Metrical structure and vowel harmony in Telugu

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The elusive nature of Telugu stress

- Previous works on Telugu word stress (Sitapati 1936; Sailaja 1985) postulate:
  - Primary stress falls on the first syllable;
  - But if the first syllable is light and the second heavy, it falls on the second syllable.

- However, a study on auditory perception of Telugu stress by Lisker and Krishnamurti (1991) finds contradictory results:
  - Little consistency in stress judgements of speakers;
  - A somewhat noticeable pattern is that the second syllable carries stress;
  - The first syllable stressed only if it contained a long vowel and if the second syllable contained a short vowel

- **Could phonological behaviour give some clues to the location of stress?**

Interaction of metrical structure and vowel harmony

- The vowel harmony pattern under consideration: the vowel /u/ in the plural suffix *-lu* triggers harmony in nominal stems and all stem vowels /i/ harmonize to /u/. That is, a "vowel copy harmony" (Rose and Walker 2011: 256).

- Sailaja (1985) points out that a vowel that is a potential target of vowel harmony resists alternation if it is in a stressed syllable.

- Kolachina (2016) argues:
  - Telugu also has secondary stress and a vowel with secondary stress resists harmony;
  - Stress accounts for vowel harmony alternations and there is no need for different lexical classes or under-specification for nominal and verbal stems (contra Sailaja 1985);
  - Stress pattern is as follows:
    - Secondary stress is assigned to every other mora after the primary-stressed mora unless it is the final mora of the word
    - No two adjacent moras can carry stress
    - In a heavy syllable, which contains two moras, stress is always assigned to the first mora
  - The same stress pattern can be derived through left-to-right word parsing using a bimoraic trochee, i.e. metrical structure, following Hayes (1995).

- I show that these stress rules proposed in Kolachina (2016) run into issues in the case of words of certain syllable structures not considered in that paper and cannot predict the correct stress pattern:
  - In (1), primary stress is assigned to the first mora of the word and, due to a ban on mora clash, secondary stress must be assigned to the third mora (the second syllable in (a) and (b) and the third syllable in (c)).
  - Then, another secondary stress cannot be assigned to the fourth mora (it causes mora clash) or to the final fifth mora (a ban on final stress).
  - Thus, the rules predict no stress on the final syllable. However, the potential target vowel /i/ in this final syllable resists harmony triggered by /u/ of the plural suffix *–lu.*

(1)

a.	de:vi̱ḍi:	'fort; palace'	CV́V.CV̀.CVV	de:viḍi:lu, *de:viḍu:lu
b.	dammi̱ḍi:	'a monetary unit'	CV́C.CV̀.CVV	dammiḍi:lu,*dammiḍu:lu
c.	pari̱kiṇi:	'frock'	CV́.CV.CV̀.CVV	parikiṇi:lu, *parikiṇu:lu

- I show that, in contrast, a metrical structure-based analysis correctly predicts the stress pattern in words of all syllable structures. For words in (1), see (3c) and (3d).

- Therefore, I argue that metrical structure *alone* facilitates an accurate statement of stress in Telugu:
  - All metrically prominent syllables, i.e. heads of moraic trochee feet, carry stress
  - The leftmost of them carries primary stress and others, secondary stress.

- In summary, a potential target vowel /i/ resists harmony and blocks the spread of harmony if it is in a prosodic head in the metrical structure of the word:

(2)

	Singular		Plural (suffix: *-lu*)
a.	maniṣi	'man'	manu**ṣu**lu, *maniṣilu, *maniṣ**u**lu
b.	pratinidʰi	'representative'	pratinidʰ**u**lu, *prat**u**n**u**dʰ**u**lu, *pratin**u**dʰ**u**lu
c.	timmiri	'numbness'	timmir**u**lu, *t**u**mm**u**r**u**lu, *timm**u**r**u**lu
d.	kiri:ṭi	'having a crown'	kiri:ṭ**u**lu, *kiri:ṭilu, *kir**u**:ṭ**u**lu, *k**u**r**u**:ṭ**u**lu

(3)

a. (x) (x .) ma ni ṣi

b. (x) (x .) (x .) pra ti ni dʰi

c. (x) (x) dam mi ḍi:

d. (x) (x .) (x) pa ri ki ṇi:

OT analysis of Telugu stress

- OT constraints proposed in Kolachina (2016), which are based on stress assignment to moras, correctly derive the stress pattern for words in (1) also, since WSP is undominated.
  - But, this generalization of an undominated WSP is not clearly brought out in the stress rules.
- Further, I argue that (contra Kolachina 2016):
  - Stress in Telugu is not strictly alternating.
  - Non-finality is not a feature of Telugu stress and that no OT constraint is required.
  - There is no prohibition on stress clash.
- Therefore, I propose here the following metrical OT constraints for Telugu.
  - FT-BIN: Feet are binary under moraic or syllabic analysis.
  - WSP: Heavy syllables are stressed.
  - WEIGHT-BY-POSITION: Coda consonants are moraic.
  - FT-FORM(TROCH): Feet have initial prominence.
  - LEFTMOST: Align (Hd-Ft, Left, PrWd, Left): The head foot is leftmost in PrWd.
  - PARSE-SYL: Syllables are parsed by feet.
  - ALIGN-FT-LEFT: Align (Ft, Left, PrWd, Left): Every foot stands at the left edge of the PrWd.

/enimidi/	FT-BIN	WSP	WEIGHT-BY-POSITION	FT-FORM (TROCH)	LEFTMOST	PARSE-SYL	ALIGN-FT-LEFT
a. ☞ (é.ni).(mì.di)							**
b. (è.ni).(mí.di)					**!		**
c. (e.ní).(mi.dì)				**!	*		**
d. (e.nì).(mi.dí)				**!	***		**
e. (é).(ni).(mì).(dì)	****!						*,**,***
f. (é.ni).mi.di						**!	
g. e.(ní.mi).di					*!	**	*
h. e.ni.(mí.di)					**!	**	**

/va:hini/	FT-BIN	WSP	WEIGHT-BY-POSITION	FT-FORM (TROCH)	LEFTMOST	PARSE-SYL	ALIGN-FT-LEFT
a. ☞ (vá:).(hì.ni)							*
b. (và:).(hí.ni)					*!		*
c. (vá:).(hi.nì)				*!			*
d. (và:).(hi.ní)				*!	**		*
e. (vá:).(hì).(nì)	**!						*,**
f. (vá:).hi.ni						**!	
g. (vá:.hi).ni	*!				*	*	
h. va:.(hí.ni)		*!			*	*	*

OT analysis of regressive and progressive harmony

- I show that the following constraints, in combination with the above metrical constraints, represent the interaction of metrical structure and harmony in Telugu:
  - HEADIDENT-IO: Segments in a prosodic head have identical values in input and output.
  - *i…u: The sequence, /i(:)/ followed by /u/, is unlicensed in Telugu.
    - This is also a static co-occurrence restriction as few words with this sequence are attested.
    - However, there is evidence that the converse *u…i* sequence is acceptable (see handout).
  - I assume that suffixes are not parsed into metrical feet and PrWd consists of the stem alone:
    - STEM=PRWD: A stem equals a PrWd.
  - From Kolachina (2016):
    - IDENTV[SFX]: Vowels in a suffix must be identical in input and output
    - IDENT-IO[STEM]: Stem segments must be identical in input and output
    - SPREAD-L[+BK]: A violation is incurred if the feature [+BK] from a suffix does not spread to a stem vowel
- Telugu also displays progressive vowel harmony (see handout).
  - I demonstrate here that these constraints derive the correct output forms in both regressive and progressive harmony patterns.

/maniṣi-lu/	FT-BIN	WSP	WEIGHT-BY-POSITION	FT-FORM (TROCH)	STEM=PRWD	HEAD IDENT-IO	IDENTV [SFX]	*i…u	SPREAD-L [+BK]	LEFT MOST	PARSE-SYL	ALIGN-FT-LEFT	IDENT-IO [STEM]
a. (má.ni).(ṣi.lu)					*!			*	* *			**	
b. (má.ni).(ṣi.lì)					*!		*					**	
c. (má.nu).(ṣù.lu)					*!	*						**	**
d. (má.ni).(ṣù.lu)					*!	*		*	*			**	*
e. (má.ni).ṣi.lu								*!	**		**		
f. ☞ (má.nu).ṣu.lu											**		**
g. (má.ni).ṣi.li							*!				**		
h. ma.(ni.ṣu).lu								*!	*	*	**	*	*
i. (ma.ni).ṣu.lu				*!				*	*	*	**		*

Conclusion

- **The metrical analysis *alone* can account for most of the empirical data on Telugu vowel harmony.**
  - This suggests that, although native speaker intuitions about stress are weak, metrical structure plays a significant role in determining phonological alternations in Telugu.

- **Telugu differs from commonly attested harmony systems in that stress does not trigger harmony**:
  - Majors (2006), in his survey of the typology of stress-dependent harmony, notes that harmony is generally triggered by a stressed vowel and manifested on unstressed vowels;
  - Thus, Telugu has "a harmony controlled by a vowel in a weak position" (Walker 2005: 918).

- **The effect of stress is manifested in Telugu in the opacity of a stressed vowel to harmony.** Though uncommon, this can also be found in Tudanca Spanish (Gordon 2011) and Mwotlap (Vaysman 2009).

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