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Editor
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DISCRIMINATING EJECTIVE STOPS OF AMHARIC IN CONTINUOUS SPEECH

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ABSTRACT: The acoustic cues to identify ejectives, such as voicing onset time, phonation type and amplitude rising time of the following sonorant become obscure in continuous speech, especially in the presence of some noise, or when ejectives are followed by voiceless sounds or silence. In an attempt to spot ejectives in continuous speech, first the burst instants of stops are detected, then a decision tree is used to identify the place of articulation, and finally a knowledge-based approach is used to identify ejectives at each place of articulation. Instant of burst of stop sounds is detected by using the differenced normalized residual of linear prediction (LP) analysis along with a ratio of spectral energy of certain band of frequencies from a frame before to a frame after the instant of burst. Band partition and normal spectral entropy extracted from a frame at the instant of oral release is used to detect the place of articulation. Finally, the closure duration, burst duration, frication duration and frication strength are used to develop a knowledge-based system to discriminate ejectives at a place of articulation. The overall performance evaluation shows that 94% of ejectives are discriminated with 6% of false indication rate.

Index Terms: *Amharic, Ejectives, Band Partition Spectral Entropy, Frication Strength, End Point Detection, Normalized residual of LPAnalysis.*

1. Introduction

Ejectives are consonants produced when the larynx with closed glottis moves upwards setting an airstream. As the vocal cords are tightly closed in generating the airstream all ejectives have to be voiceless. The volume of air is limited for generating ejectives; hence sustained articulation is not possible. However, the upward and downward movement of the

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larynx can compress the air above it so much that the release in the ejective stop sound is abrupt. While the glottis is wide open for voiceless pulmonic stops, the glottis is closed for ejective stops. This has implication for the voiced sounds adjacent to ejective sounds. These production characteristics differentiate ejectives from the corresponding pulmonic sounds. This paper makes an attempt to exploit the acoustic characteristics of ejectives in Amharic in locating the ejective sounds automatically in continuous speech.

Production of voiceless and voiced pulmonic stop consonants involves two steps: (1). the articulators form an oral closure, and pressure is built up behind by the air coming from the lungs; (2). the abrupt release of air pressure due to oral opening allows the air flow to resume. On the other hand, the production of ejective involves four steps: (1). two closures are created one at the point of articulation and another at the glottis, (2). the larynx moves upward like a piston to compress the body of air in between the two closures, (3). the oral closure of the articulators is released creating a sharp plosive sound, and (4). the glottal closure is released (Stevens and Hajek 2004; Warner 1996).

Table 1: Ejectives with voiced and voiceless conjugates in Amharic

Voicing type	Stop					Fricative
	Labial	Dental	Alveolar	Velar	Glottal	Dental
Voiced	/b/	/d/	/dʒ/	/g/		/z/
Voiceless	/p/	/t/	/tʃ/	/k/		/s/
Ejective	/pʻ/	/tʻ/	/tʃ/	/kʻ/	/ʔ/	/sʻ/

Amharic is the second largest spoken language from the Semitic family (Hayward and Hayward 1999) and is spoken in Ethiopia by about 17.4 million speakers as their mother tongue and about 5.1 million speakers as their second language (Sebsibe and Kishore 2007). It is the official language of Ethiopia, and it is one of the few languages of the world to have ejectives in its sound system. It has four ejective stops and one ejective fricative, all contrast with corresponding pulmonic stops and fricatives respectively. The total number of Amharic stop sounds is 10, including a glottal stop /ʔ/ (Leslau 1995; Abäte, Menzel, and Tefila 2005). Table 1. snows the stop and ejective sounds of the language. As can be

seen from the Table 1, each ejective has a voiced and voiceless conjugate at its place of articulation.

Spotting special sounds from a continuous speech can have many applications in speech technology. It can be used, for instance, for automatic language identification, speech alignment (Niyogi and Sondhi 2002), automatic speech recognition with knowledge-based approach (Harrington 1988), and anchor point detection.

In this paper we will present a technique to spot ejective stops automatically in continuous speech by using only the local acoustic information. The local acoustic information consists of acoustic features which can be extracted within the duration of the phoneme itself. That means, coarticulatory features like phonation quality, amplitude rising time of the following vowel are not considered. It is because this non-local information is not always available in continuous speech.

The remaining part of the paper is organized as follows. Section 2 describes the acoustic characteristics of ejective stop consonants. Section 3 describes the materials and data collection process. Section 4 deals with the spotting process in general. Section 5 explains the end point detection algorithm used in this experiment. Section 6 describes the process of spotting voiceless (voiceless pulmonic and ejective) stops. Section 7 gives description of the final discrimination step of ejective stop consonants. Section 8 reports the results of spotting. Finally, Section 9 gives the conclusions.

2. Acoustic Characteristics of Ejective Stops

Ejectives are produced by exciting the closed oral tract with the body of air in the oral cavity only, because the air coming from the lungs is blocked by the closed glottis. And the piston-like upward movement of the larynx creates higher pressure than the pressure used to produce other oral stops. Hence stronger burst and shorter VOT (voicing onset time) are the resultant acoustic evidences. This is true for Amharic even though there are some languages reported to have ejectives with longer VOT (e.g. Apache, Navajo, Tlingit, and Hupa (Gordon et al. 2001)). Moreover, ejectives of Amharic have been found to have more burst energy than their voiceless conjugates (Demoline 204). The frication duration at the burst is also less than that of other stop sounds.

In most cases when the glottis is firmly closed and released abruptly, the phonation becomes creaky. This is because of the inability of the glottis Vocal cords resuming to normal vibration mode immediately from a firm constriction. Therefore, the quality of the vowel phonation following the ejective stop is creaky, which can be used as additional acoustic evidence. In some languages, like Tigrinya, the glottal release will have long delay; hence there will be silence after the oral release (Warner 1996). In Amharic, the amplitude of the following sonorant sounds grows slowly compared to that of the sonorant sounds following the voiceless pulmonic stop (Hussien, Rajendran, and Yegnanarayana 2009).

3. Materials and Data Collection

Eleven sentences were constructed in such a way that each sentence consists of one or more words with ejective stop sounds in them. In the words selected for sentence construction, the relative position of the ejective stops in the word was carefully considered to simulate the contextual appearance in the language. That means the ejectives at the beginning, middle, and end of words, and also the ejectives followed or preceeded by fricatives, vowels and other stops were all considered.

The speech was recorded while the sentences were read aloud by two male and two female Ethiopian Amharic speakers in normal reading style. While one of the speakers is a native Amharic speaker, the others were bilinguals who acquired Amharic as a second language, but are fluent in it. Moreover, they grow up in Addis Ababa, where the dialect has emerged as the standard dialect and has wide currency across all Amharic-speaking communities (Hayward and Hayward 1999).

Table 2: The distribution of ejectives in the Database-I (B for beginning, M for middle and E for end of the word)

Sound	/p'/	/t'/	/tʃ/	/k'/
Position	B M E	B M E	B M E	B M E
Count	3 5 -	2 8 4	2 5 3	3 12 4
Total	8	14	10	19

The recordings were carried out at 16 kHz sampling frequency using wavesurfer, in a normal laboratory environment. The resulting

database, which is used for building and training the system, is called Database-I. The distribution of ejectives in this database is shown in Table 2.

Another database (Database-II) is collected from the Voice of America (VOA) Amharic Program online store (VOA cite). A one hour each day broadcast program for one week was downloaded from their official website in MP3 format. Using Sound Forge 9.0 trial version, the files were converted to wave format, down sampled from 22050 Hz to 16000 Hz, and spliced into multiple chunks to save in separate files, each containing a single sentence. The sentences which are part of interviews, music background and field recorded speeches were removed from the database. The total number of sentences collected in this way is about 1400. Since the speech data downloaded from VOA is an audio file without any transcription, we had to do transcription and labeling manually, which is a time consuming task. Therefore labeling was done for a selected 53 files, and the distribution of the phonemes in the resulting database is shown in Table 3. The average number of phonemes is about 102 per sentence.

4. Spotting Procedure

Though ejective stop consonants are unique in their acoustic characteristics, spotting them in continuous speech automatically is still a tough problem. Even spotting the whole class of stop sounds is not an easy task, because these classes of sounds are dynamic, short, speaker- and context dependant in nature (Ali, Mueller, and Spiegel 2001). In addition, though the information available in literature is neither sufficient nor consistent, most of the identified acoustic evidences are manifested as co-articulation effect on the following sonorant sounds. That means, most of these features are relatively always true only in VCV like environments. But in continuous speech, in addition to large acoustic variability, it is impossible to have one specific class of sound always followed by another specific class of sound. Hence ejective sounds may be followed or preceded by any other voiceless class of sound or even by silence, which makes the spotting task most complicated. Therefore, we devised a step by step approach, which uses local acoustic features only, to tackle the problem. In detecting stops, estimating the exact instant of time of burst has been mentioned as a critical step (Niyogi and Sondhi

2002), because burst is a unique feature of stop consonants and it is a base for the measurement of other features like VOT, burst duration and so on. Generally burst has the information, potentially that can discriminate stop sounds uniquely.

Table 3: Frequency of the phonemes in the Database-II (PoA is for Place of articulation)

Class	PoA	Sound	Count
Stop Sounds	Labial	/b/	233
		/p/	27
		/p'/	20
	Dental	/d/	134
		/t/	291
		/t'/	82
	Alveolar	/dʒ/	27
		/tʃ/	81
		/tʃ'/	18
	Velar	/g/	142
		/k/	99
		/k'/	78
	Total		1232
Others	Rest	Rest	4152
Gr. total			5384

In the proposed approach, the first task is to detect the instant of burst release in the voiceless region of speech by using the differenced normalized residual of LP analysis, and also the ratio of the spectral energy in some band of frequencies in the last frame of the closure region and in the beginning frame of the burst region. The voiced and the voiceless regions is identified by using an exponential function of the envelope of the zero frequency filter output of the speech signal. Spotting stop sounds in this way has two advantages. First, it helps to reduce the search region for ejective stops significantly, because it excludes voiced and non-stop sounds; second, since the signal around the instant of burst helps in further discrimination process.

The point of oral release can be captured or identified by the

normalized residual of LP analysis, which has prominent amplitude that can be used as mark of signal discontinuity or sudden change of acoustic gestures. Since ejectives have stronger burst, their instant of burst will be detected easily by the normalized residual of LP analysis. By differencing the normalized residual of LP residual, the prominent amplitude will become prominent pulse which can be easily picked up by a peak picking algorithm. The differenced normalized residual of LP analysis is calculated as follows:

1. The acoustic signal $s[n]$ is differenced

$$x[n] = s[n] - s[n-1], \qquad (1)$$

where n is time index of the signal

where n is time index of the signal $s[n]$.

2. The LP residual is computed as follows:

$$e[n] = x[n] - \sum_{k=1}^{p} a_k x[n-k] \qquad (2)$$

where p is the order of LP analysis, a_k and the LPCs {} are obtained by solving the following autocorrelation normal equations (Makhoul 1975)

$$\sum_{k=1}^{p} a_k R[m-k] = -R[m], \qquad m = 1,2,3,\ldots,p$$

where is auto correlation sequence of the differenced signal.

3. Calculate the normalized residual of LP analysis as follows:

$$\eta[n] = \frac{\sum_{m=n-N/2}^{n+N/2} e^2[n+m]}{\sum_{m=n-N/2}^{n+N/2} x^2[n+m]}, \qquad (3)$$

where N +1 is the total number of samples in each analysis frames.

4. The difference of the normalized residual of LP analysis is given by:

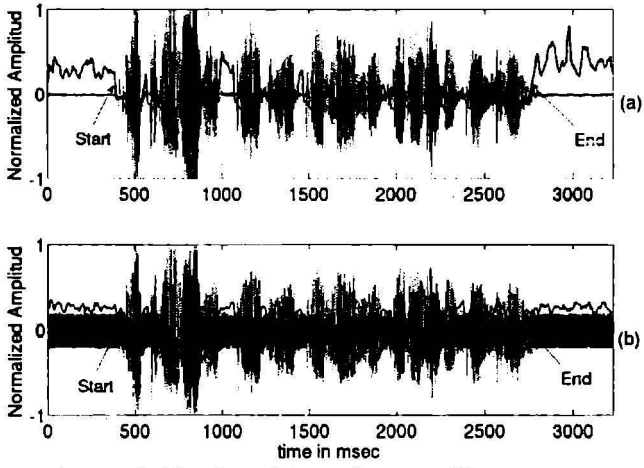
$$\epsilon[n] = \eta[n] - \eta[n-1], \qquad (4)$$

Here, differentiating the normalized residual of LPC analysis

emphasizes the point of bursts as a single prominent pulse (Figure 4) and these prominent pulses can be picked up by a peak tracking algorithm. However, such pulses can also happen in the leading and the ending silent regions because of some noise and this will give rise to the number of false indications. Hence we need to apply some simple but reasonably robust end point detection (EPD) method. The EPD used here is described in the following section.

5. The End Point Detection

In the literature, there are very sophisticated and robust end point detection methods proposed (Wu 2005; K.Yamamoto et al. 2006; Li et al. 2002). But they require more signal processing effort, which is time taking at least for our current problem. Therefore, we used the ratio of zero crossing rates to RMS of the signal which performs fine up to average.



SNR of 6dB for white noise (see Fig. 1).

Figure 1: EPD output for (a) pure speech signal and (b) noisy speech signal of the sentence /shnzhro zhkaŞ' "atla lYfYrYsu gYza/.

The signal processing part of EPD implementation is detailed as follows:

1. The zero crossing rates, is calculated from the differentiated signal over 15 msec frame with 5 msec frame shift

$$z[n] = \begin{cases} 1 & if\ x[n] \geq 0 \\ 0 & otherwise \end{cases}, \qquad (5)$$

where n is the time index of the signal

$$z'[n] = z[n] - z[n-1], \tag{6}$$

$$zr[m] = \frac{1}{N}\sum_{k=0}^{N-1}|z'[n]|, \tag{7}$$

where N is frame size and m is frame index number

2. The RMS, $r[m]$ of is also calculated in the same way.

$$r[m] = \sqrt{\frac{1}{N}\sum_{k=0}^{N-1}(x[k])^2}, \tag{8}$$

3. The ratio, of to r[m] is calculated as:

$$q[m] = \frac{zr[m]}{r[m]}, \tag{9}$$

4. The threshold is decided at 20% of the maximum value of

The start and end point are identified at the frame whose is less and greater than the threshold for the first and last time and remain less than the threshold for the next and previous four frames respectively. This algorithm is tested for average SNR of about 6 dB, 12 dB, and 20 dB added white noise over the database, Database-I. Its performance was compared with manually labeled data (Table 4). Figure 1(a) and (b) shows the output of EPD algorithm for a pure and noisy signal respectively.

6. Identifying Stops

The acoustic wave of a stop sound is characterized by five sequential acoustic events: occlusion, transient, frication, aspiration and transition. Acoustic analysis shows that it is difficult to discriminate transient from frication (Harrington 1988). Significantly, the first event as silence, and the undifferentiated transient and frication together as burst can be observed clearly. The aspiration event may not be available always, especially for voiced stops. Therefore, stop sounds are signaled in continuous speech by a period of extremely low energy which corresponds to the period of closure, followed by a sharp, broadband signal with significantly higher energy corresponding to the burst duration (Niyogi and Sondhi 2002).

At the release of the burst of the stop sounds, there is a significant increase in the normalized residual of LP analysis (Yegnanarayana, Murty, and Rajendran 2008). The differenced normalized residual of LP analysis is used to mark the instant of oral release of the stop sounds.

The instant of oral release of a voiceless stop (voiceless pulmonic and ejective stops) is marked by a peak picking algorithm, which marks an instant as a peak point if the differenced normalized residual, is maximum for previous 50 msec and for next 30 msec. By this peak picking algorithm some points of time in other non voiceless stop sound regions are also found to be marked as oral release of voiceless stop sounds. To filter out these false indications, the spectral information is

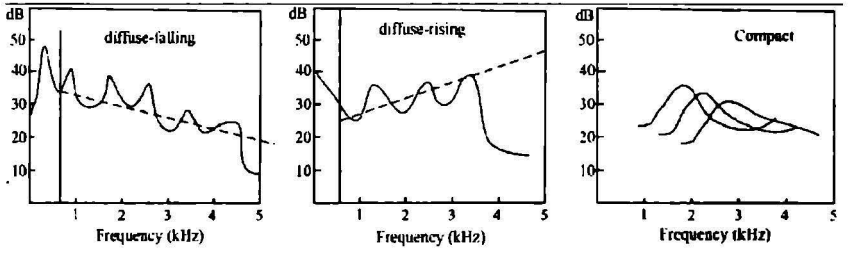


Figure 2: The three gross spectral shapes to identify place of articulation of stop sounds (reproduced from (Harrington 1988)).

used. Any marked point is accepted as a target point, if the ratio of the spectral energy from 500Hz to 3000Hz of a 25-msec frame before the point to a 25-msec frame after the point is less than or equal to 0.5 (see Figure 4).

7. Classification According to Place of Articulation

In discriminating ejective stops from other voiceless pulmonic stops, place of articulation plays an important role by simplifying the discrimination process. Because, stop sounds in general have greater variability at different places of articulation. For example, labials have relatively flat and week spectrum due to the lack of front cavity of any appreciable size (Harrington 1988; Edwards 1981). On the other hand, high resonance distributed throughout the spectrum above 2.5 kHz and concentration of energy at the middle of the spectrum is the characteristics of the burst of alveolars and velars respectively (Edwards 1981).

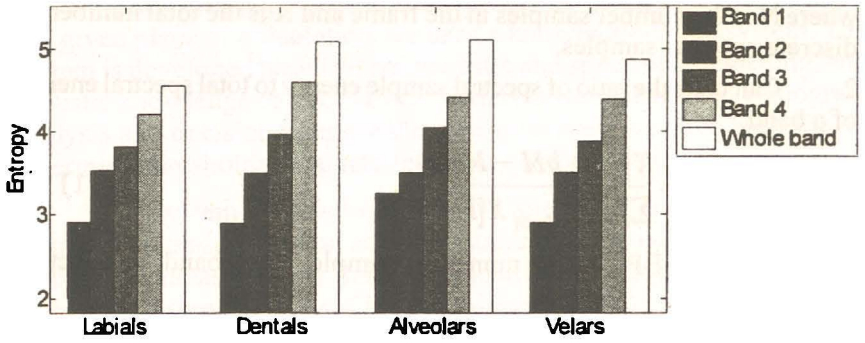


Figure 3: BPSE and spectral entropy vs. place of articulation of Amharic Stops.

Hence, several studies proposed the gross spectral shape of the speech signal at the onset of the burst to identify the place of articulation of stop sounds (Harrington 1988). In these studies, generally three shapes (diffuse-falling for labials, diffuse rising for alveolars and compact for velars) are formed to exhibit invariant acoustic attributes (Figure 2). However, these shapes are too restrictive to use for more than three classes of place of articulation.

Spectral entropy gives a good approximation of the spectral structure or distribution of a signal, because it measures the peakiness of the spectral energy distribution (Toh, Togneri, and Nordholm 2005). Therefore, we propose to use spectral entropy of a frame at the onset of the burst to classify sounds to their place of articulation. The advantage of this feature is that it is robust because it depends mainly on the relative spectral ratio rather than absolute spectral values (Wu 2005).

As can be seen from the Figure 3 spectral entropy has a capacity to classify stops to their place of articulation in average sense. However it is not enough by its own right. To make it more reliable we added the band partitioned spectral entropy, BPSE, which is calculated from four equally divided bands of the whole spectrum in mel scale (Band 1: from 0 to 710 mel, Band 2: from 710 to 1420 mel, Band 3: from 1420 to 2130 mel and Band 4: 2130 to 2840 mel).

The spectral entropy and the band partition spectral entropies are calculated from the spectral energy of a signal as follows:

1. Calculate the spectral energy, of a frame

$$X[k] = \left| \sum_{n=0}^{N-1} x[n] e^{\frac{2\pi}{N} nk} \right|^2, \qquad (10)$$

where N is the number samples in the frame and K is the total number of discrete spectral samples.

2. Calculate the ratio of spectral sample energy to total spectral energy of a band,

$$R[b,m] = \frac{X[m + bM - M]}{\sum_{k=1+bM-M}^{bM} X[k]}, \qquad (11)$$

where for BPSE is the number of samples in the band, for spectral entropy only.

3. Calculate the spectral entropy of a band,

$$E[b] = \sum_{m=1}^{M} R[b,m] \log\left(\frac{1}{R[b,m]}\right) \qquad (12)$$

Band 2, which contains the spectral entropy of frequencies 614 - 768 Hz, has shown no significant difference over all places of articulations. Hence for this research the spectral entropy and three BPSE features (Band 1, Band 3 and Band 4) are extracted from a 25 msec frame starting from the instant of identified oral release. Based on this features we have applied a decision tree to identify the place of articulation. The decision tree is built on a specially prepared database, Database-I, for this experiment.

8. Discriminating Ejectives

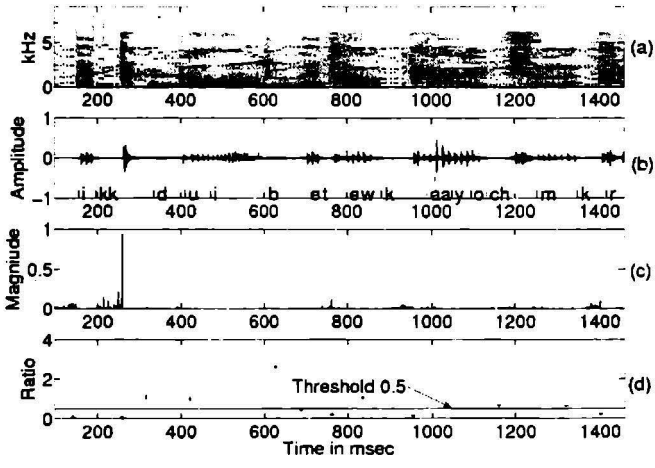


Figure 4: Stop identification (a) spectrogram (b) speech signal with manual label (c) differentiated normalized residual of LP residual and (d) spectral ratio at a proposed point (* is accepted and + is rejected point of oral release).

To discriminate the ejective stops from a given set of stop sounds at a given place of articulation, we used a knowledge-based system. The system is developed based on our acoustic and spectrogram reading, and acoustic knowledge of ejectives and different statistical tools. Histogram analysis and decision trees are the statistical tools we have used (i.e. to determine thresholds, evaluate features, combine features, etc.)

The system is developed on the specially prepared database, Database- I, and applied on another database collected from VOA news website, Database-II. For dental, alveolar and velar class of voiceless stops, the closure durations (CD), burst durations (BD), frication durations (FD) and frication strength (FS) are the main acoustic features used to discriminate ejectives from non-ejective ones.

In this experiment, closure duration and burst duration are defined as the time interval from the beginning of phoneme to the instant of the oral release and from the instant of oral release to the end of the phoneme respectively. Frication duration and frication strength is defined based on the output of a sixth order differentiator with a running mean filter as illustrated in Figure 5. The envelope of the differentiator output has high output whenever there is high frequency component of the frication. To make differentiator output envelope smooth, a running mean filter with 10 msec hamming window is used. Frication duration (FD) is measured from the instant of oral release to the point where the envelope of differentiator output reached 50% of its maximum. The sum of the envelope in frication duration is used as a measure of frication strength. The resulting knowledge-based is shown in Figure 6. All durations are measured in msec.

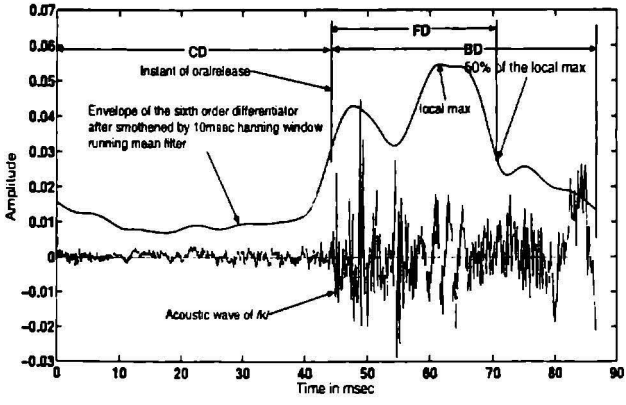


Figure 5: Illustration of frication strength and frication duration measurements

Since labial stops have flat spectrum and low intensity, the sixth order differentiator, which is basically a high pass filter, is not able to give discriminative measurement of frication duration and frication strength in this class of sounds. Hence, for labials, the mel frequency cepstral coefficients (MFCC) of a 15 msec frame with 12 filters are analyzed and the 1st, 3rd, and 7th coefficients are found enough to discriminate labial ejectives from labial voiceless pulmonic stops. Therefore, the knowledge-based for labials is built based on MFCCs. (see Figure 6).

9. Results and Discussions

Table 4 shows the result obtained from end point detection module. In the Database-I there are 44 sentences i.e. 44 end and start point pairs are available. For the speech signal without added noise the EPD module was not able to detect 2 start and 4 end points within 5 msec tolerance. That means the error rate is about 6.82%. For the noisy signal at 6dB of SNR the error rate for 5 msec tolerance is increased to 12.5% If a non-stop sound is detected in this miss detected silence regions, still it has a probability to be rejected by the ejective discrimination module.

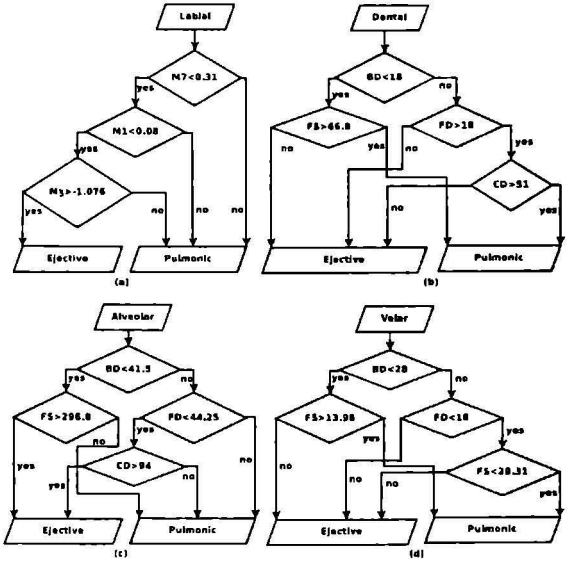


Figure 6: The knowledge-based system to discriminate ejectives

Table 5: shows the performance evaluation of voiceless stop detecting part. The peak picking algorithm proposes 1025 sounds as candidate for voiceless stop sounds based on the differenced normalized residual. The final decision is done based on the spectral ratio of the frame before and after the proposed point. The evaluation is done for the Database-II. The performance evaluation shows that 13.14% (31/236 = 0.1314) of voiced stops are detected as voiceless stops, and 98.99% (689/696 = 0.9899) of voiceless stops are correctly spotted as voiceless stop, where as the insertion rate was 9.93% (31 voiced stops + 45 other non-stop sounds/686 number of voiceless stops detected correctly + (31+45) number of false alarms = 0.09934)

Table 4: Test result of EPD algorithm (numbers are error out of 44 start and end pairs)

SNR ratio	Tolerance					
	20 msec		10 msec		5 msec	
	Start pts	End pts	Start pts	End pts	Start pts	End pts
Pure	0	1	2	3	2	4
20 dB	0	2	2	4	3	4
10 dB	1	2	3	4	3	5
6 dB	3	3	5	6	4	7

Table 5: Result of voiceless stop detection part

Class	Voicing	Detected as	
		Voiceless stop	Any other sound
Stop	Voiced	31	232
	Voiceless	689	7
Non-stop	Voiced	15	21
	Voiceless	30	
Sum		765	260

As can be seen from Table 6, 93.61% (44/47 = 0.9361) of labials, 98.39% (367/373 = 0.9839) of dentals, 98.99% (98/99 = 0.9899) of alveolars and 96.04% (170/177 = 0.9604) of velars are classified correctly with 11.12% (85/764 = 0.1112) error rate by the decision tree to identify the place of articulation.

Table 6: Result obtained from place of articulation identification part

PoA	Classified as			
	Labial	Dental	Alveolar	Velar
Labial	44	2	1	2
Dental	4	367	3	8
Alveolar		4	98	3
Velar	2	7	4	170
Others	14	16	8	7

As the detail result of spotting stops shows (Table 7) the overall result is 98.99% with 10.92% false indications which may be taken as good result. In addition, the main focus of this research is on ejective stop consonants, for which the overall result is significantly promising, 93.94% (186 out of 198 ejective stop sounds) with a false indication of 19.83% (46 non-ejective sounds out of 186 correctly identified ejective stops and 46 falsely claimed non-ejective sounds).

Table 7: Detail of result of Discrimination of ejectives (NE for non-ejective, HR for hit rate and FI for false indications)

PoA	Sound	Discriminated as					HR
		/p'/	/t'/	/tʃ'/	/k'/	NE	
Labial	/b/ /p/ /p'/	1 3 19	 1			3 20 2	95.00%
Dental	/d/ /t/ /t'/	 2	2 7 77		1 6	8 247 3	93.90%
Alveolar			1	3 16		4 79 1	88.89%
Velar	/g/ /k/ /k'/	1	1 3 1		2 2 74	9 92 2	94.89%
Any	/s/ /s'/ /r/ /a/ /f/ /i/ /m/		2 3	3 1		12 4 7 4 5 3 1	
	Total	20	98	23	85	533	93.94%
FI	/	21	7	11			

10. Conlusion

Amharic is one of the few languages to have ejectives among the world languages. It has four ejectives with voiced and voiceless pulmonic conjugates of the same place of articulation. The very dynamic and highly variable nature of the whole stop class of sounds, make the process of discriminating them in continuous speech difficult. When the idea of discriminating ejectives from voiceless pulmonic conjugates comes, the problem will become even more difficult.

In this paper we have developed a procedure to discriminate ejectives from continuous speech based on local features of the phoneme (features that can be extracted within the duration of the target phoneme). The differentiated normalized residual of LP residual with spectral ratio of closure to burst in an voiceless part of the speech is used to identify non-voiced (ejectives and voiceless) stop sounds. Classification of identified non-voiced stop sounds to their respective place of articulation is done by a decision tree which is built with band partition spectral entropy (three features) and spectral entropy at the point of oral release. The bands of band partition spectral entropy are determined by dividing the spectrum into four equal bands in mel frequency scale. The closure duration, burst duration, frication duration and frication strength are the local features used to discriminate ejectives from non ejective sounds at a place of articulation. The frication duration and frication strength are defined by the output of smoothened envelop of the sixth order differentiator.

The overall performance shows 93.94% success with 19.83% of false indications. This promising result leads to a conclusion that the features used to discriminate ejectives from non-ejectives sounds are the main acoustic evidences of ejectives as explained in (Hussien, Rajendran, and Yegnanarayana 2009) and (Demoline 204). In general, Amharic ejectives have longer closure duration, stronger frication, shorter frication duration and shorter burst duration than that of voiceless pulmonic conjugates. In addition, this experiment can be a good input for knowledge-based speech recognition systems. The experiment done in this research can also be used in language identification system. The VOT of an ejective

stop in Amharic, for instance, is shorter than the VOT of the same ejective stop in Tigrinya (Warner 1996) (see Figure 7 and 8).

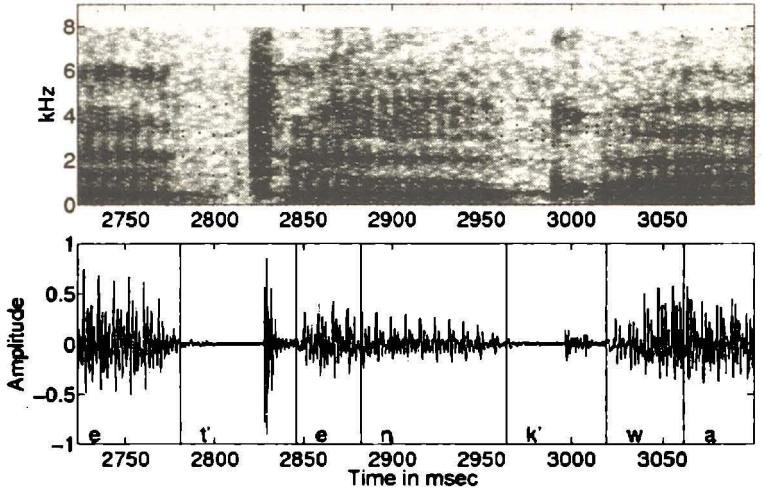


Figure 7: Acoustic signal of /t'/ and /k'/ taken from a speaker whose mother tongue is Amharic

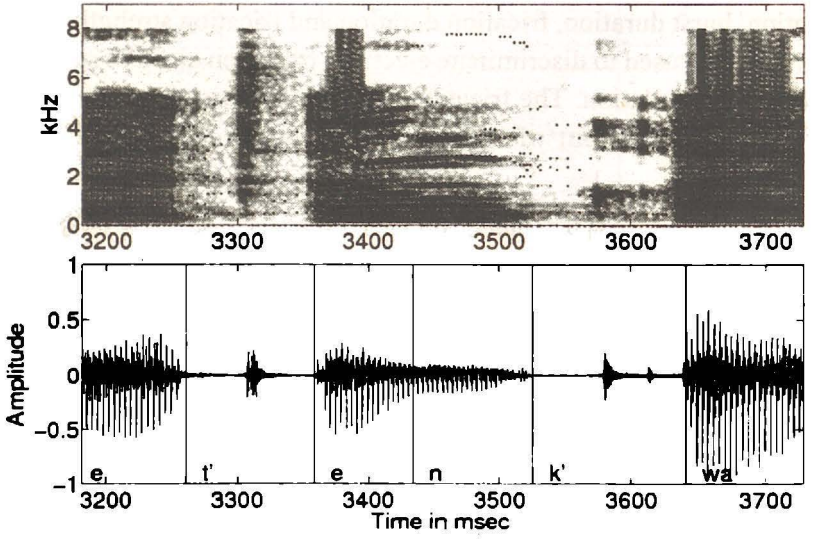


Figure 8: Acoustic signal of /t'/ and /k'/ taken from a speaker whose mother tongue is Tigrinya

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SEMANTIC AND SYNTACTIC PECULIARITIES OF CAUSATIVE CONSTRUCTIONS IN TELUGU AND ENGLISH

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ABSTRACT: Linguists are aware that the causative proposition can be expressed in all most all the languages by making use of some sort of special syntactic constructions, which in English are generally known as 'causative constructions'. Linguists are also aware that these constructions do not necessarily show the semantic and syntactic similarity as to their details both crosslinguistically and intralinguistically. The aim of this paper is firstly to present the general definition of a causative proposition crosslinguistically, and secondly to describe the causative constructions both in Telugu (a language belonging to Dravidian family) and English by highlighting their semantic and syntactic peculiarities. The relevant data from German and French is also drawn to illustrate the generalizations and peculiarities under discussion.

To begin with, let us broadly define what a **causative proposition** is. A causative proposition is any complex, but natural, semantic proposition that describes a situation in which the action (involving compulsion, persuasion, permission, etc.) of one entity results in the action (or change of state) of another entity. The inference that one can make from this (sort of) definition is that the causative proposition involves two entities and two sequentially interlinked actions. For the convenience sake, let us call the first entity a **causer subject** and the second a **causee object**. Further, let us call the action of the causer a **causer predicator** and the action of the causee a **causee predicator.** Having said this, now we need to define what a **causative construction** is. A causative construction is that linguistic construction which represents the causative proposition as defined above. Consider the following German example (1) in which the causer subject is shown in bold and the causee object is shown with an underscore:

(1) **Sie** ließ <u>ihn</u> die Autos waschen.
she (nom) made he (acc) the cars (acc) wash (inf)
'She made him wash tne cars.'

From the point of propositional semantics, the above construction is meant for describing a situation in which the causer subject, i.e. *sie*, initiates some action, and as a consequence of this the causee object, i.e. *ihn*, in turn performs the action of washing the cars.

We must bear in mind that crosslinguistically the linguistic representation of the causer and causee predicators is not always made uniformly. For instance, in some languages, the causer and causee predicators are realized by two separate lexical verbs and in some other languages both the predicators, as a whole, are realized by a single lexical verb. As an illustration, consider the examples (2), (3), and (4) drawn respectively from Telugu, French, and English:

(2) nēnu panivāDicēta nā kāru
I (nom.1st.s) servant (obl)-by my car
kaDigiMcānu.
wash-CAUS-p-1st.s
'I had my car washed by a servant.'

(3) Elle fera réparer la voiture par un mécanicien.
she have (fut) repair the car by a mechanic
'She will have the car repaired by a mechanic.'

(4) He had his house built by a famous architect.

In (2), the causee and causer predicators are realized by a single lexical verb, i.e. *kaDigiMcānu*. Morphologically, this becomes possible by two of the verb's components, i.e. *kaDig-* and *–iMc*. Let us call the former **a causee stem** and the later **causer suffix**. Of these two, the causee stem represents a causee predicator and the causer suffix a causer predicator. In (3) and (4), unlike in (2), the causer and causee predicators are realized by two separate lexical verbs, i.e. *fera* and *réparer* in (3) and *had* and *built* in (4). In each case, let us call the former a **causer verb** and the later a **causee verb**. Of these two, the causer verb is finite and represents a causer predicator, and the causee verb is non-finite and represents a causee predicator. However, notice that in (4), unlike in (3), the causer and causee predicators are not occurring one next to the other.

Remember, it is not unusual to find causative propositions having different canonical patterns both crosslinguistically and intralinguistically.

As an illustration, consider the following canonical patterns (hereafter called patterns) of causative propositions in Telugu, as given in (T1) to (T3), and English, as given in (E1) to (E3):

Telugu patterns

(T1) **causer subject + (causee object) + object + causee-causer predicator**

(T2) **causer subject + causee object + object + causee-causer predicator**

(T3) **causer subject + causee object + causee-causer predicator**

English patterns

(E1) **causer subject + causer predicator + object + causee predicator + (causee object)**

(E2) **causer subject + causer predicator + causee object + causee predicator + object**

(E3) **causer subject + causer predicator + causee object + causee predicator**

It should be noted here that the causee-causer predicator, as given in patterns (T1) to (T3), subsumes both the causee predicator and the causer predicator.

Though, in principle, the presence of both the causer subject and the causee object is essential for a causative proposition, it should be noted here that the parenthesized causee objects shown in patterns (T1) and (E1) above are sometimes not expressed overtly. Consider the examples (5) and (6) which respectively represent the patterns (T1) and (E1) in which the causee objects are not expressed overtly:

Pattern (T1)

(5) nēnu nā pāta gaDiyārānni bāgucēyiMcānu.
I (nom.1st.s) my old watch (acc) repair-CAUS-p-1st.s
'I had my old watch repaired.'

Pattern (E1)

(6) She had her novel translated.

Note that the causer subjects as well as the causee objects, subject to certain propositional restrictions, can be either animate or inanimate.

For instance, in (7) and (9) the causer subjects, i.e. *atani jōkulu* and *their criticism*, are inanimate and the causee objects, i.e. *mammalni* and *her*, are animate and in (8) and (10) the causer subjects, i.e. *nēnu* and *he*, are animate and the causee objects, i.e. *ā nīTini* and *the engine*, are inanimate:

(7) atani jōkulu mammalni
his jokes (nom.3rd.n.pl) we (acc.1st.pl)
navviMcāyi.
laugh-CAUS-p-3rd.n.pl
'His jokes made us laugh.'

(8) nēnu ā nīTini bāgā kāgiMcānu.
I (nom.1st.s) that water (acc) well boil-CAUS-p-1st.s
'I made that water boil well.'

(9) Their criticism made her cry.

(10) He made the engine run very fast.

The major syntactic distinction that we find between the Telugu causative constructions and the English causative constructions is that the former are monoclausal, while the later are biclausal. In this respect, compare Telugu patterns (T1) to (T3) with English patterns (E1) to (E3). It can be seen that there is one (i.e. causee-causer) predicator each in patterns (T1) to (T3), while two (i.e. causer and causee) predicators each in patterns (E1) to (E3). The inference is that one-predicator pattern results in a monoclausal causative construction, as in the case of Telugu, while two-predicator pattern results in a biclausal causative construction, as in the case of English. Consider the following causative constructions given in (11) and (12):

(11) mīru vāLLanu veLLaniccāru.
you(nom.2nd.pl) they (acc) go-CAUS-p-2nd.pl
'You let them go.'

(12) She let [us see the baby].

In (11) there is only one causee-causer predicator realized by the finite verb *veLLaniccāru*.[1] In (12) there are two predicators, i.e. causer predicator and causee predicator, realized respectively by the causer verb *let* and the causee verb *see* in which the former occurs in the main

clause and the later occurs in the dependent clause (shown in the square brackets).

Now let us see how the different elements of the canonical patterns given in patterns (T1) to (T3), and (E1) to (E3) are realized syntactically.

The causer subject pertaining to Telugu and English patterns is realized by a nominative noun phrase. As an illustration consider the examples given in (13), (14), (15), (16), (17), and (18) which respectively represent patterns (T1), (T2), (T3), (E1), (E2), and (E3) in which the nominative noun phrases representing the causer subjects are shown in bold:

Pattern (T1)

(13) **mīru** nācēta nā udyōgāniki
you (nom.2nd.pl) I (obl)-by my job (dat)
rājīnāmācēyiMcāru.
resign-CAUS-p-2nd.pl
'You made me resign my job.'

Pattern (T2)

(14) **āme** nāku tājā paLLanu
she (nom.3rd.f.s) I (dat) fresh fruits (acc)
tinipiMciMdi.
eat-CAUS-p-3rd.f.s
'She got me to eat the fresh fruits.'

Pattern (T3)

(15) **atanu** āmenu naDipiMcāDu.
he (nom.3rd.m.s) she (acc) walk-CAUS-p-3rd.m.s
'He made her walk.'

Pattern (E1)

(16) **She** had the rugs cleaned.

Pattern (E2)

(17) **I** let her use my telephone.

Pattern (E3)

(18) **You** made them laugh.

Both the causee-causer predicator of patterns (T1) to (T3) and the causer predicator of patterns (E1) to (E3) are realized by a finite

verb (group). It should be noted here that in Telugu the finite verb representing a causee-causer predicator agrees with the nominative noun phrase representing a causer subject[2] and in English the causer verb of the main clause representing a causer predicator agrees with the nominative noun phrase representing a causer subject. As an illustration, consider the causative constructions given in (19) to (23) below in which the nominative noun phrases are shown in bold and their corresponding finite verbs are shown in italics:

(19) **nēnu** āmenu *navviMcānu.*
I (nom.1st.s) she (acc.3rd.f.s) laugh-CAUS-p-1st.s
'I made her laugh.'

(20) **nuvvu** atanni *navviMcāvu.*
you (nom.2nd.s) he (acc.3rd.m.s) laugh-CAUS-p-2nd.s
'You made him laugh.'

(21) **ā ammāyilu** nannu
those girls (nom.3rd.f.pl) I (acc.1st.s)
navviMcāru.
laugh-CAUS-p-3rd.f.pl
'Those girls made me laugh.'

(22) **He** (nom.3rd.s) *makes* (3rd.s) them do their homework.

(23) **They** (nom.3rd.pl) *make* (3rd.pl) him do his homework.

In Telugu, the causee object is realized by an oblique noun phrase with the postposition *cēta* (*cē*[3] or *tōDa* or *tō*[4] *or dvārā or tōni*[5] or *tōTi*[6]) in pattern (T1), a dative noun phrase (if the causer suffix is *-iMc*) or an accusative noun phrase (if the causer suffix is *–icc*) in pattern (T2), and an accusative noun phrase (if the causer suffix is *-iMc* or *–icc)* or an oblique noun phrase with the postposition *cēta* (if the causer suffix is *-iMc*) in pattern (T3). Consider the examples (35) to (40), in which the causee objects of Telugu patterns are shown with an underscore. In English, the causee object of pattern (E1) is realized by an oblique noun phrase with the preposition *by*, whereas the causee objects of patterns (E2) and (E3) are realized by an accusative noun phrase. Consider the examples (41) to (52), in which the causee objects of English patterns are shown with an underscore.

The objects that constitute pattern (T1) are realized by either an accusative noun phrase or a dative noun phrase. This depends on the

causee stem representing a corresponding causee predicator. For instance, the causee stems such as *shubhraMcēy-* 'clean' and *vellavēy-* 'whitewash' in the context of pattern (T1) require respectively an accusative noun phrase and a dative noun phrase to represent their corresponding objects. This is illustrated in the examples (24) and (25) below in which the causee predicators are underscored and their corresponding objects are shown in italics:

Pattern (T1)

(24) mēmu *mā iMTini* shubhraMcēyiMcāmu.
we (1st.pl) our house (acc) clean-CAUS-p-1st.pl
'We had our house cleaned.'

(25) mēmu *mā iMTiki*
we (1st.pl) our house (acc)
vellavēyiMcāmu.
whitewash-CAUS-p-1st.pl
'We had our house whitewashed.'

The objects that constitute patterns (T2), (E1), and (E2) are realized by an accusative noun phrase. Examples given in (26), (27), and (28) respectively illustrate the patterns (T2), (E1), and (E2) in which the objects are shown in italics:

Pattern (T2)

(26) nēnu ataniki *dānni*
I (nom.1st.s) he (dat.3rd.m.s) it (acc.3rd.n.s)
tinipiMcānu.
eat-CAUS-p-1st.s
'I got him to eat it.'

Pattern (E1)

(27) She had *them* written by a professional.

Pattern (E2)

(28) We had him repair *them*.

In Telugu, the causee stem representing the causee predicator is transitive in the case of patterns (T1) and (T2), and intransitive in the case of pattern (T3). In English, the causee verb representing the causee predicator is transitive in the case of patterns (E1) and (E2), and intransitive in the case of pattern (E3). Thus the presence or absence of

an object entity in a given pattern under discussion can be directly related to the transitive or intransitive nature of the causee stem in the case of Telugu or the causee verb in the case of English that represents a causee predicator.[7] As an illustration, in the following examples (29) to (34) the causee predicators are shown with an underscore and the objects in italics:

Pattern (T1)

(29) nēnu vāLLatō *nannu*
I (nom.1st.s) they (obl)-by I (acc.1st.s)
pogiDiMcukonnānu.
flatter-CAUS-refl-p-1st.s
'I made them flatter me.'

Pattern (T2)

(30) ā abbāyilu āmeku
those boys (nom.3rd.m.pl) she (dat.3rd.f.s)
viSānni tāgiMcāru.
poison (acc.3rd.n.s) drink-CAUS-p.3rd.m.pl
'Those boys caused her to drink poison.'

Pattern (T3)

(31) atani vēdana nannu
his suffering (nom.3rd.n.s) I (acc)
ēDpiMciMdi.
cry-CAUS-p-3rd.n.s
'His suffering made me cry.'

Pattern (E1)

(32) She had *her songs* sung by a famous singer.

Pattern (E2)

(33) I got him to wash *his hands*.

Pattern (E3)

(34) I made her dance.

It should be noted here that in Telugu the causer predicator is realized by one of the two semantically distinct causer suffixes, i.e. *-iMc* (variants *–is* and *–iMcu* or *-icc*[8]) and *–icc* (variants *–is* and *-ivv/-iyy*). With respect to pattern (T2), if the causer predicator is realized by *-iMc*, then its corresponding causee object is realized by a dative noun

phrase, and if it is realized by *–icc* then its corresponding causee object is realized by an accusative noun phrase. We have earlier mentioned that the causee predicator in Telugu is realized by a causee stem. But, normally, a given causee stem manifests in two distinct forms, of which one form is selected by *–iMc* and the other form is selected by *–icc*. Consider the causative constructions given in (35) to (40), in which the noun phrases representing a causee object and the causee stems representing a causee predicator are shown with an underscore, and the causer suffixes representing a causer predicator are shown in bold:

Pattern (T1)

(35) nēnu pillalacēta telugu pāTalu
I (nom.1st.s) children (obl)-by Telugu songs
pāDi**Mc**ānu.
sing-CAUS-p-1st.s
'I got the children to sing Telugu songs.'

(36) nēnu pillalacēta telugu pāTalu
I (nom.1st.s) children (obl)-by Telugu songs
pāDani**cc**ānu.
sing-CAUS-p-1st.s
'I let the children sing Telugu songs.'

Pattern (T2)

(37) nēnu vāLLaku ā reMDu pāTalu
I (nom.1st.s) they (dat) those two songs
vini**piMc**ānu.
hear-CAUS-p-1st.s
'I caused them to hear those two songs.'

(38) nēnu vāLLanu ā reMDu pāTalu
I (nom.1st.s) they (acc) those two songs
vinani**cc**ānu.
hear-CAUS-p-1st.s
'I let them hear those two songs.'

Pattern (T3)

(39) nēnu vāLLanu/vāLLacēta
I (nom.1st.s) they (acc)/they (obl)-by
parugeTTi**Mc**ānu.
run-CAUS-p-1st.s
'I made them run.'

(40) nēnu vāLLanu parugeTTaniccānu.
I (nom.1st.s) they (acc) run-CAUS-p-1st.s
'I let them run.'

In English the causer predicator is realized by a causer verb, *have* or *get* in pattern (E1) and *make* or *cause* or *have* or *get* or *let* in patterns (E2) and (E3). Syntactically, the choice of a causer verb in a given pattern will determine the form of the corresponding causee verb. To put it more distinctly, the causee verb, in its past participle form co-occurs with a causer verb *have* or *get* in pattern (E1), in its infinitive form co-occurs with a causer verb *make* or *have* or *let* in patterns (E2) and (E3), and in its to-infinitive form co-occurs with a causer verb *cause* or *get* in patterns (E2) and (E3). Consider the examples (41) to (52) in which the causer predicators are shown in bold and the causee predicators are shown in italics:

Pattern (E1)

(41) I **had** my house *painted* by a professional painter.
(42) She **got** her room *cleaned* by her sister.

Pattern (E2)

(43) She **made** her children *do* their homework.
(44) I **had** him *close* the door.
(45) We **let** them *eat* the rest of the cake.
(46) The trauma **caused** her *to lose* her voice.
(47) I **got** him *to eat* the fresh fruits.

Pattern (E3)

(48) They **made** me *laugh.*
(49) I **had** them *sing and dance.*
(50) I **let** her *go.*
(51) A sudden crashing sound **caused** her *to jump.*
(52) She **got** him *to talk.*

In Telugu, out of the two causer suffixes *–iMc* and *-icc*, unlike the later, the former, in one sense, lacks specific meaning and only conveys the causer action in general. However, it gets its specific causer meaning from the whole context in which it is used.

In English, the causer verb *let* with its specific meaning can be

distinguished from the rest of the causer verbs, i.e. *make*, *cause*, *have*, and *get*. At the same time, it should be noted that the causer verbs *make*, *cause*, *have*, and *get* are not interchangeable in all the contexts. For instance, to mention a few, in a context in which someone (or something):

(i) persuades someone to do something the causer verb *get* is used (see example (47));[9]

(ii) causes someone to do something as a service the causer verb *have* is used (see example (41));

(iii) compels someone to do something the causative verb *cause* is used (see example (51)).[10]

Abbreviations

acc = accusative; CAUS = causative; dat = dative; f = feminine; fut = future; inf = infinitive; m = masculine; n = neuter; nom = nominative; obl = oblique; p = past; pl = plural; refl = reflexive; s = singular; 1st = first person; 2nd = second person; 3rd = third person.

Notes

1. Ramarao (2002: 16-17) considers that the Telugu sentences consisting of permissive *-iccu* of the type given below are complex sentences:
   sushīla nannu tana gadilōki
   Susheela (nom.3rd.f.s) I (acc.1st.s) her room-into
   rānicciMdi.
   come-CAUS-p-3rd.f.s
   'Susheela let me come into her room.'
2. For a detailed account of agreement in Telugu, see Vijayanarayana 2000.
3. The postposition *cē* is a contracted form of *cēta*.
4. The postposition *tō* is a contracted form of *tōDa*.
5. The postposition *tōni* is a dialectal variant of *tōDa*.
6. The postposition *tōTi*, like *tōni*, is also a dialectal variant of *tōDa*.
7. It is to be noted that in Krishnamurti and Gwynn (1985: 202-203),

the description of Telugu causative constructions is just confined to pattern (T1).

8. The causer suffix *–icc* is an informal/dialectal variant of *–iMc*.

9. For further information on *get*, see Swan (1984: 113).

10. Consider the following examples as given in Leech and Svartvik (1975: 301) which indicate the usage of the causative verb *get* in an informal context:

    What *caused* them to revise their decision? <formal>
    What *got* them to change their minds? <informal>

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VARIATION IN THE NEGATIVE PAST IN TELUGU-HISTORICAL PERSPECTIVE

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ABSTRACT: Telugu is one of the Dravidian languages spoken in Andhra Pradesh. It has been observed by the earlier scholars that the past negative in Modern Telugu is formed by adding the 3rd neuter singular form of *lee* – 'not to be' (i.e. *leedu*) to the infinitive irrespective of the gender, number and person of the subject. Contrary to this, the author in this paper has presented data collecting from Telangana dialect of Telugu showing variation in the formation of negative past. This issue has been studied in the paper from historical point of view too.

1. Introduction

Telugu language belongs to South Dravidian II branch of Dravidian family. This paper aims to study the variation found in the negative past tense in this language from Historical point of view. It was observed by the earlier scholars (Krishnamurti 1985; Ramarao 1974) that the past negative in Modern Telugu is formed by adding the 3rd neu sing. Form of *lee-* 'not to be' (i.e. *leedu*) to the infinitive. This compound verb is in direct opposition to the past tense affirmative *leedu* remains the same irrespective of the gender, number and person of the subject.

neenu raayaleedu	'I did not write'
niivu raayaleedu	'you did not write'
aame raayaleedu	'she did not write'
aayana raayaleedu	'he did not write'
vaaLLu raayaleeedu	'they did not write'

It was observed that there is variation in the negative past formation in Telugu language (Swarajya Lakshmi 1997). In Telangana dialect of Telugu language *lee* is inflected to person, number and gender to indicate negative past tense.

neenu raaleenu	'I did not come'
niivu raaleevu	'you did not come'
aame raaleedu	'she did not come'
aayana raaleeDu	'he did not come'
vaaLLu raaleeru	'they did not come'

The above paradigm creates ambiguity to the speakers of non

Telangana dialects because in those dialects inflected form of *lee* 'to be met' occurring after infinitive base has a modal meaning 'not being capable'.

neenu raayaleenu	'I cannot write'
aayana raayaleeDu	'he cannot write'

In the following sections an attempt is made to study this issue drawing data from other Dravidian languages.

2. Data drawn from South Dravidian I languages

In Old Tamil the inflected forms of *il-* 'to be not' are added to the past participle or the past participial noun to express past negative.

va-nt(u) + il + Ø – aar	'they (hum.) did not come'
ari-ntu + il – Ø – ir	'you (pl.) did not know'

In modern Tamil, Malayalam, Kodagu, Kota, Kannada negation is expressed by adding the word *illa / illai* 'it is not' to the infinitive or the noun formed on the past participle to express past negative without inflecting it to the Gender, Number, and Person markers.

Tamil

avan	*vara(v)*	*illai*	'he did not come'
avaL	*vantatu*	*illai*	'she did not come'
avar	*vantatu*	*illai*	'they did not come'

Malayalam

avan	*cey-tu-illa*	'he did not go'
avaL	*cey-tu-illa*	'she did not go'
avar	*cey-tu-illa*	'they did not go'

Kannada

aven	*nooD-al-illa*	'he did not see'
ava	*nooD-al-illa*	'she did not see'
avru	*nooD-al-illa*	'they did not see'

Among South Dravidian I group of language, Tulu deviates from the other South Dravidian languages. Negative suffixes *–ji / -ri* (different social dialects) are added to tensed stems to express negation. The personal suffixes follow in forming negative finite verbs.

kal - tii - j – i	'I did not study'
kal - tii - j – a	'we did not study'
kal - tii - j – ari	'you (pl) did not study'

3. South Dravidian II languages

In this subgroup of languages negative past is expressed in two ways. In type I languages, the negative marker is added to the base, which in turn is followed by the past suffix and personal suffixes. Some dialects of Gondi, Konda, Kui have this kind of structure.

Konda:

nes -ʔ- et – a	'I did not know'
nes -ʔ- it – i	'you did not know'
nes -ʔ- et – an	'he did not know'
nes -ʔ- et – ad	'she/it did not know'

Kui

tin -ʔa – enu	'I did not eat'
tin -ʔa-t – i	'you did not eat'
tin -ʔa – t – enju	'he did not eat'
tin - ʔ – t – e	'it/she did not eat'

However, some dialects of Gondi and Kui use a structure similar to Telugu to form past negative i.e., the negative verb *sil* – 'not to be' is added to the infinitive form and it inflects to the PNG markers.

Gondi

suuʈ ci lloon	'I did not see'
vaa cci lloor	'he did not come'
ti cci llee	'she/it did not eat'

Kui:

aanu taaka SiDenu	'I have not walked'
aanu taaka SiDi	'you have not walked'

Telugu which belongs to this particular subgroup does not inflect the negative verb *leedu* 'not to be' to the PNG markers with the exception of Telangana dialect. Grammatically, it stands for non-masculine singular form.

4. Central Dravidian Languages

In Central Dravidian two kinds of structure is found in the negative past formation. 1. Base + Negative marker + tense marker + PNG marker.

Kolami:

si – e – t – an	'I did not give'
si – e – t – in	'you did not give'
si – e – t – en	'he did not give'
si – e – t – in	'she / it did not give'

2. A periphrastic construction which is used to express negation in the past is formed by adding to the negative adjective of a verb the imperfect forms of the verb *men-* 'to be' which is inflected to the PNG markers. (Subrahmanyam 1971, p.372)

Parji:

ole	*cen o-*	*me*	*did*	'he did not go home'
iten	*uuba*	*me*	*dir*	'they did not speak like this'

Kolami: *toot* 'to be not' is inflected to the PNG markers.

aan	*vattooten*	'I did not come'

Negation is expressed at syntactic level by adding the negative word *mal / maal / mal?a* 'not' before the affirmative verb forms.

Kurukh: *mal ke raS* '(he) did not go'

5. North Dravidian languages

The languages belonging to this subgroup differ from other branches. Kurukh has no morphological negative construction. Negation is expressed by adding the negative word *mal / maal / mal?a* 'not' before the affirmative verb form.

mal keraS '(he) did not go'

Malto also lacks the morphological negative construction. The word *mala* 'not' is added to the affirmative future forms to indicate negation.

However in Brahui, the past negative conjugation consists of the erstwhile past stem (with the base followed by the past suffix *–t*) followed by the present of the substantive verb negative which is inflected to the person and number.

tiχ ta vaʈ	'I did not place'
tiχ ta vees	'we did not place'
tiχ ta u	'you (sg.) did not place'
tiχ ta van	'you (pl.) did not place'
tiχ ta vere	'he/she/it (sg.) did not place'
tiχ ta vas	'he/she/it (pl.) did not place'

6. Conclusions

Based on the above data the following observations can be made.

1. In South Dravidian I the negative past is expressed by adding *leedu*

'not to be' (3rd Non-masculine) to the infinitive of the verb. With the exception of Tulu, in which negative suffix *–ji / -ri* are added which are followed by the personal suffixes.

2. In South Dravidian II Negative past is expressed in two ways. i) through negative suffixes followed by tense and personal suffixes. ii) Adding *cil - / sil* 'not to be' to the infinitive form which in turn is followed by person markers.
3. In Central Dravidian also two kinds of structures are found to express past negative. i) through the marker followed by tense marker and PNG markers. ii) the verb *men-* 'to be' which is inflected to the PNG markers is added to the negative participle of a verb.
4. In North Dravidian also Brahui shows the evidence of a negative verb inflected to person, number being added to the verb stem.
5. In all subgroups South Dravidian II, Central Dravidian, North Dravidian, Tulu and old Tamil of South Dravidian I, there is evidence to point out that the negative past is inflected to the PNG markers. This can therefore be attributed to Proto Dravidian itself.
6. Simplification process must have taken place in South Dravidian I and some Dialects of Telugu (South Dravidian II) by which the negative verb standing for 'not to be' is used without inflecting it to the PNG markers. In these dialects of Telugu the inflected form of *lee-* is being used to indicate 'negative capability' differentiating the two semantic functions.
7. The Telangana dialect has retained the Proto Dravidian structure of using the Inflected form of the verb *lee-* 'not to be' to indicate the negative past too.

Gondi: *sill-* 'to be not' is inflected to the PNG markers

Konda: It consists of the base followed by the negative marker which in turn is followed by the past suffix, followed by the personal suffix.

Kui: The structure of past negative is: Base + Neg + Past + PNG.

Another way of expressing the Perfect Negative is by adding the inflected form of *sid-* 'to be not'.

In Central Dravidian languages also the structure of the past negative is Base + Negative (-e-) + past (-t-) + PNG.

Telugu, a member of South Dravidian II and a literary language has a past negative of the following structure VST + Neg + PNG followed by VST + 2 past tense + PNG.

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COMPOUND NOUNS IN TELUGU: A STRUCTURAL AND SEMANTIC ANALYSIS

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ABSTRACT: Noun compounding is one of the very productive word formation processes in Telugu. This paper examines Noun compounds in Telugu both from the structural and semantic points of view. Although, the non-head constituent in a compound does not exhibit any inflection, in Telugu a number of compound nouns have nouns marked for oblique case functioning as the non-head constituent. This paper focuses on the range of semantic relations possible between the nouns compounded. It is necessary to explore the structural and semantic relations of compounds in order to predict the extent of compositionality of a compound, since such a prediction plays an important role both from language acquisition point of view as well as from natural language processing point of view.

1. Introduction

The present paper investigates the structure and semantic composition of compound nouns in Telugu. Compound nouns refer to constructions wherein the non-head construction is a noun, an adjective or an adverb and the head is invariably a noun. The possibility of a either a postposition or a verb occurring as a constituent of compound nouns is ruled out by the word order of Telugu: Telugu being a verb-final language the possibility of forming verb+noun compounds is ruled out. Similar is the case with combining a post position with a noun in the pre-head position in Telugu. The following examples illustrate the combinatorial possibilities of compound nouns in Telugu:

N + N

mara maniSi	'robot'
machine man	
maTTi bomma	'clay doll'
clay doll	
gaDDi meeTu	'hay stack'
hay stack	

ADJ + N

maMci niiLLu 'drinking water '
good water
pacca boTTu 'tattoo mark'
green mark
paata kathu 'old story'
old story

ADV + N

kriiniiDa 'silhouette'
down shadow
paimaniSi 'an outside or an external member '
above man
looguTTu 'inner secrets'
inside secret

Out of the various types of compound nouns illustrated above, the present paper focuses on the compound nouns of N+N type. The roadmap of the paper is as follows: Section 1 gives a brief introduction to compound nouns, Section 2 discusses the morpho-phonological structure of Telugu compounds, Section 3 explores the semantic relations that hold between the constituents of a compound and investigates how such relations help in predicting the combinatorial possibilities between any two nouns to form a compound and Section 4 concludes the paper.

The fact that a large number of concepts can be conveniently and readily denoted by combination of nouns accounts for the high frequency of formation of compound nouns. Compounds are also highly productive because it is possible to combine any two nouns and produce a noun compound and native speakers will be able to analyze and comprehend compound nouns thus formed. Compounding is a handy word formation strategy to accommodate loan words into language, to express newer concepts in science and technology, in journalism and also used as effective advertisement strategy.

Moreover from a theoretical view point since none of the stems in a compound noun is argument-taking, there are fewer syntactic restrictions on their combination. This legitimizes the high frequency or productivity of compound nouns (cf. Lieber 1983).

In Telugu though there is no restriction on the number of constituents in a compound noun, the upper limit depends on the memory limitations of the native speakers. For example. in Telugu a compound noun like *upakaara veetanaala sangha adhyaksha padivi pooTii* 'election for the post of the president of scholarship committee' can further be extended.

Most of the earlier studies on compounds in Telugu strictly adhere to the Sanskrit grammatical tradition, and focus mainly on compound nouns comprising of two nouns. The word *samaasa* is used to refer to constructions involving two or more nominal stems or *praatipadika.* The earlier analyses were mainly based on semantics. Therefore, two major types of compound nouns in Telugu were identified viz. *bahuvriihi* or exocentric and *karmadhaaraya* or endocentric compounds. Other subtypes include *dvandva* or co-compounds, *dvigu* or numeral compound nouns (the first noun is an enumerator) etc. depending on the semantic relations between the nouns involved in compound construction. Suryanarayana's (1966) study of compounds in old Telugu (in the Mahaabhaarata of Tikkana) is one of the early works that can be cited.

1.1 The Internal Structure of N+N Compounds

In Telugu, nominal compounds may involve a simple or complex (derived) nominal or a compound noun either as the head or non-head .The simple noun when it occurs as the non-head constituent is realized either in the direct (identical in shape to nominative) or in the oblique form or sometimes it may be in the special form exhibiting morpho-phonological alternation . A complex (derived) noun as stated above can either be a head or non-head, and accordingly it is possible to have combinations:

1. N1(derived) + N2(derived) ,
2. N1(derived) + N2 (non-derived) ,
3. N1(non-derived) + N2(derived) and
4. N1 (non-derived) + N2 (non-derived).

Although all these combinations are attested in language, unlike English, no significance can be attached to the derived nouns and thereby the classification of the nominal compounds as in (a). (b), (c) and (d) is of little significance.

2. Morpho-phonological Alternations in Telugu compound nouns

Compound formation may also trigger certain morpho-phonological changes. In the case of *dvandva* or co-compound types one can observe two types of morpho-phonological processes:

Either the initial voiceless consonant of the second word is voiced or the final vowel of the first word is lengthened. In the latter case i.e. in the case of lengthening of the final vowel of the first word the initial consonant of second word is not voiced. Each precludes (bleeds) the other.

The following examples will drive home the point:

a. Voicing of initial consonant of the second word:

anna dammulu	'brothers (elder and younger)'
akka jelleLLu	'sisters (elder and younger)'
talli daMDrulu	'parents (mother and father)'

b. Lengthening of final vowel of the first word

akkaa celleLLu	'sisters (elder and younger)'
annaa tammuLLu	'brothers (elder and younger)'
pillaa paapalu	'children (old and young)'

The phenomenon of vowel lengthening is also observed in the case of compound nouns used as proper nouns as in case of following examples:

priyaa pacccaLLu	'priya pickles'
lakshmii jeneral sToors	'lakshmi general stores'
bhavaanii kaTpiises seMTar	'bhavani cut pieces center'
deevii pikcar peeles	'devi picture palace'
kriSNaa reDDi	'krishna reddy'
reeNukaa caudari	'renuka choudhary'
raMgaa raavu	'ranga rao'

The phenomenon of vowel lengthening in the case of final vowels of the non-head constituents is an instance of explicit compound formation phenomenon in Telugu .These proper nouns when used independently always exhibit a short vowel as in the following examples:

priya
lakshmi
reeNuka
kriSNa

Sometimes, when the two nouns are juxtaposed to each other, the final vowel of both the words may be lengthened as in the following examples:

attaa kooDaluu	'mother-in-law and daughter –in-law'
maMduu maakuu	'medicine and the like'
maamaa alluDuu	'father –in-law and son-in –law'
uuruu peeruu	'village and name'

The constructs cited above where in the initial vowels of both nouns are lengthened must be treated as phrases and not as compounds, because the phenomenon of vowel lengthening (clitic length) or cliticization is a mechanism of conjunction employed in Telugu.

2.1 Compound linking elements

It has been observed that in a great majority of compound nouns, the nouns which occur as non-head constituents are identical in form to the corresponding nominative singular form. However a small set of nouns, ending in sonorants *l,r,n,y,* and *M/mu* have oblique stems realized by the suffix allomorphs *-i,-Ti,-ti,-ni,* and *–pu*. It can also be observed that when the non-head constituent is a noun in plural it is always realized as ending in the oblique marker *–a*. The following examples illustrate this:

Nominative Sg.	Gloss	Oblique Sg.	Gloss	Oblique Pl.	Gloss
kaalu	'leg'	*kaali*	'of leg'	*kaaLLa*	'of legs'
nuyyi	'well'	*nuuti*	'of well'	*nuutula*	'of wells'
illu	'house'	*iMTi*	'of house'	*iLLa*	'of houses'
pannu	'teeth'	*paMTi*	'of house'	*paLLa*	'of tooth'
diipaM	'lamp'	*diipapu*	'of lamp'	*diipaala*	'of lamps'
nooru	'moth'	*nooTi*	'of moth'	*nooLLa*	'of mouths'

However, the oblique stem formation of singular nouns is ridden with numerous exceptions. Oblique stem formation in singular nouns should be treated as an exceptional behavior with a closed set of nouns. A larger number of nouns with identical phonological structure do not conform to similar oblique stem formation. It should be noted that the absence of overt oblique suffix in singular nouns is a norm and the occurrence of overt oblique suffix is an exception and this stem allomorphy needs to be specified in the lexicon in Modern Telugu. As the oblique stem formation is not phonologically predictable it follows that it is lexically conditioned.

This observation is based on the fact that there are three sets of compound nouns attested in the language. The following examples illustrate this:

Set A

$NC[[N_1]_{[\text{dir. sg.}]} + [N_2]]$		Gloss
1.	*uMgaraM veelu* ring finger	'finger for wearing ring'
2.	*ceyyi vaaTaM* hand dexterity	'dexterity of hand'
3.	*gandhaM cekka* sandal stick	'stick of sandalwood'
4.	*biyyaM bastaa* rice bag	'bag of rice'
5.	*neyyi siisaa* ghee bottle	'bottle of ghee'
6.	*nooru noppi* mouth pain	'pain in the mouth'

Set B

$NC[[N_1]_{[\text{obl. sg.}]} + [N_2]]$		Gloss
1.	*uMgarapu veelu* ring-obl.sg. finger	'finger for wearing ring'
2.	*ceeti vaaTaM* hand-obl.sg. dexterity	'dexterity of hand'
3.	*gandhapu cekka* sandal-obl.sg. stick	'stick of sandalwood'
4.	*biyyapu bastaa* rice-obl.sg. bag	'bag of rice'
5.	*neeti siisaa* ghee-obl.sg. bottle	'bottle of ghee'
6.	*nooTi noppi* mouth-obl.sg. pain	'pain in the mouth'

Set C

$NC[[N_1]_{[\text{obl. pl.}]} + [N_2]]$		Gloss
1.	*puula kuMDii* flower- obl. pl. pot	'flower pot'
2.	*gooLLa raMgu* nail- obl. pl. paint	'nail paint'
3.	*raaLLa nagalu* stone- obl. pl. jewellery	'jewellery made out of stone'

4.	*peela duvvena* lice- obl. pl. comb	'lice comb'
5.	*eDla baMDi* bullock- obl. pl. cart	'bullock cart'
6.	*ciimala baaru* ant- obl. pl. row	'row of ants'

It is to be pointed out that though the compound nouns in Set A have alternates in Set B, it is not always possible to find such alternates for majority of the nouns in Telugu. For instance consider the following:

Compound with N_1 in direct form and the gloss:

1. (a) *guuDu baMDi* 'nested cart'
2. (a) *gooru muddalu* 'balls of rice made on finger tips'
3. (a) **guuDu ciluka* 'bird of a nest'

Compound with N_1 in oblique form

1. (b) **guuTi baMDi*
2. (b) **gooTi muddalu*
3. (b) *guuTi ciluka*

The oblique marker that occurs in between the compound constituents seems to violate an important criterion of compounding viz. suppression of inflectional marking on the non head constituent.

However, the oblique stem which occurs before case markers and as non head constituent in compounds should be treated as derivational and not inflectional. In Modern Telugu the genitive marker *yokka* 'of' is either extremely rare or found only in certain registers. Some earlier studies have treated the oblique stem to be functioning as genitive. The oblique stem which occurs in compounds as well as before the inflectional markers should be considered as a special allomorph or an uninflected base which participates in compound formation.

Similar phenomenon can be observed in English compounds which show internal plural or genitive markers. Consider the following examples cited by Allen (1978) quoted in Scalise (1984:123): *swordsman, salesman, sportsman, craftsman, clansman and kinsman.*

Allen (1978) argues that the internal *s* within the compounds is neither a plural marker nor genitive marker but a "derivational linking element" which is attested only in compounds as in the examples cited above. Her argument is based on the evidence that compound like

craftsman does not contain the notion of plural because *craftsman* refers to one who practices a "single" craft only. The same is true in the case of *kinsman* in which internal *s* is attached to a word that does not have a plural form with marker.

Leiber (1981) cities the following examples form German which exhibit a similar phenomenon, where consonantal stem extensions *–s* and *-en* are found to be intervening the two nouns of a compound:

Arbeit-s-zeit	'worktime'
Stern-en-Schein	'Starshine'
Strauss-en-feder	'Ostrich feather'

Insertion of the Genitive Marker – *yokka*

The compoundedness of these [$N1_{[obl.sg.]}$ + [N2]] structures can be tested by trying to insert the genitive marker *yokka* 'of' between the two nouns, as in the following cases:

a)	[$N1_{[obl.sg.]}$ + [N2]]	Gloss
1.	*kaali veelu* foot obl. finger	'finger of foot'
2.	*ceeti vaaTaM* Hand obl. dexterity	'dexterity of hand'
3.	*varSapu cinuku* Rain obl. drop	'drop of rain'
b)	[$N1_{[obl.sg.]}$ - *yokka* + [N2]]	Gloss
1.	*kaali yokka veelu* foot obl. gen. finger	'finger of foot'
2.	*ceeti yokka vaaTaM* Hand obl. gen. dexterity	'dexterity of hand'
3.	*varSaM yokka cinuku* Rain obl. gen. drop	'drop of rain'

Constructs in which *yokka* is inserted should be treated as phrases rather than compounds. But semantically the constituents of the constructs express an adnominal relationship with a much wider range of semantics. However, a) type constructs which exhibit an intervening oblique marker, the range of semantics is very narrow. In each of these cases only a restricted sense is possible and hence the constructs are compounds.

In the following cases the insertion of the genitive marker *yokka*

is not possible and the semantic relation that can be seen between the two constituent is much narrower as in the following examples:

Compounds	Gloss	N_1-case-N_2
1. *paLLu poDi* tooth-obl. powder	'tooth powder'	N_1-koosaM-N_2 (purposive)
2. *goLLa raMgu* nails-obl. colour	'nail paint'	N_1-koosaM-N_2 (purposive)
3. *raaLLa nagalu* stones-obl. jewels	'stones jewelry'	N_1-too-N_2 (instrumental)
4. *eDla baMDi* bullock-obl. cart	'bullock cart'	N_1-too-N_2 (instrumental)
5. *guuTi ciluka* nest-obl. parrot	'parrot of the nest'	N_1-loo-N_2 (locative)

Compound nouns in which N1 is a container noun, as in *paala ginne* 'milk vessel', *neeti siisa* 'oil bottle' can have two interpretations: (a) it might mean *paala koosaM ginne* 'a vessel for keeping milk' and *neeti koosaM siisa* 'a bottle for keeping oil' and (b) it is *paalu unna ginne* 'vessel with milk' *neyyi unna siisa* 'bottle with oil', similar to those found in Hindi, *duudh kaa bartan* 'vessel for milk' vs. *duudh waalaa bartan* 'vessel with milk'.

3. Semantic Relations between Compound Constituents

In the foregone discussion we have investigated the morpho-phonological structure of compound nouns in Telugu and the consequences of this on the semantic interpretation. In this section we examine semantics of compound nouns from the point of view of how do native speakers interpret compound nouns? What are the various factors that determine the comprehension and production of compounds (in this particular instance compound nouns)? Is it possible to predict the semantics of compound nouns from that of the constituent nouns? How should compounds be represented in the lexicon: should each compound be listed individually or is it possible to formulate rules that account for their composition?

A number of earlier studies have focused on the compound semantics, which Séaghdha (2008 pp.15) summarizes under three broad classes: Inventory based theories, which posit a restricted set of general semantic relations; Pro-verb theories which provide only an underspecified

skeletal representation of a compound's meaning; finally, the Integrational theories which generate structural representations of compounds by combining aspects of the constituent nouns.

Though the inventory approach has been criticized on a number of grounds like the variety of compound relations is so great that listing them becomes impossible and also that these inventories do not capture the range of meanings possible in an adequate manner it appears to be a feasible option in order to account for semantic relations that hold between the constituents of compound.

3.1 Semantic relations as proposed by Bh. Krishnamurti (1972)

An attempt in this direction was made by Krishnamurti (1972) for Telugu. Krishnamurti identifies the importance of compounding as an effective word formation strategy in Telugu in relation to the occupational vocabulary of the weaving community. He proposes sixteen types of semantic relations operating between the constituents of compound nouns. Though the study is confined to the occupational vocabulary it proposes general guidelines for capturing the semantic relations of compounds in general. The semantic relations proposed by Krishnamurti (1972) are as follows:

	Compound	Gloss	Compound Relation
1.	*aDugu balla* bottom plank (X+Y)	' plank at the bottom'	'Y located in the direction of X'
2.	*kaaraM toTTi* red pepper basket	'Basket of red pepper'	'Y contains X'
3.	*inupa goTTaM* iron pipe (X+Y)	'Pipe made of iron'	'Y made of X'
4.	*guvvakannaMcu* Bird's eye boarder' (X+Y)	'Boarder like a bird's eye'	'Y marked X'
5.	*ciMta ceTTu* tamarind tree (X+Y)	'Tree of tamarind'	'Y belongs to X species'
6.	*cilaka pacca* parrot green (X+Y)	'Parrot Green'	'Y resembles X'

7.	*maggaM taaDu* spinning-mill rope (X+Y)	'Spinning rope'	'Y an integral part of X'
8.	*maggaM guMTa* spinning mill pit (X+Y)	'Pit where spinning mill is located'	' Y is the locus of X'
9.	*vari gaMji* rice starch (X+Y)	'Starch extracted from rice'	'Y extracted from X'
10.	*tokkuDu karra* pedalling stick (X+Y)	'stick for pedalling'	'Y is an instrument for the act X'
11.	*kaMDe nuulu* spindle thread (X+Y)	'thread wound on a spindle'	'Y on X'
12.	*gaLLa ciira* stripes saree (X+Y)	'Saree with stripes'	'Y identified because of X'(X=Y)
13.	*gadvaala ciira* Gadwal saree (X+Y)	'Saree of Gadwal'	'Y belongs to X' (X is famous for Y)
14.	*erra unni* red wool (X+Y)	'Red wool'	'Y qualified by X'
15.	*paDuguMbeekalu* warp and weave (X and Y)	'warp and weave'	'Y and X are members of coexistence'
16.	*veesaMgi unni* summer wool	'wool of summer'	'Y is a commodity available at X'

3.2 Semantic relations as proposed by Nastase and Szpakowicz (2003)

It is also worth considering the relational model proposed by Nastase and Szpakowicz (2003) in which they propose a large inventory of semantic classes. The relations proposed by them are grouped into five super categories viz. Causality, Temporality, Spatial, Participant, and Quality. The thirty relations used by Nastase and Szpakowicz (reproduced from Sèaghdha (2008)) are as follows:

Causality:		**Temporality:**	
Cause	flu virus	Frequency	daily exercise
Effect	exam anxiety	Time at	morning exercise
Purpose	concert hall	Time through	six-hour meeting
Detraction	headache pill		

Quality:		**Participant:**	
Container	film music	Agent	student protest
Content	apple cake	Beneficiary	student discount
Equative	player coach	Instrument	laser printer
Material	brick house	Object	metal separator
Measure	saturation point	Object Property	sunken ship
Topic	weather report	Part	printer tray
Type	oak tree	Possessor	group plan

Participant:		**Spatial:**	
Property	novelty item	Direction	exit route
Product	plum tree	Location	home town
Source	olive oil	Location	from country butter
Stative	cell division		
Whole	daisy chain		

3.3 Semantic relations developed by Girju et. al. (2005)

Yet another set of semantic relations developed by Girju et. al. (2005) explicitly state a set of 22 relations described by Girju (2006; 2007a, cf. Sèaghdha, 2008 pp23-24) are as follows:

Possession	family estate	Kinship	Sons of men
Property	pellet diameter	Agent	insect bites
Temporal	night club	Depiction	caressing gestures
Part-Whole	hawk wings	Hypernymy	coyote pup
Cause	fire shadows	Make/Produce	sunlight
Instrument	cooking plate	Location	staircase door
Purpose	identity card	Source	orange juice
Topic	war movie	Manner	performance with passion
Means	bus service	Experiencer	consumer confidence
Measure	fishing production	Type	member state
Theme	cab driver	Beneficiary	victim aid

On a careful observation of the three inventories listed above, one can notice a considerable amount of similarity in terms of the semantic relations

that the compound constituents enter into. For example, the *semantic relations 1, 2 and 3* of Krishnamurti (1972) fit into Nastase and Szpakowicz's (2003) relation types, viz. *Spatial:location; Quality:container; Quality:Material.* Similarly *semantic relations 9, 10 and 12* are the same as those of *Source, Instrument and property* of the semantic relations developed by Girju et. al. (2005).

4. Conclusions

Certain similarities in the semantic relations developed by the three different sources cited above is an indication of the presence of some evidence to reduce the semantic relations between the constituents of compounds to a finite set. Such an inventory should provide us clues to predict the compositionality of the noun + noun compounds which are freely and regularly formed in the language. Compounds whose semantics is predictable can be rule-generated and need not be stored in the lexicon, whereas the ones in which the semantics cannot be predicted (exocentric compounds) need to stored. It is also important to note that in Telugu the morpho–phonological structure of the compounds play an important role in the prediction of the semantics of compounds. These issues become pertinent for psycholinguistic studies and also for various NLP related tasks like machine translation, information extraction and retrieval, building online lexical resources like wordnet etc.

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NEWS OF THE DEPARTMENT 2009

Prof. A. Usha Rani took up the responsibilities of Head of the Department on May 20, 2009.

Dr. K. Ramesh Kumar assumed the responsibilities of the Chairperson, Board of Studies in Linguistics on May 20, 2009.

Mr. B. Vijayanarayana retired from University service in August 2009.

Academic Activities of the Faculty

Publications

Prof. D. Vasanta

1. 'Speech contrast discrimination in Telugu: Observations from normal hearing and hearing impaired children'. Proceedings of the National Symposium on Acoustics. Hyderabad: Acoustical Society of India.
2. 'Applied Linguistic Research and the role of the Lexical Corpora in Telugu'. *Indian Linguistics (Bh. Krishnamurti Festschrift volume)* 70: 1-4. pp. 441-451.
3. Translated into Telugu a children's story titled 'Ju's story' by Paul Zachariah. Chennai: Tulika Publications.
4. 'Speaking of Motion: On the Convergence of Language Typology, LexicalSemantics and Sociolinguistics'. *Osmania Papers in Linguistics*, Vol. 34, 11-26, 2008.

Prof. A. Usha Rani

'Character reference in a Narrative: An Observation'. *Osmania Papers in Linguistics*, Vol.34, 2008 .

Dr. K. Ramesh Kumar

Editor *Osmania Papers in Linguistics*, Vol.34, 2008.

Mr. B. Vijayanarayana

1. Co-edited (with P.C. Narasimha Reddy, G. Umamaheshwara Rao, and M.V. Ramanaiah) *Bhaasha: International Journal of Telugu Linguistics*, Vol. **3**:1, 2008.

2. 'Relative Constructions in Telugu'. *Osmania Papers in Linguistics*, Vol. **34**, 2008.

Papers presented by the Faculty

Seminars / Conferences / Workshops.

Prof. D. Vasanta

1. With Lakshmi Venkatesh 'Speech Contrast discrimination in Telugu: Observations from Normal Hearing and Hearing Impaired children' at the National Symposium on Acoustics, 26-29 November, 2009 at DRDO, Hyderabad.
2. 'Motion Verb Processing in Indian Languages: A Framework for research' at the 'International Seminar on Language & Cognition Interface' held at Centre for Behavioural & Cognitive Sciences, Allahabad, during December 6-9, 2009.

Research Project

Prof.D.Vasanta has been granted Rs.13 lakhs for a Collaborative Interdisciplinary Research Project to be carried out as part of the Cognitive Science Research Initiative during the XI Plan funded by the Department of Science and Technology.

This 3- year project which began in July 1, 2009 involving a faculty member from the Dept of Computer Science, University of Hyderabad and a Neurologist from Nizam's Institute for Medical Sciences (NIMS), will investigate brain mechanisms underlying multilingual individuals (normal and neurologically impaired adults) in Hyderabad.

Workshop organised by the Department

An Interdisciplinary Workshop on 'Translation: Perspectives from Computational Linguistics' on March 26, 2009.

Prof.Aditi Mukherjee has been felicitated at the beginning of the Workshop on the occasion of her retirement from the University services.

Research Degrees Awarded

Awarded Ph.D. degree to Ms. Haobam Basantarani for the dissertation 'Meiteilon-English Code Switching and Identity Issues among Meiteis in Delhi' Supervisor: Prof. Aditi Mukherjee.

ABSTRACT

The work presented here is based on extensive field work consisting of a pilot study and a final survey in Delhi, the field for the present study. The aim of the field work was to collect sufficient data, including recordings of speech data in the form of interviews and group conversations in formal as well as informal settings, in order to provide a wide empirical coverage to the findings. The data thus collected were supplemented by participant observation and a detailed questionnaire study. Working towards the goal of arriving at a better understanding of the phenomenon of code switching by qualitatively evaluating conversations, this work avoids excessive quantification as part of the analysis. However, quantification does figure in Chapter 3 which looks as the results obtained from the questionnaire study. This attempt of quantifying the results of the questionnaire study is put to use in deriving the social factors in code switching which constitute part of the analysis presented in chapter 5.

The approach taken for the analysis of the questionnaire responses (chapter 3) is mainly sociolinguistic and deals with issues of the attitude-behaviour relations and the projection of identity by the Mieteis in Delhi by looking at the manner of integration and motivation manifested mainly in their social and linguistic attitude towards various sociolinguistic stereotypes. The attitude-behaviour relations of the Meitei population in Delhi is further explored in detailing their attitude towards mixed code and reported patterns of code mixing behaviour and also their patterns of use of Meiteilon, English and Hindi in various domains. The findings resulting from the questionnaire responses are supplemented by the analysis of the code switching data found in the recorded speech.

As hinted above, the theoretical moves the dissertation makes are in the direction of a qualitative analysis of the Meiteilon-English corpus in terms of conversationalist and structural analyses. The conversationalist perspective is adopted in analaysing the Meiteilon-English code switching data by using the Conversation analysis approach initiated in Auer (1984) (chapter 5). This approach further attempts to show that code switching in conversation can be better explained through this approach by focusing on the internal structure of conversational organization by the participants rather than by looking at code switching as merely motivated by the social and symbolic values attached to the languages involved in code switching. In this attempt, through the CA approach, some of the

observations made in the questionnaire study are shown to be reflected and brought to play a role in the conversational organization by the participants.

The Meiteilon-English code switching data is dealt with from a structural perspective in two ways (Chapter 6). Firstly, the data is analysed in the light of the Matrix language Frame (MLF) Model of Syers-Scotten (2002). Secondly, the Meiteilon-English code switching data is subsequently explained by comparing the results obtained from the Conversation Analysis approach to the data in Chapter 5 and a theory-neutral structural analysis outside the framework of the MLF Model.

The findings of the dissertation can be presented as follows:

(i) The relation between attitude and behaviour need not be a proportional one. The questionnaire study shows a pattern of duality of what is ideal and pragmatic as can be deciphered from the social and linguistic attitude of the Meiteis towards various social and linguistic stereotypes as well as in the attitude towards mixed code and code mixing. This attitude-behaviour pattern of the Meiteis points to an accommodating and integrative but non assimilating attitude, with an instrumental motive, towards the host society.

(ii) Though English is rated highly positively by the Meiteis and considered the most important language in various domains, mainly in education and career, Meiteilon emerges as the preferred language of interaction among the Meiteis in Delhi. Use of English by Meiteis seems to be based on the relationship shared by the people in the given domains which are defined by the roles the interlocutors have in the social hierarchy based on power and on socially equal footing and characterized by a relationship solidarity.

(iii) Code switching can act as a conversation cue. It is motivated by the internal structure of the conversation and how the meaning of code switching is arrived at by a sequential analysis of the conversation. Frequent employment of juxtaposition of the two languages as a contrast bring about conversational goals by resorting to change of footing, reframing, emphasis and elaboration by repetition and quotation of reported speech. In this connection, it was also found that the direction of switch is irrelevant.

(iv) Conversation is not only an independent entity providing the contexts

that act as triggers for code switching. Through various conversational negotiations, various social motivations of code switching can be made relevant by the participants.

(v) While some linguistic structures in code switching can be explained within the framework of the MLF Model, certain structures are not accountable by this model from theory-neutral structural perspective. The phenomenon of code switching can be better understood if the results obtained from such an analysis supplement or add to the observations arrived at with the CA approach.

(vi) The CA perspective when supplemented with a structural analysis, affords us a much richer account of code switching than any single perspective can individually offer. Code switching data of a particular speech community is made more accountable by showing the connection between how a conversational context is shaped by its participants and the linguistic, grammatical structures the participants employ or call upon to achieve such conversational goals.

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