when the word is inflected with certain suffixes, the underlying /e/ is recalled, e.g. /ɐdde/ ~ /ɐddi/ 'rent' – /ɐddelu/ 'rents' but not /ɐddilu/. If the /ɐddilu/ option is chosen, then it would have to undergo a further process of vowel harmony, where the /u/ of the plural suffix /lu/ would have converted the final /i/ of the noun to /u/, wrongly resulting in /ɐddulu/. Similarly /sɐːre/ ~ /sɐːri/ 'post-wedding gift' – /sɐːrelu/ 'post-wedding gifts' (compare /sɐːri/ 'an instance' – /sɐːrulu/ 'instances').

Allophones of vowels

The vowel of a syllable is lowered when followed by a syllable with the low vowel /ɐ/ or /ɐː/ (Subrahmanyam 1974; see Figure 2). Thus, /ɛ/ and /æː/ are allophones of /e/ and /eː/ respectively in native vocabulary (e.g. [peʈʈi] 'box' vs. [pɛʈʈɐ] 'hen', [peːɽu] 'wood splinter' vs. [pæːɽɐ] 'cattle dung'), but these pairs stand in contrast when considering borrowed vocabulary together with native vocabulary (e.g. [sɛɳɖu] 'to send' vs. [sæːɳɖu] 'sand'). Thus, when both the native and borrowed vocabularies are combined (as in the speech of educated speakers)

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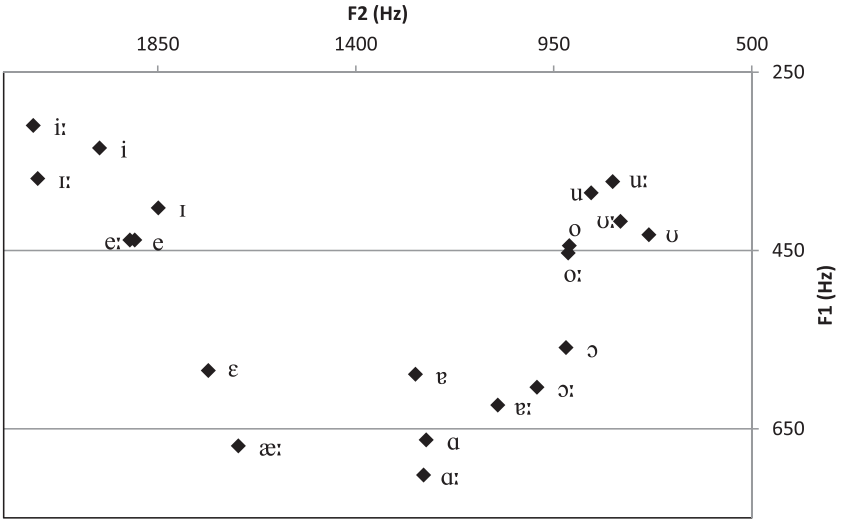

Figure 2 Vowel allophones.

we find all the four sounds, /e eː ɛ æː/ in contrastive distribution e.g. /beŋḍu/ 'cork' – /bɛŋḍu/ 'bend' (<Eng.) – /bæːŋḍu/ 'band' (<Eng.) and /meːʈu/ 'heap' – /mæːʈu/ 'mat' (<Eng.).

Vowel allophones are illustrated by the following examples:

PHONEMIC	PHONETIC	EXAMPLE WORD
/i/	[i]	[pilli] 'cat'
	[ɪ]	[pɪllɐ] 'girl'
/iː/	[iː]	[giːɾu] 'to scratch'
	[ɪː]	[gɪːɾɐ] 'arrogance'
/e/	[e]	[meʈʈu] 'step'
/eː/	[eː]	[meːʈu] 'heap'
/ɛ/	[ɛ]	[pɛʈʈu] 'pet'
/æː/	[æː]	[mæːʈu] 'mat'
/u/	[u]	[puʈʈu] 'a kind of food preparation'
	[ʊ]	[pʊʈʈɐ] 'ant-hill'
/uː/	[uː]	[kuːɾu] 'to stuff in'
	[ʊː]	[kʊːɾɐ] 'curry'
/o/	[o]	[poʈʈu] 'husk'
	[ɔ]	[pɔʈʈɐ] 'tummy'
/oː/	[oː]	[koːti] 'monkey'
	[ɔː]	[kɔːtɐ] 'cut'
/ɐ/	[ɐ]	[pɐʈʈiː] 'strap'
	[ɑ]	[pɑʈʈɐ] 'bark'
/ɐː/	[ɐː]	[pɐːɾu] 'to flow'
	[ɑː]	[pɑːɾɐ] 'spade'

Post-sandhi changes in vowels and consonants

Telugu uses extensive sandhi processes involving both consonants and vowels at morpheme junctures (Krishnamurti 1957, Kelley 1959, Lisker 1963, Wilkinson 1974, Bhaskararao 1982).

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Table 2 Examples of internal and external sandhi processes.

	INTERNAL SANDHI	
1A	Root	/iːdu/ 'to swim'
1B	Past-participle suffix addition	/iːdu-i/
1C	Short vowel elision	/iːdi/
1D	Conditional-participle suffix addition	/iːdi-teː/
1E	Short vowel elision between homorganic consonants	/iːd-teː/
1F	Regressive consonant assimilation	/iːtteː/
1G	Final post-sandhi form	/iːtteː/ 'if one swims'
	EXTERNAL SANDHI	
2A	Word + word	/ɐdi/ + /teː/ 'that one' + 'bring'
2B	Short vowel elision between homorganic consonants	/ɐd/ + /teː/
2C	Regressive consonant assimilation	/ɐtteː/
2D	Final post-sandhi form	/ɐtteː/ 'Bring that one!'

Table 3 Comparison of operation of internal sandhi and external sandhi in identical environments.

	INTERNAL SANDHI		
	I	II	III
1A	Lexical form of a verb	[koʧu] 'to hit'	
1B	Addition of an inflexional suffix	[koʧu-ɐku] RT-NEG_IMP	[koʧu-i] RT-PA_PRT
1C	Short vowel elision	[koʧ-ɐku]	[koʧ-i]
1D	Influence of V_2 on V_1	[kɔʧ-ɐku]	[koʧ-i]
1E	Final post-sandhi form	[kɔʧɐku] 'Don't hit!'	[koʧi] 'having hit'
	EXTERNAL SANDHI		
2A	Word+word	[koʧu] + [ɐdi] 'shop' + 'that one'	[koʧu] + [idi] 'shop' + 'this one'
2B	Short vowel elision	[koʧ] + [ɐdi]	[koʧ] + [idi]
2C	Final post-sandhi form	[koʧɐdi] 'That is a shop.'	[koʧidi] 'This is a shop.'

Several of the sandhi processes can be both internal and external (Kelley 1963), as illustrated in Table 2. Steps 1A–G illustrate application of sandhi changes word-internally and 2A–D illustrate sandhi changes applied word-externally. It may be noted that 'short vowel elision between homorganic consonants' and 'regressive consonant assimilation' can be applied both word-internally and word-externally.

As explained earlier, an /ɐ/ or /ɐː/ lowers a vowel in the preceding syllable. This process is applicable only within a word which could be either uninflected or inflected. In other words, the controlling vowel /ɐ/ or / ɐː/ is either present inherently in the lexical form of the word or occupies the appropriate controlling position as a result of internal sandhi processes.

Table 3 gives examples of this phenomenon (for abbreviations and notation see the list at the end of the Illustration). In the case of the example for internal sandhi (traced through steps 1A–E), in the formation of 'negative imperative form of a verb' given in column II, vowel /ɐ/ which originally belongs to the inflectional suffix /ɐku/ occupies the V_2 position and lowers the [o] in the preceding syllable to [ɔ]. In the formation of a 'past participle' of a verb, vowel /i/ of the inflectional suffix occupies the V_2 position and since it has no lowering effect on V_1, the V_1 retains its original height.

In the case of the example for external sandhi (traced through steps 2A–C), in the forms given in column II, although vowel /ɐ/ which originally belongs to the following word, now occupies the V_2 position, it does not lower the V_1 of the preceding word. Thus, the scope of lowering effect of /ɐ/ is word-internal but not word-external.

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Table 4 Examples of external sandhi changes not influencing word-internal phonetic realization.

	A	B	C	D
	Phonemic form	Phonetic form after the influence of V_2 on V_1	Addition of the word [ɐdi] 'that one'	Output phonetic form after V_2 elision
1	/poʈʈu/ 'husk'	[poʈʈu]	[poʈʈu] + [ɐdi] 'husk' + 'that one'	[poʈʈɐdi] 'It is husk.'
2	/poʈʈɐ/ 'tummy'	[pɔʈʈɐ]	[pɔʈʈɐ] + [ɐdi] 'tummy' + 'that one'	[pɔʈʈɐdi] 'It is a tummy.'

Table 5 Forms illustrating post-sandhi changes in consonants.

	A	B	C
	Pre-sandhi form	Post-sandhi form	Final phonetic output
Form1	/koʈʈu-mu=ɐnnɐːnu/	/koʈ-ɐ=mɐnnɐːnu/	[kɔʈʈamannɐːnu]
Gloss	RT-IMP_SG=I said.	RT-INF ='I said.'	
Meaning	You hit – I said	I asked (x) to hit.	
Form2	/koʈʈu-ɐ-mu=ɐnnɐːnu/	/koʈ-ɐ-m=ɐnnɐːnu/	[kɔʈʈaṽannɐːnu]
Gloss	RT-NEG-1P_PL=I said.	RT-NEG-1P_PL=I said	
Meaning	We will not hit – I said	I said that we would not hit.	
Form3	/koʈʈu-ɐ-ʋu-ɐnnɐːnu/	/koʈ-ɐ-ʋ=ɐnnɐːnu/	[kɔʈʈaʋannɐːnu]
Gloss	RT-NEG-2P_SG = I said.	RT-NEG-2P_SG = I said	
Meaning	You will not hit – I said	I said that you would not hit.	

If, after a word-internal process is completed, there arises a word-external condition that has the potential to influence the word-internal condition, then this potential influence is nullified. This is illustrated in Table 4. In B2, vowel /ɐ/, which is in the V_2 position, lowers /o/ to [ɔ] in the V_1 position whereas in B1, the V_1 /o/ is not lowered since it is not followed by /ɐ/ in V_2 position. This is a word-internal process. Column C contains forms juxtaposed for the operation of a word-external process of vowel deletion by which the original V_2 of the word is replaced by /ɐ/ (of the word /ɐdi/). Forms in column D include the forms after the external sandhi process is completed. The final output of the process results in a condition where the earlier allophonic variants [o] (in [poʈʈu] 'husk') and [ɔ] (in [pɔʈʈɐ] 'tummy') now stand in contrast in [poʈʈɐdi] 'It is husk' and [pɔʈʈɐdi] 'It is a tummy'.

Among consonants, as noted earlier, the phoneme /m/ has the allophones [m] and [ṽ], and the phoneme /ʋ/ has the allophone [ʋ]. However, in the case of some inflected verbal paradigms, in their post-sandhi forms, the allophones of /m/ as well as the allophone of /ʋ/ emerge in contrastive distribution (Lisker 1963), as shown in Table 5.

The underlying string for Form1 is /koʈʈumu ɐnnɐːnu/ 'Hit (IMPERATIVE SINGULAR) – I said'. In this form, the /koʈʈumu/ portion, meaning 'hit (IMPERATIVE SINGULAR)', is available only in literary Telugu and is preserved in such constructions in contemporary language. But speakers of contemporary colloquial Telugu do not have access to this historical information. Its contemporary reflex is /koʈʈu/ 'hit! (VERB_ROOT)'. After the 'short vowel deletion' and 'vowel copying' rules are applied, the resulting form would be /koʈʈɐmɐnnɐːnu/. This form is morphologically reanalysed[9] in contemporary Telugu as /koʈʈɐ-mɐnnɐːnu/. Now /koʈʈɐ/ is reanalysed as /koʈʈu-ɐ/, where /ɐ/ is treated as an infinitive suffix. This enables /ɐ/ to cause the V_1 /o/ to be realized as [ɔ]. Further, /m/ now occupies initial position of the remnant /mɐnnɐːnu/ and hence gets realized as [m] but not as [ṽ].

[9] The infinitive form of a verb acts as the nucleus in a majority of types of compound verbs (Bhaskararao 1975). We are thankful to Prof. G. Uma Maheshwar Rao for information about 'morphological reanalysis' in these forms (personal communication, 3 February 2015).

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Suprasegmentals

Telugu does not have lexically contrastive stress or pitch. However, pitch changes are used in forming intonation patterns.

Transcription of recorded passage: 'The North Wind and the Sun'

Phonemic transcription

uttɛrepugɛːliː suːrjudu:

okɛ bɛːʈɛseːri dɛɭɛseri kɛmbɛɭiː kɛppukoni ʋɛstuːɳdɛgɛː, uttɛrepugɛːliː, suːrjuduː, tɛmɛloː eʋeru bɛlɛʋentulu ɛni ʋɛːdintʃukonʧunneːru. eʋeru ɛː bɛːʈɛseːri tɛnɛ kɛmbɛɭiːni ʋippi pɛɖɛːseːlɛːgɛ ʧeːsteːroː, ʋɛːɭɭu bɛlɛʋentulu ɛni nirdʱɛːrinʧɛːli ɛni oppukunneːru. ɛppudu, uttɛrepugɛːli ʋiːlɛjnɛntɛ bɛlɛngɛː ʋiːʧindi. kɛːni ɛː bɛːʈɛseːri, gɛːli entɛ bɛlɛngɛː ʋiːʧiteː, ɛntɛ biguʋugɛː kɛmbɛɭiːni ʧuʈʈiʋɛːsikonneːɖu. ʧiʋeriki uttɛrepugɛːli tɛnɛ prɛjɛtneːnini ɛːpiʋɛːsindi. ɛppudu suːrjudu ʋɛːɖigɛː prɛkɛːʃinʧɛːɖu. ʋɛnʧɛneː ɛː bɛːʈɛseːri kɛmbɛɭiː ʋippiʋɛːseːɖu. ɛntʃɛːtɛ, tɛmɛ idderiloː suːrjuɖɛː bɛlɛʋentuɖu ɛni, uttɛrepugɛːli oppukoːʋɛlɛsiʋɛʧʧindi.

Orthographic rendering

ఉత్తరపుగాలీ సూర్యుడూ

ఒక బొటసారి దళసరి కంబళీ కప్పుకొని వస్తూండగా, ఉత్తరపుగాలీ, సూర్యుడూ, తమలో ఎవరు బలవంతులు అని వాదించుకొంటున్నారు. ఎవరు ఆ బొటసారి తన కంబళీని విప్పి పడేసేలాగ చేస్తారో, వాళ్ళు బలవంతులు అని నిర్ధారించాలి అని ఒప్పుకున్నారు. అప్పుడు, ఉత్తరపుగాలి వీలెనంత బలంగా వీచింది. కాని ఆ బొటసారి, గాలి ఎంత బలంగా వీచితే, అంత బిగువుగా కంబళీని చుట్టివేసికొన్నాడు. చివరికి ఉత్తరపుగాలి తన ప్రయత్నానిని ఆపివేసింది. అప్పుడు సూర్యుడు వేడిగా ప్రకాశించేడు. వెంటనే ఆ బొటసారి కంబళీ విప్పివేసేడు. అంచేత, తమ ఇద్దరిలో సూర్యుడే బలవంతుడు అని, ఉత్తరపుగాలి ఒప్పుకోవలసివచ్చింది.

Abbreviations and notation

1P_PL	1st person plural
2P_SG	2nd person singular
IMP_SG	imperative singular
INF	infinitive
NEG	negative
NEG_IMP	negative imperative
PA_PRT	past participle
RT	root

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SG singular
- word-internal morpheme boundary
= word boundary

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