CHAPTER IV

SYLLABLES: SYLLABICATION IN GUJARATI

vyañjanānyuttarasyaiva

svarasyāntyam to pūrvabhāk

(RP.XVIII.33)

Syllables: Syllabication in Gujarati

4.0 Introduction

This chapter proposes to study some aspects of syllables. Syllables necessarily imply syllabicity and to study syllabicity sonorants should be understood. Sonorants are defined in two ways. Chomsky and Halle[1] say that "sonorants are sounds produced with a vocal tract cavity configuration in which spontaneous voicing is possible." Ladefoged[2] defines them as having an auditory property which arises from their having a comparatively large amount of acoustic energy within a clearly defined formant structure. He argues that Chomsky and Halle's definition does not require that a sonorant be voiced whereas his definition makes voicing a prerequisite for sonorants, since it is the only way to produce a comparatively high acoustic intensity within a well defined formant structure. Chomsky and Halle's system classify 'h' and '?' as glides but Ladefoged considers them as true consonants. One is a physiological definition and the other is an acoustic one. Hence Ladefoged prescribes obligatory voicing for sonorants but Chomsky and Halle have left it open for spontaneous voicing thus indicating that 'h' and '?' have potentiality of being included among sonorants. Gujarati 'h' is also an example of this potentiality. Sonority acts like a stumbling block. The sonority element (alongwith the variations of tone, pitch, stress, duration etc.) and the aspiration-mahāprāṇattva - (alongwith its capacity to vary between the segmental/non-segmental status) are difficult to define. These

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1. Chomsky and Halle, 1968, p. 302.

2. Ladefoged, 1971, p. 58.

elements have tremendous potentialities of creating non-discreteness amongst the segmental units. These potentialities mean 'spilling over' and 'assimilating in' of the properties which are the cause of smooth flowing speech. The dynamicity and rhythmicity of this flow have made linguists realize that phonological studies can no more be represented merely in the form of discrete phonemes. As Kim[3] remarks the monograph of Kozhevnikov and Chistovich freed linguists from the 'spell of phoneme.' Ancient Indian phoneticians give us the evidence that they understood this dynamicity very well. According to them speech was the result of two mechanisms. These mechanisms (see fig. 1 chapter I), if viewed properly can help to explain many of the vague notions of phonology. The sounds made by external processes can easily turn into non-segmental flow of sounds. This property of sounds is responsible for the rhythmic structure and for the prosodicity of human speech.

Phonological descriptions having feature based phonemic approach have badly neglected this aspect of language. The rhythmicity and the prosodicity of speech depend on the basic unit of speech i.e. syllables.

4.1. 'Syllables' in ancient Indian treatises

Mahulkar has rightly pointed out that our ancient scholars tried to "explore far below the linear organization" of speech segments. The motor correlates of the neurological activity of speech and the respiratory and physiological mechanism jointly proceed producing the rhythmic units. These units - syllables - involve three processes:

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3. Kim, (Ed. Dingwall) 1978, p. 169-170.

(1) "the respiratory mechanism: prosodic processes (stress, tone, etc.)

(2) the phonatory mechanism: phonatory processes (voicing, aspiration)

(3) the articulatory mechanism: articulatory processes (labial, dental etc.)

These processes are associated with the elements of speech such as:

syllable	Articulatory processes	: articules	- C
	Phonatory processes	: sonants	- V
	Prosodic processes	: tonals	- P." [4]

All treatises have been clear about the importance of 'vowel' in the syllables. RP says that a vowel whether 'pure', combined with consonants or with anusvāra is a syllable.[5] The commentator uvata clarifies this by saying that vowel combined with consonant as well as with anusvāra or with only consonant or with only anusvāra is a syllable.[6] He asserts that every vowel is called a syllable.[7] Allen has registered that the phonological interdependence between syllable and vowel shown in our treatises is so close that very often the term aksara means vowel.[8] RP refers to the 'belongingness' of 'svara' to syllables.[9] All the treatises

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4. Mahulkar, 1981, p. 83-84.

5. RP, XVIII, 32. vyañjanena yukto'nusvārena sahitah athavānusvārena rahito vyañjanena rahitah svaro'ksarasamjño bhavati. (Commentary)

6. savyañjanah sānusvārah suddho vāpi svaro'ksaram. (See the commentory of RP, I, 19).

7. RP, I, 19. svaramātrasya akṣra samjñā vidhīyate.

8. Allen, 1953, p. 80.

9. RP, III, 2. aksarāsrayāh.

consider vowel as the nucleus of syllable. Uvata 'once again', is explicit in noting the relationship of vowel with syllable.[10] How consonants are attached to this 'nucleus' of syllable was studied by these scholars. In defining syllabication they were preparing a framework for correct pronunciation. They had realized that the consonantal frame and the duration of vowel could be responsible for the light and heavy syllables. Heaviness and lightness of syllables were the features of prosody relevant to the understanding of the general syllabication. Any vowel (syllable) which is short makes a light syllable but when it is followed by consonant conjunct or anusvāra it can be heavy. Any vowel which is long obviously makes syllable heavy and heavier still when conjoined with consonants.[11] Prātiśākhyas have noted that consonants get attached to vowels. The notion of consonants 'getting attached' is very crucial in understanding 'syllable'. The 'temporal aspect' of syllable together with the 'accomodative function' (accomodating consonants) of syllable performs the 'dual programming' determining,

(1) the span of the temporal stride to be taken in articulation and,

(2) the bunch of articules which have to be grasped together in this stride.[12]

In this concept of syllable consonants have a secondary

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10. RP, III, 2. svarānāmakṣaraiḥ saha dharma-dharmi sambandho na tu vyañjanaiḥ. (commentary)

11. TP, XXII, 14. yadvyañjanāntam yadu cāpi dīrgham saṃyogapūrvam ca tathā'nunāsikam; etāni sarvāni gurūni vidyāt śeṣānyato'nyāni tato laghūni.

12. Mahulkar, 1980, p. 82.

position. RP says that (a) the consonant is attached to the following vowel but the final consonant is attached to the preceding vowel[13] (b) nasality goes with the preceding vowel[14] (c) the first of the consonant conjunct is optionally attached to the preceding vowel.[15,16] Ancient scholars were not merely describing the linear relation between consonants and vowels but they were emphasizing the very significant role of vocalic nucleus by saying 'pūrvamaksaram bhajet'. They wanted to establish that the nucleus of the rhythmic unit of speech while taking a temporal stride in the ongoing flow of speech carries along the consonants with it, i.e. it accomodates the consonants within its realm. As a result, instead of linear relationship 'CV' it gives a dependency relationship such as $\overset{V}{|}_{C}$. Having established the unit syllable, they try to give rules for syllabication. Their syllabic view implies a kind of potential 'junction' in the sequential flow of speech. (sequence is the inevitable aspect of temporality). The 'junction' is the result of natural articulatory process. They noted that in a sequence of mutes (contact consonants) or a mute followed by

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13,14,15. RP, XVIII, 33. vyañjanānyuttarasyaiva svarasyāntyam tu pūrvabhāk.

16. All the treatises have more or less similar views regarding the syllable boundaries. (AP, I. 55-57, TP, XXI, 2-4).

antastha there is abinidhāna.[17] Abhinidhāna means holding apart of a consonant; the consonant that suffers abhinidhāna is suppressed and weak. This abinidhāna phenomenon is, in a subtle manner, an indication of the possible syllable break. The consonants which are simply the 'adjuncts' to the vowels prepare the frame within which the respective vowels dominate. This frame is highly patterned for each language. Abhinidhāna hints at one important fact that the consonants can be divided into their stages of production, by attaching the consonant to the preceding as well as the following vowel. However, there is no agreement regarding abhinidhāna amongst all the scholars. But such disagreement does not create any confusion. Abhinidhāna might have been the result of dialectal speech habit and it was observed regularly in the case of geminated consonants. The scholars were trying to catch the correct phonetic phenomenon and at the same time trying to give rules for syllabication. While doing so they realized that plosives when they are conjunct with other consonants appear to be doubled. These geminated consonants were divided in such a way that the first (on-glide) part of the plosive got attached to the preceding syllable and the next (off-glide) part got

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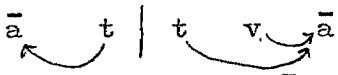
17. RP, VI, 17. abhinidhānam krtasamhitānām sparsāntasthānāmapavādya repham: samdhāranam, samvaranam, srutesca sparsodayānām.

AP, I, 43. vyañjanavidhāranamabhinidhānah pīditah sannataro hīnasvāsanādah.

attached to the following syllable, e.g. in



the first 't' belongs to the first 'ā' and the second 't' belongs to the second 'ā'. The double consonants or twins have been noted by most of the scholars.[18] The doubling was also represented in the orthography at the time of prātiśākhyas, e.g. 'apa' came to be represented as 'appa'. This device might have been used for the sake of syllabication. Hence according to Varma the general rule about single intervocalic consonant getting attached to the following vowel was not so simple.[19] It is quite possible that the doubling rule where the consonant gets attached on both the sides was formed to describe the dialectal variants. This rule implies some of the phonological possibilities:

(i) the intervocalic voiced consonant when attached to the preceding as well as the following vowels can result into a 'sonority spread'.

(ii) doubling evidences the dependency relation between the elements constituting the units of phonological space.

(iii) 'sonority spread' also suggests the possibility of non-segmentality of vocalic element.

(iv) such rule hints at the prosodic level of the language concerned.

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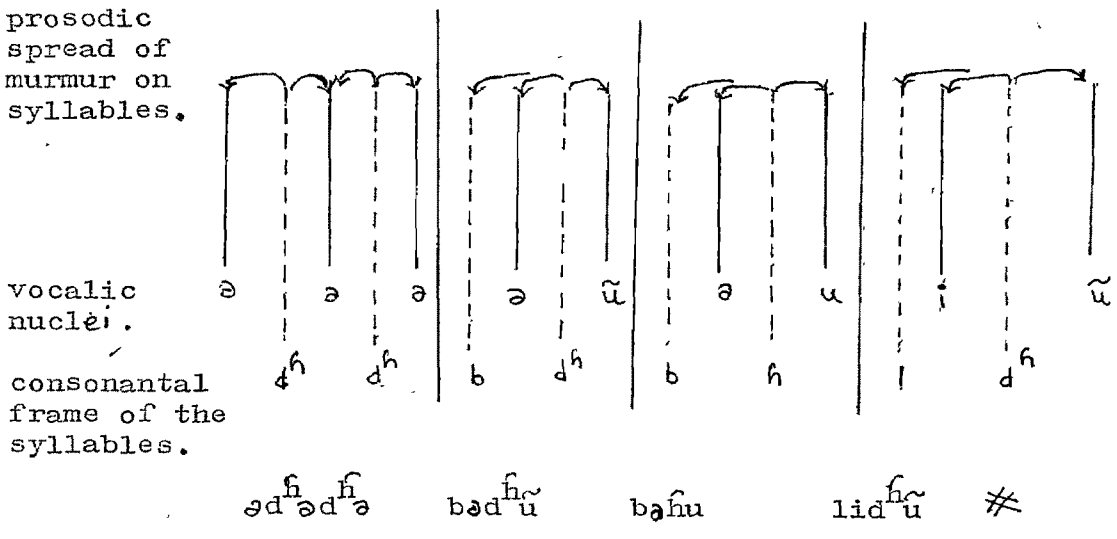
18. AP, 1. 99. samānapade'nuttamātspārśāduttame yamairyathāsamkhyam.
111, 26, padānte vyañjanam dvih.

19. Varma, 1961, p. 61.

These implications can be shown as manifested in Gujarati as given below:



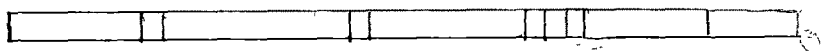
Prātiśākhyas indirectly help to see how the discrete segments when concatenated / attached to the vowels can result into a beautiful sonic extension. It is like unfolding of the potential sonority in the appropriate frame of speech.

4.1.1. Discrete segments and continuum of speech

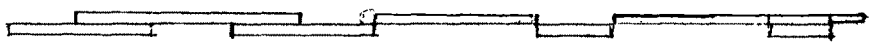
Prātiśākhyas have shown how segments are chained into sequences. Modern researchers also have proved that the notion of 'discreteness' no longer can be accepted fully. Coarticulatory effects are expected on sequential stretches. The fusion and merging of segmental sounds are often restrained by language specific syllable frame. Fant has given different models indicating various ways of looking at speech chain:

(a) speech can be a sequence of phonemes which are ideally like discrete non-overlapping units:

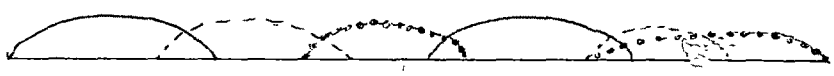
(b) or speech is a sequence of minimal sound segments, the boundaries of which are defined by relative distinct changes in the speech wave structure:



(c) or speech may be taken as having one or more of the sound features characterizing a sound segment and this feature may extend over several segments:



(d) or speech may be viewed as showing a continuously varying importance function for each phoneme describing the extent of its dependency of particular events within the speech wave, where overlapping curves are without sharp boundaries:



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Fant does not feel that these views are contradictory. He sees the link between these views because the sound segments of a sequence can be decomposed into a number of simultaneously present sound features. Simultaneity of features is undeniable. Fant combines the discreteness view with the continuum view. Boundaries between sound segments are due to the beginning or end of <u>atleast one</u> of the sound features. But one and the same sound feature may extend over several successive sound segments. The possibility that several adjacent sounds of connected speech

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20. Fant [illegible] 1962, p. 8-[illegible].

may convey information on one and the same phoneme has already been shown in the chapter on murmur. Segment boundaries need not be parallel to phoneme boundaries. Segments are accepted theoretically because without knowing them we cannot know what the continuum is made of, or what is it that 'continues'. Similarly 'continuity' concept is not just a fancy but it also refers to the inevitably natural fluidity of human speech.

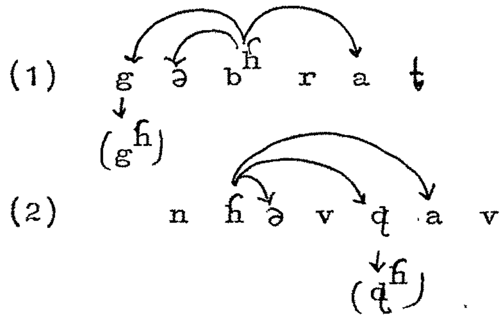
The discreteness may disappear as the discrete elements themselves have enormous capacities of creating togetherness. These potentialities are very well manifested by Gujarati murmur. The laryngeal adjustments required for murmur prove that the phonological explanation cannot be confined to discrete segments alone. No Gujarati dialect can ever be described by neglecting this laryngeal dimension.

Murmur, lowering of the mid-vowels and nasalization are in the right sense either 'spilling over' or 'assimilating in' phenomena which involve atleast complete syllable as a domain, e.g.

I. Murmur can involve more than a syllable:

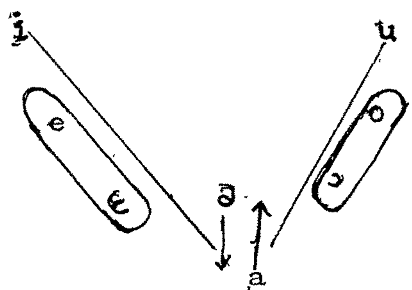
monosyllable		disyllable		polysyllable	
d̤ar	'guess'	ə d̤ar	'support'	sad̤arəɳ	'ordinary'

This phonation feature deposes a 'segmental phoneme unit' and disposes a strictly linear view of phonology. Murmur often lingers over the whole stretch of sequence and even turns a voiced stop into a voiced aspirated stop, e.g.

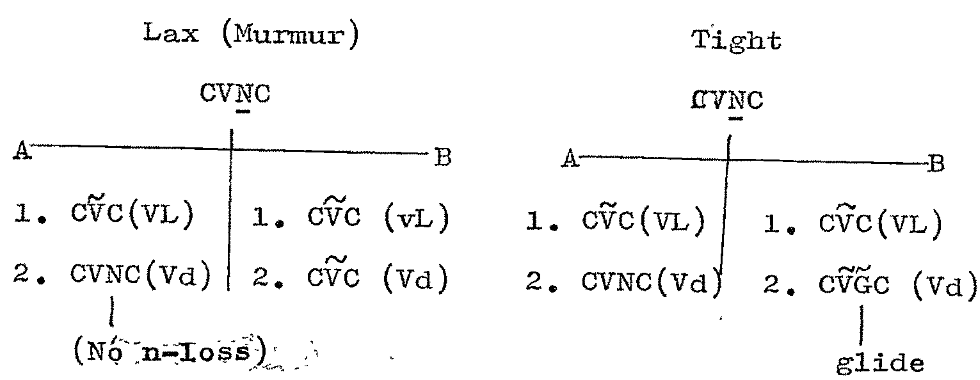


This shows that in an appropriate syllabic frame the 'murmur' overtakes every suitable segment under its sweep.

II. It has been shown that the lower variants of mid-vowels are the result of their contextual consonants within the respective syllables. Segmental inventory will extend eight vowels without explaining the relationship between e -ɛ, o -ɔ, ə- a such as,



III. The nasalization after N-loss is obviously tautosyllabic in Gujarati. It has been sufficiently discussed that the process of nasality-spread has changed into a 'rule' regarding N-loss nasalization before voiceless consonants. The nasality-spread process is in progress dialectally before voiced consonants. In all the dialects a 'Nasal' has to be posited in the underlying representation, such as,



This shows the need for a level between the surface level segments and the underlying sequences. The phonetic representation is the result of the phonological process which has acted upon the underlying sequence syllabically. Hence, a clearer picture of the syllables of the language is called for.

4.2. Syllable in modern researches

Till now syllable played a very insignificant role in linguistics and at best only attracted a passing attention. In the western ancient grammars the Greeks used a word syllabē meaning 'taking together' and the Romans used the terms 'littera vocalis' - 'the voiced letter' (vowel) and 'littera consonans' - 'the letter that sounds with'(consonant).

But in general one can say that 'syllable' is yet ill-defined and remains a vague topic. Having a 'troubled history'[21] it has had a place of a 'step child of phonology'.[22] In recent years there have been some serious attempts made to organize segments and syllables[23]. From among the earlier attempts in studying syllable, Stateson's should be noted first. He identified syllables on the basis of chest pulse and muscular tension.[24] But there are so many speech muscles and such complex interactions that it would be surprising to find a single muscle responsible for syllabication.[25] So also

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21. Bell and Hooper, 1978, p. 4.

22. Pike, 1967.

23. Bell and Hooper, 1978.

24. Stateson, 1945.

25. Fry, 1964.

Ladefoged feels that there is no one-one correspondence between chest pulses and syllables.[26]

Acoustics defines syllable in terms of sonority. The syllable is marked by rise and fall in the intensity of a column of air released through the vocal mechanism. The syllable centre has the greatest acoustic intensity or sonority. Through his experiments Malmberg demonstrated that there is actually a physical acoustic basis for syllable division and speakers organize a complex series of these muscular events into a syllable sized utterance.[27] This was the first acoustic evidence for syllable boundary.

Kim espouses a neurophysiological approach to syllable.[28] She agrees with Kozhevnikov and Chistovich's opinion that brain sends out a complex message package to the motor centres to produce a syllable sized unit. According to them the neural command for serially ordered segments is a sort of reflex mechanism connecting several movements in such a way that stimulation for the following movement is sublimal, which rises above the threshold value to cause an external effect when given an additional push created by the impulsation occuring upon the articulation of preceding segment. Most of the phoneticians have agreed upon the syllable as a motor-neural unit, i.e. it is planned at the motor level and is produced in an 'all-or-none' fashion.

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26. Ladefoged, 1967.

27. Mālmberg, 1955.

28. Kim (Ed. Dingwall), 1978, p. 174.

Unfortunately Sapir's concept of phoneme as a psychological reality was misinterpreted after the linguists had rigidly insisted on transcribing phonemes by symbols. This insistence changed phonemes into visible forms. When linguists chose this way of doing their phonology they did not realize that "in avoiding one variety of orthography they were going to fall into traps of another... the so called phonemic transcription."[29] Hoard accuses the phonemic transcriptions of Northwest Indian languages for masking the important phonetic properties especially the syllabication.[30]

With modern phonetic studies it became evident that the unit of articulatory programming is larger in size than the segment and many proposals have confirmed the relevance of larger-than-segment units (i.e. non-syntactio-morphological units) like syllable.[31] This unit with syllable-length is found responsible for rhythm in speech. Kim considers this rhythm a biological factor and asserts that the unit of such rhythm is syllable and not a segment.[32] In this sense all speech is syllabic. Speech synthesis experiments showed that "phoneme sized segments are not appropriate as concatenative units for describing speech phenomena -- syllables are intuitively good."[33]

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29. Mahulkar, 1981, p. 62.

30. Hoard (Eds. Bell and Hooper) 1978, p. 71.

31. Anderson and Jones, 1977, p. 71.

32. Kim (Ed. Dingwall) 1978, p. 176.

33. Fujimura and Loving (Eds. Bell & Hooper) 1978, p. 107.

Fromkin[34] shows that speakers when they blunder they do so by exchanging syllables for syllables, consonants for consonants, vowels for vowels but they never metathesize across the syllables. Stutterers stutter and babblers babble in terms of syllables.[35] Studying the cases of aphasia Blumstein found that segment was only 'a quasi-independent unit' as all types of phonological errors were analyzed to be sensitive to larger units.[36] Lehiste has established the syllable as a structural unit of Estonian language by presenting proof from morphophonemics, quality system and metric structure of folk songs.[37] An examination of the studies on phonological development reveals that the notion of syllable is central to understanding young children's phonological pattern; children acquire entire syllables and not only the segments.[38] In a pilot study on infixation McCawley showed that syllable boundaries and syllable organization are highly relevant in deciding where the infix can be inserted.[39]

The purpose of extending the results of various studies is to show that linguists have started realizing the need for syllable sized unit. It is certain that there are properties of speech events that cannot be described satisfactorily in terms of segments.

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34. Fromkin, 1971,
35. Taylor, 1966,
36. Blumstein (Eds. Bell & Hooper) 1978, p. 199.
37. Lehiste (Eds. Bell & Hooper) 1978.
38. Ingram (Eds. Bell & Hooper) 1978, p. 143.
39. McCawley (Eds. Bell & Hooper) 1978,

There are three views regarding segmental organization. One view assumes that given the sequences of segments there is a procedure for deciding syllable boundaries. The other view considers syllable as an independent construct, though syllable is defined in terms of segments. The third view hypothesizes that there are bonds among segments. These bonds constitute the organization of segments: segments with common bond belong to same syllable but consecutive unbonded segments lie across a syllable boundary.

These three streams in phonological theory on the one hand, and the precise phonetic evidences on the other, have directly or indirectly agreed upon non-segmentality of speech events. Studdert-Kennedy describes the speech event like this: "rapid consonantal gestures cannot carry the melody and dynamics of the voice. The segmental and suprasegmental loads are therefore divided over consonant and vowel - the first with its poor auditory store, taking the bulk of segmental load, and the second taking the suprasegmental load. There emerges the syllable, a symbiosis of consonant and vowel."[40]

There have been some attempts in studying syllable which are contrary to all these results. Gay proposes segment as a phonological unit. He gives evidence from electromyographic and cinefluorographic experiments for this and shows that there are no such anticipatory coarticulations in CVCV sequences which can support CV syllable as the basic unit. He speculates that motor input to speech mechanism might be operating by simple

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40. Studdert-Kennedy, 1975, p. 119-120.

rules on phoneme-sized units.[41] This could be a good speculation. However, against this there can be a stronger speculation, viz: can there be a gap between the motor input and physiological input? What human laryngeal mechanism along with air-stream mechanism can produce to be heard is a syllable. The inevitable adjustment required in production of sonorant-nonsonorant sequences will at least need larger than a segment-sized unit. At this point one is not ready to accept that there is no correlation between the production as a process and the product as the result. Another opposition to syllable has come from Kohler. He judges syllable to be unnecessary because it is harmful to phonological understanding. His claim can be proved to be invalid since it is based on an assumption that phonology and morphology are normally completely isomorphic.[42]

4.2.1. Segments versus syllables

What should be the domain of phonological unit? One reason for asking such a question is that 'segment' certainly is not an adequate domain for the phonological explanation of many issues in Gujarati. The second reason is that phonetically as well as perceptually a syllable appears to be phonologically relevant. In general the controversy should not be between segments and syllables, but if at all, it may be in regards to coordination between segmental and non-segmental or asegmental approach. 'Segment' is an inhibitive, limitative element and being so it is insufficient in accomodating asegmental aspects of language.

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41. Gay (Eds. Bell & Hooper) 1978.

42. Kohler, 1966.

for Gujarati provides evidence that syllable is the smallest domain to hold the prosody of murmur which results from lax phonation, i.e. it is a lenis prosody[43] of svāsa (breath) and nāda (voice).

4.2.2. Syllabication

Many languages have issues such as Gujarati, where it becomes imperative to think in terms of the unit which is larger than a segment. This has made linguists look for a method of syllabication. Languages constrain their syllabic structure and base their constraints on natural phonological contrast between consonant and vowel. Syllabic division becomes essential to get the clear idea of coherence in speech. Syllabic division is the essence of speech utterance. However, according to Jakobson there is an appropriate syllable peak and syllable slope but not a distinct syllable boundary. This observation is due to the fact that elements of syllable are linked in different ways in different languages. The formation of the 'nucleus' of the syllable seems to be the same in all languages but the cover of the nucleus differs, i.e. the elements of the syllable can have adhesion to the respective syllabic nuclei in different ways. The looseness or closeness with which the initial or final consonants of the syllable are linked can be language specific, e.g.,

	Marathi		Gujarati
singular	[maɳūs]	'man'	[maɳəs]
plural	[maɳsə]		[maɳəso]

43. The term 'lenis' (as against 'tight') is devised here to indicate the distinction between the murmur and the 'tight' phonations.

Syllabication then varies from language to language and it cannot be an absolute matter. Syllabication of a language depends on what phonetic difficulties the language speakers have overcome.[44] These phonetic difficulties and peculiarly specific methods adopted by the language speakers to overcome them are crucial in understanding the phonology of the language. A speech community spaces the sound sequences in a manner which is most appropriate for the entire phonological structure. This spacing is what is meant by syllabication.

Jakobson feels that the connection between two phonemes depends on their degree of sonority. If the first member is less sonorous the connection is closer, if the first member is more sonorous the connection is looser. When a more sonorous phoneme is in a less sonorant environment, its sonority is substantially reduced so that the unity of the syllable is preserved, i.e. even if there is no clear cut boundary of syllable there is a potential recognition of syllable division. Syllabication does not necessarily mean slicing of the speech event. In fact the motive with which we move from 'segment to syllable' is to understand the continuum.

It has been asked if the units at linguistic level are segments and if syllables are the units only at physiological level.[45] This brings up the question of syllable at two

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44. Donegan and Stampe (Eds. Bell and Hooper) 1978.

45. Tatham, 1971,. p. 16-17. CPS/CPS)

levels: phonological (deep-linguistic) and phonetic (suface-physiological). The question is justified to some extent as there is no complete isomorphism between phonetic and phonological level.

Opinions of some linguists call for a little digression. Some linguists have considered 'syllable' as a necessity in linguistic methodology. Hooper uses 'syllable' because it allows to express generalizations about phonology.[46] Such motivated status of syllable is not acceptable. Whatever we construct as a part of phonology is based on phonetic facts. There is certainly a strong equivalence between pre-speaking/pre-production conception and post-hearing perception. The gap between the reality and perception is not as big as to hide the bond between them. Hooper is more careful in her later work and admits that syllable is not entirely divorced from physical reality.[47] The attitude of the linguists who consider syllable only out of usefulness criterion for expressing generalizations is not acceptable. Syllable is not merely a methodological device. Any theoretical construct capturing phonological generalizations must have the sound phonetic basis. The view that a phonological unit need not have physical reality should be weighed critically. Foley considers the use of manifest elements as a 'reductionist fallacy'. This accusation has been answered well by the natural phonologists.[48] They maintain that

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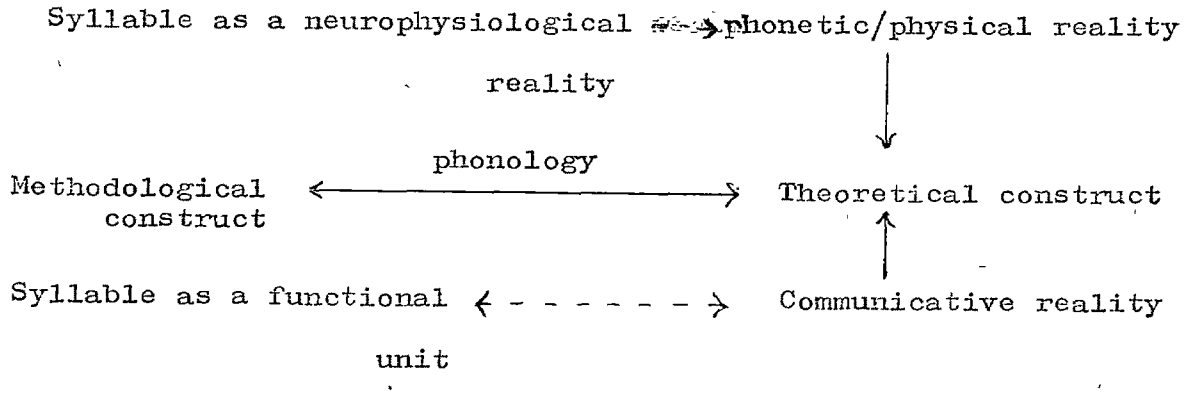
46. Hooper, 1972.

47. Hooper, 1976.

48. Donegan, 1978, p. 25.

if one wishes to explain the behaviour of sounds one must look for an intensional rather than extensional definition and look for physical properties. There are other phonologists who are careful in recognizing the phonological function of syllable distinct from its phonetic character. They have not 'used' syllable out of methodological need. Kramsky feels that it is necessary to reach "agreement on the phonetic explanation of the syllable and to decide which of the phonetic explanations is the most adequate for the functional appreciation of syllable".[49] It has been noted that in the communicative function of sounds in language, syllable plays an important role. Syllable has a function in relation to meaning of the word unit.

It is proposed here that syllable can be better explained if its physical, functional and theoretical positions are understood as given below:



It is assumed that because syllable has physical and communicative reality, a theoretical construct has to be created. In otherwords any methodological construct can have justification only when it is relevant to the realities. The functions of

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49. Kramsky, 1971, p. 46.

syllable can be summed up as:

1. Syllables explain the phonotactics of the language - the constraints on the sequences of segments.
2. They explain the natural phonological processes in language.
3. They serve as the carriers/domains of prosodic qualities.
4. They serve as the rhythmic units in speech.

Phonologists have proposed different ways of syllabication. In 1947 Kuryłowicz[50] gave a method for marking syllable boundaries. Word initial and word final clusters have definite relation with word medial consonant sequences. Word medial cluster can be divided into two parts such as word final cluster + word initial cluster. His principle of syllabication includes all admissible combinations - existing as well as those which do not exist - but yet do not violate the phonological patterns of the language. Arnold proposes a statistical method based on distributional criteria.[51] He calculates the frequency of occurrence of various sequences. This method fails when there is more than one way to divide the medial sequence. Pulgram's proposal is similar to Kuryłowicz.[52] Word initial and word medial syllable-initial patterns are compared and used as a basis for syllabication. He gives five rules for syllabication. These rules predict syllables by proposing maximum open syllabicity, maximal coda and onset and the principle of irregular coda. But they are not able to account for interludes, i.e.

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50. Kuryłowicz, 1948.

51. Arnold, 1965.

52. Pulgram, 1965,&1970.

consonants that are actually spread over two adjacent syllables. Hooper[53] follows Vennemann's[54] proposal and states syllabication in terms of consonantal strength. She gives universal strength hierarchy of consonants.

glides	liquids	nasals	Vd continuants	VL continuants	Vd stop	VL stop
1	2	3	4	5	6	7

She gives universal syllable structure condition (SSC).

Positive condition: $\# \; C_m \; C_n \; C_p \; C_q \; V \; C_r \; C_s \; C_t \; \#$ ($C_p C_q$)

where $m > n > p > q$

$r > s > t$

$m \neq \phi$

The strength scale values of consonants reduce in descending order from syllable initial position inward towards the nucleus. It follows the same order from syllable final position towards nucleus. Her optimal syllable principle claims to account for consonant strengthening syllable-initially and weakening syllable-finally. It is clear that Hooper's proposal does not take into account 'interludes' and accent.

All these attempts of syllabication have some common principles showing phonotactic constraints expressing relationship between word-initial position and word-medial syllable-initial position. They all place a syllable boundary to the left of maximum initial cluster and associate any remaining consonant with the preceding syllable.

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53. Hooper, 1976.

54. Vennemann, 1972.

Anderson and Jones[55] extend three theses in their proposal for syllabication. In their first thesis they argue that phonological representations are highly structured. One aspect of this structure is bracketing into syllables (possibly overlapping). This aspect is relevant to stress rules, redundancy constraints and to word level phonology. In their second thesis they give the characterization of syllable which according to them is a simple structured string. This characterization is based upon the methods shown by dependency grammar. Here the syllable has a syllabic centre to which other elements are subordinate. Syllable enters a higher level construction in which one syllable centre holds dependency relation with the other syllable centre. Bidependent elements are permitted. In a syllable the elements can have different types of dependency relations, e.g. either the element is subjoined to the other element or it is adjoined to the other element. In their third thesis they argue that phonological model should be 'more structured'. The structure that they have added is concerned with two phonological primes.

(1) Phonological segments are non-linearly as well as linearly ordered in relation to each other and they enter into dependency ($\rightrightarrows$) and precedence ($\leq$) relations. (2) Phonological segments can be complex, i.e. they may incorporate sub-trees containing more than a single node.

In short Anderson and Jones assume that syllable shape is a function of morpheme structure constraints in a given language.

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55. Anderson and Jones, 1974.

They have two principles of syllabication: (a) Insert left and right syllable brackets at the left and right extremes of any lexical item. (b) when lexical item contains more than one syllabic segment divide each medial (i.e. inter-syllabic) sequence of interlude as if it were simultaneously the coda of the preceding syllabic and the onset of the following.

They propose rules for syllable boundary placement (SBP).[56] These rules push out forwards and backwards the syllable boundaries associated with each syllabic as far as is compatible with constraints on well-formed syllables. They will, in most instances, result in overlapping bracketings. They prefer overlap in the interludes, proper bracketing being highly marked. This has been opposed as there can be cases where the medial sequence if broken may either give incorrect syllabication[57] or may give incompatible consonant sequence. Barri feels that the word <u>caro</u> 'dear' in Italian should not have overlapping 'r' because the first syllable must remain open to permit vowel lengthening. But theoretically interlude has to be accepted. A language specific condition to block this rule may be added when required. Anderson and Jones have noted the incompatible clusters created due to the interludes, e.g.

$$\underset{1}{[}\text{pen}\ \underset{2}{[}\text{t}\ \underset{1}{]}\ \text{a}\ \underset{3}{[}\theta\ \underset{2}{]}\ \text{lon}\ \underset{3}{]}$$

They suggest two answers to this:

(1) In cases where their SBP rule does not allow sequences

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56. Anderson and Jones, 1977, p. 107.

57. Barri, 1977, p. 27.

such as 'rld' (world), they feel that such sequence may derive from an underlying sequence containing a vowel as is superficially the case in some Scotish dialects or in morphologically complex sequences as 'curled'. This proves that at times phonetic possibilities are more extensive than the phonemic ones. (2) They have shown that the stress placement will require that the cluster terminating the second syllable be strong in 'pentathlon'. Moreover 'θl' being an impossible initial sequence syllable structure constraint will block the bracketing 'θl'. The rejected 'θ' will get harmonized by contracting the third syllable, thus pushing the bracket after 'θ'. They also feel that epenthesis and deletion of segments in the course of the phonological rules will often require the revision of syllable bracketing. This leaves their proposal more of an 'open-ended' nature.

In short they have shown that prohibited sequences can throw light on syllable structure rules. These rules help in deciding phonemic clusters of the language. And there would be no discrepancy between phonemic and phonetic syllabication if overlapping is accepted.

Kahn assumes that although segments and syllables are closely related, syllable boundaries do not necessarily match segment boundaries.[58] His approach is within the tenet of 'autosegmental' phonology.[59] He proposes two levels of phonology: segmental and syllabic. These levels are related

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58. Kahn, 1976.

59. John Goldsmith is the chief proponent of 'Autosegmental phonology'.

to each other by a series of mapping conventions. These conventions are syllable-structure assignment rules. The rules are:

I. with each [+ syll] segment of the input string associate one syllable(s).

IIa. $c_1 \cdots c_n \quad V \;(s) \Longrightarrow c_1 \cdots c_i + c_{i+1} \cdots c_n \quad V$ (V and $c_{i+1} \cdots c_n$ associated to s)

$c_{i+1} \cdots c_n$ is a permissible cluster

b. $V \cdots c_n \;(s) \Longrightarrow V \quad c_1 \cdots c_j \quad c_{j+1} \cdots c_n$ (V and $c_1 \cdots c_j$ associated to s)

$c_i \cdots c_j$ is a permissible cluster but

$c_1 \cdots c_j \quad c_{j+1}$ is not

The application of rules:

S t r i p — Rule I

S t r i p — Rule II a.

S t r i p — Rule II b.

III. In [cons] c_1 c_o [−stress] associated c_o and S_1 (c_1 to s_1, [−stress] to s_2)

The application:

p a s t r y — Rule III

IV. In c_1 c_2 [−stress] associate c_2 and s_2 (c_1 to s_1, [−stress] to s_2)

Condition: $c_1 c_o$ must not be a member of the set of universally prohibited clusters.

The application:

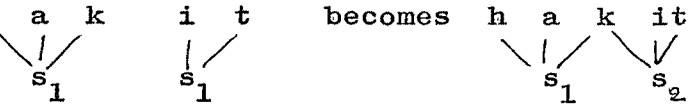
b o d k i n — By rules I, IIa, b.

Rule IV is blocked by the condition.

V. In c # v associate c and s
        |
        s

The application:

hock it, i.e. h a k i t becomes h a k it



This mapping convention is adopted for the issues of murmur, nasalization, stress etc. of Gujarati. The theoretical implications of autosegmental approach are noted alongwith this adoption (See chapter V).

4.3. Syllabication of Gujarati

It is assumed here that the clusters of the language can help to decide the syllables and syllabication can help to decide the acceptibility of clusters.

All IA languages have two categories of medial consonant sequences: I Sanskritic,

II Indigenous.

I. There is a very large Sanskritic vocabulary especially in the standard dialects. The Sanskritic clusters[60] are:

(1) consonant + consonant (this includes homorganic nasal + stop and geminated consonants).

(2) a. s + voiceless stop/nasal/liquid/glide

b. consonant + liquid/glide

c. very small number of words having s + stop/nasal + r

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60. The words 'sequence' and 'cluster' are used to indicate two distinct categories. By 'sequence' we mean simply the occurrence of more than one consonant. By cluster we mean 'phonemically acceptable, non-prohibited sequences'.

II. Indigenous sequences are created due to,

(1) morphemic extensions which delete the vowels from the final syllable of the stem; this contracts the syllabic frame.

(2) covert endings such as -ʈ, -ɖ, - ɭ etc. which have developed diachronically, and have become inherent to the words when inflectional suffixes follow the similar contractions as indicated in(1).

Both these changes are to be attributed to stress-syllable rhythm. Vowel deletion is in a way a rhythm balancing factor.

The indigenous diphthongal vowel sequences are,

	-ui	[dʒui]	'a flower'
	-oi	[foi]	'aunt'
	-ai	[kəlai]	'tin'
	-əi	[bəiri]	'wife' (D)
*	-iu	[piũ]	(I)'drink'
	-əu	[səu]	'everyone'
*	-au	[k^haũ]	(I)'eat'
*	-ou	[dʒoũ]	(I)'see'
*	-eu	[beu]	'both'

The other vowel sequences result into two syllables, e.g.

*	-ie	[manie]	'(we) believe'
*	- ue	[sue]	'sleeps'
*	-oe	[d^hoe]	'washes'
*	-ae	[bae]	'mother' (inst.)
*	-io	[vaɖio]	'gardens'
*	-ao	[baɭao]	'girls'
	-uo	[kuo]	'well'
*	-eo	[teo]	'they'
	-ia	[məɖia]	'surname'

* = inflectional formations.

Being in a weak position (i.e. final) these sequences also turn into monosyllabic diphthongal sequences.

Most of the Sanskritic clusters can appear only in formal dialects. From the large vocabulary of this group some words are listed below:

consonant + liquid			
[krəndən]	'weeping'	[plut]	'long vowel'
[kleʃ]	'distress'	[bruɦəd]	'broad'
[gruɦə]	'house'	[bʰruku‿i]	'eye brow'
[glani]	'unhappiness'	[mrut]	'dead'
[gʰruɳa]	'hatred'	[ɱlan]	'withered'
[tras]	'harassment'	[vrutʰa]	'uselessly'
[drakʃ]	'grape'	[srudʒən]	'creation'
[dʰruv]	'steady'	[ʃri]	'wealth'
[nrutjə]	'dance'	[ʃleʃ]	'pun'
[pras]	'rhyme'	[ɦras]	'destruction'
consonant + consonant			
[kʃem]	'well-being'	[stʰəl]	'place'
[spəndən]	'vibration'	[skʰələn]	'down fall'
[stər]	'layer'	[sɬot]	'explosion'
[skəndʰ]	'shoulder'	[sneɦ]	'love'
[smərəɳ]	'memory'		
consonant + glide			
[kjã]	'where'	[dvar]	'door'
[kvətʃit]	'rarely'	[dʰvəstə]	'destroyed'
[dʒjã]	'wherein'	[dʰjan]	'meditation'
[dʒvala]	'flame'	[vjom]	'sky'
[tjã]	'there'	[svə]	'self'
[tvətʃa]	'skin'	[ʃjam]	'dark'
[djotək]	'illuminative'	[ʃvan]	'dog'
consonant + consonant + liquid			
[spruha]	'jealousy'	[smruti]	'memory'
[stri]	'woman'		

4.3.2. Medial Sanskritic clusters

consonant + glide

[vakjə]	'sentence'	[pəttʰʃə]	'diet'
[pəkvə]	'ripe'	[ədjə]	'today'
[səkʰjə]	'friendship'	[ədvəit]	'non-duality'
[jogjə]	'appropriate'	[ədʱjəjən]	'study'
[ərgʱjə]	'oblation'	[adʱjə]	'abundance'
[patʃjə]	'digestible'	[karu(ɳ)ɳjə]	'kindness'
[pudʒjə]	'worthy of worship'	[gopjə]	'hidden'
[udʒdʒvəl]	'bright'	[səbʱjə]	'gentlemanly'
[stutjə]	'worthy of praise'	[rəmjə]	'pleasing'
[hasjə]	'laughter'	[grahjə]	'worth taking'
[asvadjə]	'taste'	[ə njaj]	'injustice'
[əʃvə]	'horse'	[ənvəj]	'synthetical analysis'

consonant + liquid

[akro]	'agitation'	[amrə]	'mango'
[agrɔh]	'insistence'	[əmlə]	'sour'
[ətrə]	'here'	[əʃru]	'tears'
[vidrup]	'ugly'	[viʃleʃ]	'analysis'
[viplə v]	'war'		

liquid + consonant

[ərkə]	'essence'	[ərgʱjə]	'oblation'
[murkʰə]	'fool'	[ərtʃənə]	'worship'
[sərgə]	'section'	[murtʃʰa]	'unconsciousness'
[artə]	'distress'	[dərbʱə]	'grass'
[partʰiv]	'earthy'	[kərmə]	'work'
[mardəv]	'softness'	[vərʃə]	'year'
[murdʱəɳjə]	'alveolar'	[vəlkəl]	'bark clothing'
[kərɳə]	'ear'	[əlpə]	'little'
[ərpə]	'officer'		

liquid + glide		glide + liquid	
[kərjə]	'work'	[avrutti]	'edition'
[kəljaɳ]	'benefaction'	glide + glide	
[gərvə]	'pride'	[divjə]	'divine'
liquid + liquid		[sə̃uvad]	'dialogue'
[nirlədʒdʒə]	'shameless'		
[kʃullək]	'trivial'		

4.3.3. Final clusters

Most of the speakers of standard dialect will not have final clusters except when the sequence is homorganic 'N+C'; elsewhere they will retain the final 'ə' of Sanskritic syllable after the clusters, e.g. [tʃittə] 'mind', [mokʃə] 'salvation'. It should be noted that there is a very small Sanskritic vocabulary which is common to all the dialect speakers. But the speakers of non-standard dialect tend to drop the final 'ə' in these words. See the sample list below:

[kaʂʈ]	'wood'	[ərtʰ]	'meaning'
[gutʃ tʃʰ]	'bunch'	[əst]	'set'
[gʱəʈʈ]	'strong'	[stəbdʱ]	'silent'
[tʃitt]	'mind'	[svəʈʃ tʃʰ]	'clean'
[tərk]	'guess'	[spəʂʈ]	'clear'
[ʃə bd]	'word'	[mokʃ]	'salvation'
[dʱurt]	'cunning'	[vərg]	'class'
[gərbʱ]	'womb'	[murkʰ]	'fool'
[prarəbdʱ]	'fate'	[pəkʃ]	'side'

Nevertheless these speakers have to retain the final 'ə' when the final consonant of the cluster is 'voiced'. If the voiced consonant is preceded by a consonant the phonetics of voicing will require a vowel in the following position. Hence in a very large Sanskritic vocabulary final 'ə' is retained.

4.4. Indigenous clusters

The indigenous as well as borrowed consonant clusters are of three types. One having gemination of consonants, the second having homorganic nasal + consonant sequences and the third having 'consonant + j' (resulting after past tense suffixation). All the three can occur medially. The second type can also occur finally. See the list below:

Gemination of consonants

* [əkkəl]	'common sense'
[əkkəɖ]	'tight'
[əkʰkʰəɖ]	'untilled land'
* [əttər]	'perfume'
[əlləɖ]	'childish'
[kəkko]	'alphabet'
[kətʃtʃər]	'powder'
[kəmmər]	'waist'
[kutʃtʃo]	'brush'
[əddʱər]	'suspended'
* [ummər]	'age'
[ullər]	'tendency to grow tall'
[kəʈʈər]	'staunch'
[kəttəl]	'slaughtering'
[kənna]	'the arrangement of strings for kite'
[killo]	'fort'
[kʰəkʰkʰər]	'a surname'
[kʰətʃtʃər]	'a mule'
[kʰətta]	'defeat'
[kʰullũ]	'open'
[gəʈʈʰo]	'lump'
[gəbbər]	'a hill near Ambaji'
[gəllo]	'counter'
[gilli]	'stick used in a game'
[gulla]	'small balls of dough'
* [gusso]	'anger'
[gʱəmmər]	'round movement'
[tʃəɖɖi]	'short pants'
[tʃəmmər]	'fly swopper'
[tʃiʈʈʰi]	'note'
[tʃitto]	'leopard'
[tʃokkəs]	'surely'
[tʃokkʰũ]	'clean'
[tʃʱəggo]	'number six or the 'six' in cards'
[tʃəttu]	'right side'
[tʃʰõtter]	'seventy six'
[tʃʰəɳɳu]	'ninety six'
[tʃʰellũ]	'the last'
[dʒəkki]	'obstinate'
[pillu]	'a roll of string'

[gədʒdʒər]	'a surname'
[dʒət^{h}t^{h}o]	'a mass/heap/ collection'
*[dʒuɬɬ^{h}o]	'a liar'
[dʒusso]	'spirit/force'
[dʒ^{ɦ}əbb^{ɦ}o]	'a loose garment'
[ɬəkkər]	'a counter attack'
[ɬ^{h}əkkər]	'a surname'
[ɬ^{h}ətʃ tʃər]	'donkey'
[ɬ^{h}ə ɬɬ^{h}a]	'joke'
[ɬ^{h}əsso]	'style'
[ɖəɭɭo]	'a plug'
[ɖukkər]	'pig'
* [təbəkko]	'period'
[tukko]	'whim'
[t^{h}ə ppəɖ]	'slap'
[t^{h}ə ppi]	'a bundle'
[tə mmər]	'giddiness'
* [dərədʒdʒ o]	'a rank'
[dəllo]	'wealth'
[d^{ɦ}əkko]	'push'
[d^{ɦ}əbbo]	'push'
[nəkki]	'sure'
[nəvvaɲũ]	'ninety nine'
[nəffəɭ]	'shameless'
[pəkkai]	'shrewdness'
[pətʃ tʃis]	'twenty five'
[pəɬ ɬ^{h}o]	'stout'
[pəɬɬo]	'belt'
[pətt^{h}ər]	'stone'
[fikkũ]	'bland'
[fuggo]	'balloon'
[pəllu]	'a balance scale'
[bəɬɬo]	'blame'
[bətʃ tʃi]	'kiss'
[bəbbe]	'in pairs'
[bənnus]	'blanket'
[buɬɬ^{h}ũ]	'blunt'
[buɬɬi]	'earing'
[b^{ɦ}ətt^{h}u]	'bonus'
[b^{ɦ}əɬɭ^{h}i]	'furnace'
[mədʒdʒa]	'marrow'
* [məmmi]	'mother'
[murəbbi]	'respectable elder'
[rəddi]	'waste paper'
[lətto]	'locality'
[ləppəɖ]	'slap'
[sikko]	'coin'
[sək^{h}k^{h}ət]	'hard'
[sikkəl]	'face cut'
[sədʒ dʒəɖ]	'hard'
[sitter]	'seventy'
[ɦ əllo]	'attack'
* [ɦimmət]	'braveness'
* [ɦisso]	'share'
* [ɦukko]	'hukkah'
[hulləɖ]	'riot'
* [ɦoddo]	'position'

* = borrowed words

The tendency of doubling the consonants is common in all IA languages (see the section 4.1.1). The 'doubling' is done for stressing the meaning e.g. Gujarati speakers never use the word for 'liar' without doubling the medial consonant e.g. [dʒuʈʈʰo]. Many abusive adjectives are spoken this way: e.g.

[pakko]	'cunning!'	[pəʈʈʰo]	'fatty!'
[buʈʈʰo]	'dull!'	[gəddʱo]	'donkey!'

other adjectives also often get such doubling.

[səkkʰət]	'hard'
[kʰullũ]	'open'
[lissũ]	'smooth'
[dʒəbbər]	'strong' (actually [dʒəbrũ])
[fikkũ]	'bland'

The orthography does not show gemination in all these words. It is quite likely that the words which show gemination in orthography might have been at an earlier stage written with single consonants.

This means that meaning-stress doubling enters the orthography gradually. In most of the informal writings-letters notes etc. such doubling is evident. Ultimately all the geminated forms of spoken language may enter the orthography. A paralinguistic expressive feature thus has become a part of the cluster system of the language.

The syllabication of such words throws light on the relationship between the sonic facts and orthography of the language. The sonic reality that there is a tendency to double the consonants is highly significant. Vājasaneyi prātiśakhya[61] has prescribed that intervocalic double consonants have to be pronounced as a single

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61. Vājasanayi prātiśakhya: IV, 172.

consonant. This inhibitive prescription hints at the tendency to double the consonants. Sonic reality and graphic reality cannot be fully parallel. Gujarati doubling is a process that highlights prātisakhya observations regarding the medial consonants. The syllabication of such words would be:

$$_1(\text{lis})_1 \quad _2(\text{s}\,\tilde{\text{u}})_2 \quad \text{i.e.} \quad (\text{li}_1(\text{s}_2)_1\ \tilde{\text{u}}_2)$$

4.4.1. Homorganic nasal + consonant

The clusters of this nature have been discussed in chapter-III. Here is the list of only indigenous words having N + c cluster.

[kaŋgũ]	'meak'	[dʒəŋdʒaɭ]	'involvement'
[kaɳɖũ]	'wrist'	[dʒəmpwũ]	'to feel settled'
[kuŋdʒo]	'earthen jar for water'	[dʒʰaŋdʒʰ]	'an instrument'
		[ʈəŋk]	'of one time'
[kʰaɳɖ]	'sugar'	[ʈəɳʈʃai]	'shortage'
[kʰənt]	'perseverence'	[ʈəɳʈo]	'quarrel'
[kʰəŋtʃawũ]	'to hesitate'	[ʈaŋgwũ]	'to hang'
[gəndu]	'dirty'	[ʈiɳɖora]	'a vegetable'
[gᵥeɳɖo]	'rhinoceros'	[ʈʰəɳɖi]	'cold season'
[gaŋgli]	'simpleton(F)'	[ɖaŋg]	'a stick'
[gᵥondre]	'outskirt of village'	[ɖoŋgo]	'evader'
		[ɖʰəŋg]	'manner'
[gunda]	'a fruit'	[ɖʰaɳɖʰo]	'an abuse'
[tʃəmbu]	'pot'	[dʰᵥoŋg]	'pretension'
[tʃʰaɳɖ]	'leave'	[təŋgi]	'shortage'
[tʃʰiɳɖũ]	'a hole in the hedge'	[tuɳɖmidʒadʒ]	'arrogance'
		[dəŋg]	'surprise'
[dʒəŋgi]	'huge'	[bʰondu]	'a fraud'
[dund]	'big paunch'	[bʰuŋgɭũ]	'a pipe'

[dʰandʰəl]	'racket'	[məɲtʃʰa]	'a name' (female)
[dʰiŋgu]	'big'	[miɳdu]	'zero'
[nəŋg]	'a jewel/ a specimen'	[miɲdʒ]	'seed'
		[rəɲdʒ]	'grievance'
[paŋglũ]	'physically handicapped'	[raɳɖ]	'widow'
		[liɳɖi]	'goat-dung'
[pəɳɖ]	'self'	[londo]	'mashed thing'
[puŋgi]	'an instrument'	[luŋgi]	'lungi'
[fand]	'paunch'	[vandʰo]	'objection'
[faŋgũ]	'squint eyed'	[veŋgəɳ]	'brinjal'
*[fəmfoɓʷũ]	'search'	[səmp]	'unity'
[fəŋgoɓ]	'sling'	[səɲtʃo]	'machine'
[fiɳɖlũ]	'a bundle of thread'	[saɳɖʰ]	'she camel'
		[suŋgʰ]	'smell'
[bəɳɖi]	'jacket'	[suɳɖʰ]	'trunk'
[bəɳɓi]	'kind of grain'	[handi]	'a metal pot'
[baɳɖu]	'sleeveless'	[haɲdʒa]	'guts'
[bandi]	'slave'(female)	[huɳɖi]	'a bill of exchange'
[bʰəɳɖəkiju]	'a storing place'		
[bʰiŋgdũ]	'scales'(of skin)		

4.4.2. Clusters in morphemic extensions

Consonant + j

We get consonant + j sequences in morphemic extensions, e.g. all the verb stems ending in consonants can have such sequence in their past tense. Only a sample list is given here:

[ʃəkja]	'we could'	[vədja]	'(we) spoke'
[rakʰja]	'kept' (pl)	[vəɖʰja]	'increased' (pl)
[vagja]	'played' (pl)	[manja]	'came round'
[sungʰja]	'smelt' (pl)	[apja]	'gave' (pl)

[pətʃja]	'digested' (pl)	[hãɦja]	'(we) panted'
[putʃʰja]	'asked' (pl)	[ʃobʱja]	'looked nice' (pl)
[pudʒja]	'worshiped' (pl)	[ʃəmja]	'become quiet'
[sudʒʱja]	'occurred' (pl)	[varja]	'stopped'
[vaɽja]	'crushed' (pl)	[bolja]	'(we) spoke'
[ɦəɽʰja]	'(we) moved'	[sivja]	'stitched'
[paɖja]	'dropped' (pl)	[ɦəsja]	'(we) laughed'
[məɖʱja]	'framed' (pl)	[poʃja]	'nurtured' (pl)
[maɳja]	'enjoyed' (pl)	[kəɦja]	'said' (pl)
[pətja]	'finished'	[paɭja]	'to protect'
[natʰja]	'defeated' (pl)		

These examples pose a question: 'do we consider such crossmorphemic sequences as clusters??' The answer is 'yes' if we accept the phonetic bond between the consonant and glides as being natural, i.e. universally non-prohibited. However theoretically the question remains yet to be answered. Earlier we have discussed the issue of sequences against clusters.

4.5. Medial sequences

In short for syllabication of medial sequences of Gujarati only initial clusters will serve as the criterion. The few final clusters given here will not disturb the syllable division rules.

Initially there can be very few three consonant clusters, e.g.,

[spruɦa]	'jealousy'
[stri]	'woman'
[smruti]	'memory'

But medial three consonant sequences are created after prefixes or suffixes are added. These sequences don't make clusters of the language as they don't have natural phonetic bond between

them. No syllable in Gujarati can begin or end with these sequences, e.g.,

[durvjəj]	'wastage'	-rvj-
[daridrjə]	'poverty'	-drj-
[utkrəm]	'transgression'	-tkr-

There is a very large vocabulary showing such unnatural phonetic bond between the medial sequences of two consonants. It is intended to show here that these sequences can be proved dividable such that the first consonant of the sequence will belong to the preceding syllable and the second will belong to the following syllable.

I. Derivationally dividable

[əg|vəɖ]	'discomfort'	[gəf|ləṭ]	'blunder' (borrowings)
[səg|vəɖ]	'facility'	[səv|ləṭ]	'facility'
[gəɳ|tər]	'country'	[gəɭ|pəɳ]	'sweetness'
[bʰəɳ|tər]	'studies'	[gʰəɖ|pəɳ]	'old age'
[bəṭʃ|pəɳ]	'childhood'	[bʰus|ko]	'jump'
[gol|vaɖ]	'place where 'gola' community stays'	[kud|ko]	'jump'
		[ṭʰəm|ko]	'playful gesture'
[bʰoi|vaɖ]	'place where 'bhoi' community stays'	[vəṭʃ|ko]	'obstacle'
		[vəɭ|ko]	'absorption of steam while cooking'
[pəɖ|kar]	'challenge'		
[bʰəɳ|kar]	'echoing - humming sound'	[tʃʰuṭ|ko]	'freedom'
[i|kar]	'i' 'sound'	[pəɖ|ti]	'down fall'
[səg|pəɳ]	'relation'	[dʒoɖ|kũ]	'pair/twins'
[bəɭ|təɳ]	'firewood'	[ṭal|kũ]	'head without hair' (diminunitive)
[nəɖ|tər]	'obstacle'		
[vəɭ|tər]	'return'	[ṭoṭʃ|kũ]	'tip'
[pəɖ|tər]	'unused'	[toɭ|ki]	'a group of people'
[ləl|kar]	'singing'		

Very large number of sequences of this group are apparently created due to vowel deletion. This deletion is caused in-order to balance the syllabic rhythm, i.e. a consonant is carried over with the following vowel of the suffix. This reduces the preceding syllable, ultimately balancing the total number of syll-ables, e.g.[ukaɭ] 'boil', [ukɭat] 'heat'. This shows that -kɭ- cannot be classed as clusters.[62] See the list on p.588-589

4.5.1. Indigenous derivational endings

III. A large vocabulary comes under this group where forms are followed by 'ending' consonants + gender markers. These conso-nants have become inherent to the forms.

	1	
a ʈ + l + ũ	o ʈ + 1 + i	beɖ + 1 + ũ
teʈ + 1 + ũ	k^hob + 1 + o	k^hudʒ + 1 + i
po ʈ + 1 + ũ	ʈəp + 1 + i	tʃuɖ + 1 + o
kap + 1 + i	ʈoj + 1 + i	tʃo ʈ + 1 + i
		tʃos + 1 + o
	w	
kəɖ + w + ũ	b^ho$ʈ^h$ + w + o	sat^h + w + o
pəʈ + w + o	b^hə ʈ + w + o	ʃəɭ + w + o
fəg + w + o		
	ɳ	
bar + ɳ + ũ	tãk + ɳ + ũ	tʃas + ɳ + i
poj + ɳ + ũ	$dʒ^h$ul + ɳ + ũ	

62. See the discussion in Chapter III p.

ɖ

k^{h}or + ɖ + i	rak^{h} + ɖ + i	k^{h}as + ɖ + a
tʃip + ɖ + o	vãk + ɖ + o	kor + ɖ + o
tʃev + ɖ + o	ʃer + ɖ + i	b^{ɦ}aj + ɖ + o
tʃop + ɖ + i	lug + ɖ + ũ	lõk + ɖ + i
pav + ɖ + o	səm + ɖ + i	lep + ɖ + o
pap + ɖ + i	sãk + ɖ + ũ	vəg + ɖ + o

k

gənd + k + i	təɖ + k + o	batʃ + k + o
ʈ^{h}us + k + ũ	pol + k + ũ	vaɖ + k + i
dʒ^{h}iɳ + k + ũ	bəʈ + k + u	ɦeɖ + k + i

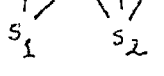
r

ɦodʒ + r + i	bək + r + i	pad^{ɦ} + r + ũ
ləɬ + r + ũ	b^{ɦ}ak^{h} + r + i	ɖəm + r + o
mog + r + o	pãs + r + o	tʃĩt^{h} + r + ũ
vək + r + o	ɖ^{ɦ}eb + r + ũ	tʃ^{h}ot + r + ũ
vag^{ɦ} + r + i	pət + r + ũ	k^{h}ək^{h} + r + i
badʒ + r + i	nat + r + ũ	g^{ɦ}og^{ɦ} + r + o

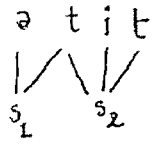
4.5.2. Interludes and ambisyllabicity

IV. Contrary to these words are a large number of words having ambisyllabicity. These words have two syllables with the middle consonant behaving like an interlude, e.g.,

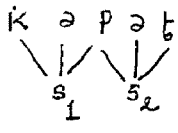
(1) ə k i k



(2) ə t i ʈ



(3) ḱ ə p ə ʈ



. See the list of such words on p.590-601

[atʃər]	'behave'	[atʃ|rəɳ]	'behaviour'
[utər]	'descend'	[ut|raɳ]	'descending'
[o̤ɭəkʰ]	'know'	[o̤ɭ|kʰaɳ]	'knowing'
[kəkəɭ]	'cry'	[kək|ɭaɭ]	'crying'
[kətʃəɖ]	'crush'	[kətʃ|ɖaɭ]	'crushing'
[kʰətʃək]	'hesitation'	[kʰətʃ|kaɭ]	'hesitation'
[katər]	'slice/cut'	[kat|rəɳ]	'sliced thing'
[kʰəɖək]	'hill/rock'	[kʰəɖ|kaɭ]	'hilly'
[gafel]	'negligent'	[gəf|lət]	'mistake'
[tʃəmək]	'shine'	[tʃəm|kaɭ]	'shine' (N)
[tʃəɭək]	'shine'	[tʃəɭ|kaɭ]	'shining'
[dʒʱəɭək]	'shine'	[dʒʱəɭ|kaɭ]	'shining'
[patʰər]	'spread'	[pətʰ|raɭ]	'spreading'
[fəfəɖ]	'fear'	[fəf|ɖaɭ]	'fright'
[fufəv]	'hiss'	[fuf|vaɭ]	'hissing'
[rəɳəkwũ]	'to make sweet sound'	[rəɳ|kar]	'sweet sound'
[ləʈək]	'hang' (VI)	[ləʈ|kav]	'hang' (VT)
[vetər]	'to cut according to measure'	[vet|rəɳ]	'cutting'
[həɭəd]	'turmeric'	[həɭ|dər]	'turmeric'
[vərəs]	'rain'	[vər|sad]	'rain'
[ãkədio]	'hooks' (Pl)	[ãk|ɖi]	'hook'
[ãtʃəkwũ]	'to pull'	[ãtʃ|ki]	'convulsion'
[apəd]	'difficulties'	[ap|da]	'difficulty'
[arəsio]	'mirrors' (D)	[ar|si]	'mirror'
[aŋgəɳ]	'front of the house'	[aŋg|ɳũ]	'front of the house

(D) = dialectal

[aɲɪdʒəɳʈ]	'collyrium'	[aɲɪdʒ|ɳi]	'sty'
[u|əʈ]	'reverse'	[ul|ʈi]	'vomit'
[o̤səriɔ]	'front of the house (pl)'	[o̤s|ri]	'front of the house'
[kəkəɖio]	'pieces' (D)	[kək|ɖi]	'piece'
[katərwũ]	'to crush'	[kat|ri]	'chips'
[kəɳək]	'husk'	[kəɳʈ|ki]	'husked rice'
[kəʈʰən]	'say'	[kəʈʰ|ni]	'story of mishap'
[kəpətʃio]	'flakes' (D)	[kəp|tʃi]	'flake'
[kəpəʈ]	'fraud'	[kəp|ʈi]	'fraudulant'
[kəbədʒ]	'in possession'	[kəb|dʒo]	'possession'
[kələm]	'a graft on a tree'	[kəl|mi]	'grafted'
[kəsəb]	'craft'	[kəs|bi]	'craftsman'
[kagəd]	'paper'	[kag|di]	'paper-seller'
[kapəɖ]	'cloth'	[kap|ɖi]	'cloth-seller'
[kapəlio]	'pieces' (D)	[kap|li]	'piece'
[ka|ədʒ]	'heart'	[kaʈ|dʒu]	'lever'
		[kaʈ|dʒi]	'worry'
[gaŋgəɖijo]	'pebbles'	[gaŋg|ɖũ]	'pebble'
[kaŋgərijo]	'indentations'	[kaŋg|ri]	'indentation'
[kãsəkijo]	'combs' (D)	[kãs|ki]	'comb'
[kuɭəɖijo]	'pots' (D)	[kul|ɖi]	'pot'
[kubəɖ]	'ugly'	[kuɓ|ɖu]	'ugly'
[ko̤gəʈijũ]	'cholera'	[ko̤g|ʈo]	'mouthfull'
[kutərijo]	'bitches' (D)	[kut|ri]	'bitch'
[kunɖəʈ]	'circle'	[kunɖ|ʈi]	'horoscope' (drawn in circles)
*[kevəɖija]	'place name'	[kev|ɖo]	'fragrant tree'
[kesər]	'saffron'	[kes|ri]	'saffron coloured'
[kokəɖijo]	'reels'	[kok|ɖũ]	'reel'

[kotʃəlijo]	'shells' (D)	[kotʃ|lũ]	'shell'
[koʈəɖijo]	'small rooms' (D)	[koʈ|ɖi]	'room'
[kodər]	'a species of corn'	[kod|ri]	'a grain'
[kot^{h}əɭijo]	'bags'	[kot^{h}|ɭi]	'bag'
[kopərijo pərsad]	'coconut' (in a nursery rhyme)	[kop|rũ]	'coconut'
[k^{h}əʈək]	'pinch'	[k^{h}əʈ|ko]	'pinch'
[k^{h}ət/ək]	'hesitation'	[k^{h}ətʃ|ko]	'hesitation'
[k^{h}ərəɖ]	'writing' (in a humiliating sense)	[k^{h}ərəɖ|o]	'an agreement'
[k^{h}adʒəlijo]	'eatables' (D)	[k^{h}adʒ||i]	'an eatable'
[k^{h}asəɖijo]	'shoes' (D)	[k^{h}as|ɖu]	'shoe'
[k^{h}anɖəɳijo]	'pestles' (D)	[k^{h}anɖ|ɳi]	'pestle'
*[k^{h}idʒəɖijo]	'place name'	[k^{h}idʒ|ɖo]	'a tree'
[k^{h}opərijo]	'skulls' (D)	[k^{h}op|ri]	'skull'
[gərəɳijo]	'sieves' (D)	[gər|ɳi]	'sieve'
[gərəm]	'hot'	[gər|mi]	'heat'
[gəɭəɳio]	'sieves' (D)	[gəɭ|ɳi]	'sieve'
[k^{h}urəsijo]	'chairs' (D)	[k^{h}ur|si]	'chair'
[gãsəɖijo]	'bundles' (D)	[gãs|ɖi]	'bundle'
[gapətʃiʃo]	'shirkings' (D)	[gap|tʃi]	'shirking'
[gabəɖ-gubəɖ]	'gaps'	[gab|ɖũ]	'gap/hole'
[gəɖ-guməɖ]	'boils/blisters'	[gum|ɖũ]	'boil'
[gok^{h}əlo]	'a protruded balcony'	[gok^{h}|lo]	'a nitche in wall'
[goɭəlijo]	'mango/seeds' (D)	[goɭ|li]	'mango seed'
[gobər]	'dung'	[gob|rũ]	'dirty'
[g^{ɦ}ag^{ɦ}ər]	'round pot'	[g^{ɦ}ag^{ɦ}|ri]	'round' (skirt)
[g^{ɦ}aɭəɖio]	'bridal sarees' (pl)	[g^{ɦ}aɭ|ɖi]	'bridal saree' (sg)

[gʰugʰərijo]	'small bells'	[gʰugʰ|ri]	'bell'
[tʃəkəlijo]	'small sparrows' (D)	[tʃək|li]	'sparrow'
[tʃɑɬəɳ]	'something pasty'	[tʃəɬ|ɳi]	'a spicy paste'
[tʃəppəɬ]	'flat'	[tʃp|ɬũ]	'flat'
[tʃəmətʃijo]	'spoons' (D)	[tʃəm|tʃi]	'spoon'
[tʃamədɖijo]	'skin' (D)	[tʃam|ɖi]	'skin'
[tʃələɳ]	'currency'	[tʃəl|ɳi]	'currency'
[tʃəsək]	'shooting pain'	[tʃəs|ko]	
[tʃabuk]	'a whip'	[tʃab|kʰo]	'one whip'
[tʃãpədɖijo]	'latches' (D)	[tʃãp|ɖo]	'a latch'
[tʃa|ən]	'sieve'	[tʃa|ɳjjo]	'sieves' (pl)
[tʃãpəlijo]	'overwise' (F)(PI)	[tʃãp|li]	'overwise'
[tʃikəɬ]	'sticky'	[tʃik|ɬũ]	'sticky'
[tʃĩtʰərijo]	'one in rags'	[tʃĩtʰ|rũ]	'rag'
[tʃibʰədɖijo]	'fruits-like cucumber' (D)	[tʃibʰ|ɖi]	
[tʃukəv]	'pay back'	[tʃuk|te]	'paid'
[tʃusəɳ]	'sucker'	[tʃus|ɳi]	'sucker'
[tʃogəɖ tʃar]	'number four' (for teaching children)	[tʃog|ɖo]	'number four'
[tʃʰəɳək]	'anger'	[tʃʰəɳ|ko]	'an abrupt anger'
[tʃʰapəria ʃeri]	'a name of the locality'	[tʃʰap|rũ]	'roof'
[tʃʰabəɖio]	'baskets'	[tʃʰab|ɖi]	'small basket'
[tʃʰĩk]	'sneeze'	[tʃʰĩk|ɳi]	'snuff'
[tʃʰokər-veɖa]	'childishness'	[tʃʰok|ro]	'a boy'
[dʒʰəgʰəɖ]	'quarrel'	[dʒʰəgʰ|ɖo]	'quarrel'
[dʒʰəɬək]	'slash'	[dʒʰəɬ|ko]	'slashing'
[dʒʰapəɬ]	'slash'	[dʒʰap|ɬi]	'a duster cloth'

[dʒʰuləɳ]	'swinging'	[dʒʰul|ɳũ]	'a swing'
[dʒʰ̃upəɖ pəʈʈi]	'hutment'	[dʒʰ̃up|ɖi]	'a hut'
[ʈəpəkwũ]	'to drip'	[ʈəp|kũ]	'a drop'
[ʈətʃako]	'noise of bones cracking'	[ʈatʃ|ko]	
[ʈ̃ãkəɳio]	'pins' (D)	[ʈãk|ɳi]	'pin'
[ʈukəɖio]	'small groups of men'	[ʈuk|ɖi]	'a small group of men'
[ʈekərijo]	'hills'	[ʈek|ri]	'hill'
[ʈopəlijo]	'baskets'	[ʈop|li]	'basket'
[ʈʰikərijo]	'small stones' (D)	[ʈʰik|ri]	'small stone'
[ɖəgəlio]	'steps'	[ɖəg|lu]	'a step'
[ɖəbəkvəɖi]	'an eatable-like dumpling'	[ɖəb|kũ]	'an eatable'
[ɖabəlijo]	'boxes'	[ɖab|li]	'box'
[ɖãkʰə|ijo]	'branches'	[ɖãkʰ|ʈi]	'a branch'
[ɖʰəgəɻijo]	'heaps'	[ɖʰəg|lo]	'heap'
[ɖʰokəʈijo]	'an eatable' (D)	[ɖʰok|ʈi]	'an eatable'
[ɖʰãk]	'cover'	[ɖʰ̃ãk|ɳũ]	'a cover'
[ɖʰiməɖijõ]	'swelling' (D)	[ɖʰim|ɖũ]	'swelling'
[dʰoləkʃ]	'drum'	[ɖʰol|kũ]	'drum'
[təgəɖ-məgəɖ]	'healthy and hearty'	[təg|ɖo]	'fat/healthy'
[təɳəkʰ-lũ]	'spark'	[təɳ|kʰʰo]	
[təbəltʃi]	'a drum player'	[təb|la]	'drums'
(təraɳũ]	'straw (in poetry/ singling)	[tər|ɳũ]	
[tanɡ]	'leg'	[təŋg|ɖi]	'leg'
[tap]	'hot'	[tap|ɳi]	'hearth'
[tamas]	'anger'	[tam|si]	'angry'
[tavəɖijo]	'hot plates'	[tav|ɖi]	'hot plate'

[təntu]	'thread'	[t̃at|no]	'thread'
[tumbəɖijo]	'pots'	[tumb|ɖi]	'pot'
[t^{h}agəɖt^{h}igəɖ]	'patching'	[t^{h}ig|ɖũ]	'patch'
[dam]	'money'	[dəm|ɖi]	'pie'
[nəkəl]	'imitation'	[nək|li]	'imitation'
[nəkəʃijo]	'designs' (D)	[nək|ʃo]	'map'
[nəgər]	'city'	[nəg|ri]	'city'
[nes]	'shepherd's hut'	[nes|ɖo]	'shepherd's hut'
[notər]	'invite'	[not|rũ]	'invitation'
[nonɖ^{ɦ}]	'cite/note'	[nond^{ɦ}|ɳi]	'noting'
[pəg]	'leg'	[pəg|li]	'imprints of foot'
[patʃ^{h}əl]	'back/behind'	[patʃ^{h}|lũ]	'back'
[pəɖəg^{ɦ}ijo]	'bases of the pots' (D)	[pəɖ|g^{ɦ}i]	'base of the pot'
[pətt^{h}ər]	'stone'	[pət^{h}|ro]	'stone'
[pələɽ]	'change'	[pəl|ɽo]	'change'
[paɽ]	'a board to sit on'	[paɽ|lo]	'a board to sit on'
[parək^{h}]	'test'	[par|k^{h}ũ]	'test'
[palək^{h}ijo]	'palanquins' (D)	[pal|k^{h}i]	'palanquin'
[paɳdʒər]	'cage'	[paɳdʒ|rũ]	'cage'
[pãpəɳ]	'eyelid'	[pãp|ɳi]	'eyelid'
[pũtʃ^{h}əɖijo]	'tails'	[pũtʃ^{h}|ɖi]	'tail'
[poɽəkijo]	'bundles' (D)	[poɽ|ki]	'bundle'
[popəɖijo]	'crusts'	[pop|ɖi]	'crust'
[fəɳəgwũ]	'to sprout'	[fəɳ|go]	'sprout'
[fumətijal]	'with tussels'	[fum|tũ]	'a tussel'
[bəkərijo]	'she goats'	[bək|ri]	'she goat'
[bəgəɖija]	'a surname'	[bəg|ɖo]	'number two'

[bərəɳijo]	'jars' (D)	[bər|ɳi]	'jar'
[baləɖijo]	'buckets' (D)	[bal|ɖi]	'bucket'
[bʰəgər]	'coarse'	[bʰəg|ru]	'coarse'
[bʰəɖəkʷũ]	'burn'	[bʰəɖ|ko]	'fire'
[bʰəbʰək]	'show'	[bʰəbʰ|ko]	'pomp'
[bʰərəɖ]	'twines and crushes'	[bʰər|ɖo]	'twines and crushes'
[bʰarət]	'India'	[bʰar|tijə]	'Indian'
[bʰakʰərijo]	'breads' (D)	[bʰakʰ|ri]	'bread'
[məgər]	'crocodile'	[məg|ri]	'she crocodile'
[məmət]	'obstinacy'	[məm|ta]	'attachment'
[mərəgʰ-ɖi]	'hen'	[mər|gʰi]	'hen'
[mərəɖ]	'twist'	[mər|ɖo]	'dysentery'
[məɲtʃ]	'platform'	[mãtʃ|ɖo]	'platform'
[murəli]	'flute' (in poetry or singing)	[mur|li]	'flute'
[mogər]	'name of the place'	[mog|ro]	'a flower'
[rəkʰəɖ]	'roam'	[rəkʰ|ɖu]	'loafer'
[rəgəɖ]	'mash'	[rəg|ɖo]	'mashed thing'
[rəɖʒʰəl]	'roam'	[rəɖʒʰ|ɭu]	'roamer'
[revəɖijo]	'an eatable'(D)	[rev|ɖi]	
[reʃəm]	'silk'	[reʃ|mi]	'of silk'
[rẽkəɖijo]	'hawker's cart'	[rẽk|ɖi]	'hawker's cart'
[rokəɖ]	'cash'	[rok|ɖa]	'cash'
[ləɭək]	'graceful gestures'	[ləɭ|ka]	'graceful gestures'
[ləpəɭ]	'slip'	[ləp|ɭu]	'slippery'
[lalətʃ]	'greed'	[lal|tʃu]	'greedy'
[limbəɖija]	'a surname'	[limb|ɖi]	'Neem tree'

[vaɖəkijo]	'bowls' (D)	[vaɖ|ki]	'bowl'
[vadəɭ]	'cloud'	[vad|ɭi]	'cloud-colured'
[vaməŋ]	'dwarf'	[vam|ɳũ]	'short'
[səgʰəɖijo]	'stoves' (D)	[səgʰ|ɖi]	'stove'
[səgʰəɭũ]	'all' (in poetry)	[səgʰ|ɭũ]	'all'
[səɳək]	'pain' (shooting)	[səɳ|ko]	'pain'
[səməɖijo]	'hawks'	[səm|ɖi]	'hawk'
[satəɖ sat]	'the number seven' (in teaching children)	[sat|ɖo]	'number seven'
[sadəɖijo]	'mats'	[sad|ɖi]	'mat'
[sakəɖ mokəɖ]	'in narrow space'	[sãk|ɖu]	'narrow'
[sãkəɭ]	'chain'	[sãk|ɭi]	'chain'
[sukʰəɖija]	'sweet makers'	[sukʰ|ɖi]	'sweet'
[surət]	'Surat'	[sur|ti]	'from Surat'
[supəɖie]	'winnowing fan' (in folk song)	[sup|ɖũ]	'winnowing fan'
[sorəʈʰ]	'Saurashtra'	[sor|ʈʰi]	'from Saurashtra'
[ɦodʒəɾijo]	'bowel'	[ɦoʈʒ|ri]	'bowel'

[əkaɻ]	'draught'	[ənatʰ]	'orphan'
[əkik]	'agate'	[ənudʒ]	'brother'
[ekek]	'each one'	[əpər]	'not one's own'
[əkʰəɳɖ]	'whole'	[əpad]	'from foot'
[əkʰuɻ]	'inexhaustible'	[əpil]	'appeal'
[əgəm]	'inscrutable'	[əfəɻ]	'fruitless'
[əgər]	'salt bed'	[əfiɳ]	'opium'
[əgadʱ]	'deep'	[əfər]	'immovable'
[əgop]	'overt'	[əbudʒʱ]	'without understanding'
[əgʱoʃ]	'unaspirated'	[əbol]	'speechless'
[ətʃək]	'hesitation'	[əbʱəg]	'fortuneless'
[əɻəl]	'immovable'	[əbʱəɳ]	'uneducated'
[ətʃuk]	'without fail'	[əbʱəj]	'fearless'
[ətʃʰət]	'scarcity'	[əbʱav]	'dislike'
[ədʒəb]	'surprising'	[əmər]	'immortal'
[əbədʒ]	'a million'	[əmap]	'measureless'
[ədʒəj]	'a name'	[əmit]	'a name'
[ədʒaɳ]	'ignorant'	[əmin]	'a surname'
[əɻək]	'surname'	[əmul]	'a name'
[əɖəd]	'pulse'	[əruɳ]	'a name'
[ətit]	'distant'	[əvər]	'others'
[ətul]	'incomparable'	[əvadʒ]	'noise'
[ətuɻ]	'unbreakable'	[əʃubʱ]	'bad omen'
[ədəb]	'respect'	[əʃok]	'a name'
[ədʱər]	'lip'	[əsər]	'influence'
[ədʱik]	'much'	[aɻop]	'to wind up'
[ədʱir]	'patienceless'	[atʰəɖ]	'to bang'
[ənəl]	'fire'	[adan]	'giving'
[ənənt]	'endless'	[adeʃ]	'order'
[ənadʒ]	'grain'	[adʱar]	'support'

[adʰin]	'under control'
[adʰeɖ]	'adult'
[abad]	'prosperous'
[aɬət]	'difficulties'
[abʰar]	'thanks'
[abʰas]	'illusion'
[amukʰ]	'preface'
[ajat]	'import'
[amod]	'pleasure'
[ajas]	'efforts'
[aram]	'rest'
[arop]	'allegation'
[alap]	'musical notes'
[alok]	'light'
[avək]	'income'
[avas]	'abode'
[aveg]	'excitement'
[asam]	'Assam'
[asəv]	'concoction'
[asan]	'easy'
[aɦar]	'food'
[aɭəs]	'laziness'
[itər]	'others'
[idʒar]	'pyjama'
[inam]	'present/gift'
[iladʒ]	'treatment'
[isəm]	'person'
[udʒas]	'light'
[udəj]	'rise'
[udər]	'stomach'
[udas]	'sad'
[udit]	'risen'
[udʰar]	'borrowed'
[upər]	'above'
[upaj]	'solution'
[ubʰəj]	'both'
[uvekʰ]	'ignore'
[upədʒ]	'income'
[ekəm]	'unit'
[otʃʰaɖ]	'a cover'
[odʒəs]	'brightness/lustre'
[oɬəɳ]	'hemming'
[osəɖ]	'medicine'
[kətʃəɖ]	'rush'
[kəɬək]	'Cuttak'
[kətar]	'queue'
[kəɖəp]	'control'
[kəɓʰəɳ]	'hard'
[kəɓʰoɭ]	'pulse'
[kəɳək]	'dough'
[kəɬar]	'sword'
[kətʰir]	'led'
[kədəm]	'step'
[kədər]	'appreciation'
[kənək]	'gold'
[kəpəɬ]	'meanness'
[kəbər]	'grave'
[kəbaɬ]	'cupboard'
[kəbir]	'Kabir'
[kəbul]	'agree'

[kəməɭ]	'lotus'
[kəmod]	'a kind of rice'
[kəman]	'arch'
[kəmal]	'excellent'
[kərəʤ]	'debt'
[kərəɖ]	'bite'
[kərəm]	'fate'
[kəroɖ]	'a crore'
[kələm]	'pen'
[kəvətʃ]	'armour'
[kəsəb]	'craft'
[kəsər]	'economizing'
[kə͡har]	'a surname'
[kəɭəɔ]	'a pot'
[kagəɭ]	'paper'
[kadʒəɭ]	'soot'
[katər]	'scissors'
[kanəs]	'saw'
[kapəɖ]	'cloth'
[kaməɳ]	'magic'
[kajər]	'coward'
[kiʃor]	'name'
[kuʈil]	'mean'
[kuʈev]	'bad habit'
[kuneɦ]	'clever'
[kupit]	'angry'
[kumək]	'in aid of'
[kumar]	'young boy'
[kumud]	'lotus'
[kujog]	'bad time'
[kuran]	'holy book of Islam'
[kulin]	'of good lineage'
[kuʃəɭ]	'clever'
[ketən]	'abode'
[kesər]	'saffron'
[kevəɭ]	'only'
[keʃəv]	'Krishna'
[koməɭ]	'delicate'
[kʰəgoɭ]	'astrology'
[kʰəʤur]	'dates'
[kʰəʈaʃ]	'sourness'
[kʰətəm]	'exhausted'
[kʰəməɳ]	'an eatable'
[kʰə mis]	'shirt'
[kʰərəʤ]	'eczema'
[kʰə rab]	'bad'
[kʰərid]	'buy'
[kʰəlel]	'disturbance'
[kʰamoʃ]	'silence'
[kʰarek]	'dry fruit'
[kʰitab]	'title'
[kʰeɖut]	'farmer'
[kʰetər]	'farm'
[kʰorak]	'food'
[gəgən]	'sky'
[gəʤəb]	'surprising'
[gəʈər]	'gutter'
[gəɳeʃ]	'elephant God'
[gəmək]	'a style in singing a musical note'

[gəmən]	'going'
[gəmar]	'villager'
[gərədʒ]	'need'
[gəraṃ]	'hot'
[garuḍ]	'eagle'
[gəɦən]	'deep'
[gaggər]	'pot'
[guman]	'pride'
[gulab]	'rose'
[gulaʈ]	'summer salt'
[guvar]	'a vegetable'
[goɭaṇ]	'sling'
[gobər]	'cow-dung'
[gorəs]	'curds'
[gɦəʈək]	'unit'
[gɦəsaḍ]	'to drag'
[gɦaʈəṇ]	'Maratha woman' (derogatory)
[gɦajəl]	'wounded'
[tʃanək]	'urge'
[tʃəḍəs]	'competition'
[tʃəmək]	'shine'
[tʃətur]	'clever'
[tʃəpəl]	'swift'
[tʃəmar]	'cobbler'
[tʃə ləṇ]	'currency'
[tʃə sək]	'pain'
[tʃalək]	'proprietor'
[tʃakər]	'servant'
[tʃadər]	'bed sheet'
[tʃarəṇ]	'a community'
[tʃitar]	'a picture'
[tʃinar]	'a tree'
[tʃitəl]	'a snake'
[tʃuḍel]	'witch'
[tʃogəm]	'four sides'
[tʃogan]	'a ground'
[tʃopaʈ]	'a game'
[tʃomer]	'four sides'
[tʃʰəgən]	'a name'
[tʃʰələk]	'spill'
[tʃʰajəl]	'a cotton saree'
[tʃʰuʈək]	'loose'
[tʃʰevəʈ]	'end'
[dʒkʰəm]	'wound'
[dəgət]	'world'
[dʒəṇəs]	'thing'
[dʒətən]	'nurture'
[dʒənəm]	'birth'
[dʒəban]	'language'
[dʒəməṇ]	'dinner/lunch'
[dʒərur]	'sure'
[dʒəvab]	'answer'
[dʒuvan]	'young'
[dʒadʒəm]	'carpet'
[dʒamin]	'bail'
[dʒavək]	'expenditure'
[dʒasus]	'spy'
[dʒaɦer]	'public'
[dʒigər]	'heart'

[dʒiraf]	'giraffe'
[dʒugəɭ]	'pair'
[dʒulab]	'purgative'
[dʒokʰəm]	'danger'
[dʒoɖaɳ]	'joint'
[dʒotər]	'yoke'
[dʒʱələk]	'glimpse'
[dʒʱəver]	'a name'
[dʒʱarəɳ]	'welding'
[ʈəkav]	'maintain'
[ʈəgər]	'a flower'
[ʈə pal]	'mail'
[ʈəsər]	'a kind of silk'
[ʈuval]	'towel'
[ʈʰərel]	'matured'
[ʈʰakər]	'a community'
[ʈʰakor]	'a small king'
[ʈʰokər]	'trip'
[dəfoɭ]	'duffer'
[ɖakəɳ]	'witch'
[ɖaməɾ]	'tar'
[ɖoləɳ]	'swinging'
[ɖoləɾ]	'a flower'
[ɖʱəlaɳ]	'slope'
[ɖʱolək]	'drum'
[təɖəp/tələp]	'desire'
[təpas]	'inquiry'
[təmal]	'a tree'
[tərət]	'soon'
[tərəɖ]	'slit'
[tərəs]	'thirst'
[tərap]	'attack'
[tərunɳ]	'young'
[təʃav]	'pond'
[takid]	'warning'
[tamas]	'anger'
[tamil]	'Tamil'
[talim]	'training'
[tasək]	'plate'
[tavidʒ]	'charm'
[tʧər]	'a bird'
[tuʃar]	'dew'
[tuver]	'a pulse'
[tedʒəl]	'a name'
[tedʒab]	'acid'
[tevis]	'twenty three'
[torəɳ]	'a festive hanging'
[tʰotʰəɾ]	'swelling'
[dəkʰəl]	'disturbance'
[dəʱən]	'burning'
[dakʰəl]	'admit'
[daɖəm]	'pomegranate'
[dadəɾ]	'staircase'
[danət]	'motivation'
[divəs]	'day'
[divel]	'castor oil'
[dekʰav]	'scene'
[dolət]	'wealth'
[ɖoləɳ]	'swing'
[doʱən]	'churning'

[dʰəkɛl]	'push'
[dʰəɖək]	'throbbing'
[dʰənik]	'rich'
[dʰənur]	'tetanus'
[dʰəmaɳ]	'billow'
[dʰəvəl]	'white'
[dʰimaʃ]	'slowness'
[dʰupel]	'hair oil'
[dʰusər]	'tawny'
[dʰobəɳ]	'washer-woman'
[dʰoɭaʃ]	'whiteness'
[nəkəl]	'imitation'
[nəkar]	'negation'
[nəgər]	'city'
[nədʒər]	'look'
[nəmən]	'bowing'
[nəjən]	'eye'
[nərəm]	'soft'
[nəlin]	'lotus'
[nəsib]	'fate'
[nagər]	'a community'
[nadʒuk]	'delicate'
[naʈək]	'drama'
[natal]	'Christmas'
[nadan]	'childish'
[nadar]	'bankrupt'
[nanəp]	'humiliation'
[najəb]	'deputy'
[navik]	'boatman'
[nahək]	'uselessly'
[nikal]	'settlement'
[niket]	'house'
[nitʃoɖ]	'sum'
[nipuɳ]	'clever'
[nijəm]	'rule'
[niveʃ]	'abode'
[niraʃ]	'disappointed'
[niʃam]	'aim'
[niʃitʰ]	'night'
[niʃedʰ]	'restriction'
[niɖər]	'fearless'
[nipədʒ]	'production'
[nirəkʰ]	'see'
[nirədʒ]	'lotus'
[nirəv]	'soundless'
[nirəs]	'lack of interest'
[nilə m]	'saphire'
[nirog]	'healthy'
[nutən]	'new'
[nupur]	'anklet'
[nobət]	'drum'
[netər]	'cane'
[pəkəɖ]	'catch'
[pəkʰal]	'water carrier'
[pəgar]	'salary'
[pətʃʰat]	'backwards'
[paʈək]	'bang'
[pəɖəɭ]	'the film over the eye'
[paʈel]	'a community'
[pəɖoʃ]	'neighbourhood'

[pətən]	'down fall'	[puruʃ]	'man'
[pəɳətʃʰ]	'string of a bow'	[pokəɭ]	'hollow'
[pərəm]	'highest'	[popəɽ]	'parrot'
[pərag]	'pollen'	[polad]	'steel'
[pərigʱ]	'circumferance'	[poʃak]	'dress'
[pərodʱ]	'dawn'	[polis]	'police'
[pələk]	'blink'	[poʃəɳ]	'nutrition'
[pəlaʃ]	'a tree'	[ʱədʒet]	'put to shame'
[pəvən]	'wind'	[ʃəɽək]	'break'
[pəʱaɖ]	'mountain'	[ʃəɖək]	'fear'
[pagəl]	'mad'	[ʱərək]	'difference'
[patʃʰəɭ]	'back side'	[ʱaraɭ]	'food for the fasting days'
[paɽəɳ]	'a city'		
[pataɭ]	'region under the earth'	[ʃələk]	'board'
		[ʃəsəl]	'crop'
[padʱər]	'outskirt of village'	[ʃadʒəl]	'extra'
		[ʃanəs]	'a lamp'
[pamər]	'weak'	[ʃarəs]	'force'
[pajəl]	'anklet'	[ʃikər]	'worry'
[parekʰ]	'a surname'	[ʃuveɖ]	'clumsy'
[paləkʰ]	'spinach'	[ʃorəm]	'fragrance'
[paləv]	'front end of the saree'	[bəkul]	'flower'
		[bəgaɖ]	'destruction'
[pavək]	'holy'	[bəɽət]	'saving'
[pitʃʰan]	'acquaintance'	[bəɽən]	'button'
[piɖən]	'harassment'	[bədəl]	'change'
[pipəɭ]	'a tree'	[bənav]	'incident'
[pipər]	'a herb'	[bəpor]	'noon'
[punəm]	'full moon night'	[bəbəɖ]	'mutter'
[puraɳ]	'myth'	[bərəf]	'ice'

[badʒəʈʰ]	'a stool'	[mədəd]	'help'
[batəl]	'cancel'	[mədar]	'hope'
[babət]	'paint'	[mədʱur]	'sweet'
[barik]	'minute'	[manəs]	'mind'
[baliʃ]	'childish'	[məfət]	'free of charge'
[bavən]	'fifty two'	[məjur]	'peacock'
[bavəl]	'a tree'	[mərod]	'twist'
[bavis]	'twenty two'	[mərən]	'death'
[bedʒar]	'harassed'	[məlaj]	'wind'
[beʈʰək]	'seat'	[məlin]	'dirty'
[betal]	'rhythmless'	[məʃin]	'machine'
[botʰəɖ]	'duffer'	[məsadʒ]	'massage'
[bʱəgət]	'devotee'	[məsur]	'a pulse'
[bʱədʒən]	'devotional song'	[məʱan]	'big'
[bʱəʈək]	'roam'	[makʰəɳ]	'butter'
[bʱərəɖ]	'grind'	[magəɳ]	'beggar'
[bʱəvən]	'house'	[maɳek]	'ruby'
[bʱago]	'gate'	[madʱəv]	'Krishna'
[bʱaɳedʒ]	'niece/nephew'	[manəv]	'man'
[bʱarət]	'India'	[maɳəs]	'man'
[bʱitər]	'inside'	[maʃək]	'suitable'
[bʱiʃəɳ]	'terrible'	[maʈəɳ]	'gardener' (she)
[bʱekʰəɖ]	'rock'	[midʒadʒ]	'temper'
[məkan]	'house'	[milən]	'meeting'
[məgən]	'name'	[milit]	'met'
[məgər]	'crocodile'	[mukam]	'destination'
[mədʒəl]	'way'	[mukuʈ]	'crown'
[mədʒur]	'labourer'	[mukur]	'bud'
[məʈək]	'blink'	[mukul]	'bud'
[mətʰək]	'destination'	[mudʒəb]	'accordingly'

[mudət]	'period'
[munim]	'clerk'
[murət]	'occassion'
[moʈəp]	'greatness'
[modʒud]	'present'
[mohən]	'Krishna'
[mosəm]	'weather'
[moʃəp]	'blandness'
[jəvən]	'muslim'
[juvək]	'youngman'
[jodʒək]	'planner'
[rəkəm]	'amount'
[rəkʰat]	'kept'
[rəgəɖ]	'crush'
[rədʒət]	'silver'
[rədʒəs]	'passionate'
[rəɳən]	'chant'
[rətəʃ]	'redness'
[rəmən]	'name'
[rəsik]	'colourful'
[rəsaɭ]	'juicy'
[rəsid]	'receipt'
[ranək]	'name'
[ravən]	'Ravana'
[raman]	'a kind of a lamp'
[ravəl]	'a community'
[rumal]	'kerchief'
[rokan]	'investment'
[ləkʰan]	'in writing'
[ləgən]	'marriage'
[ləgam]	'rein'
[ləgar]	'slight'
[ləʈək]	'hang'
[ləɖʰən]	'style'
[ləbaɖ]	'cunning'
[lələt]	'a raga'
[ləlaʈ]	'forehead'
[ləvən]	'salt'
[ləsən]	'garlic'
[lagʰəv]	'brevity'
[lalətʃ]	'temptation'
[lalən]	'fondling'
[lilam]	'auction'
[lekʰən]	'writing'
[lokəl]	'local'
[lolup]	'greedy'
[loban]	'essence'
[lotʃən]	'eyes'
[vəkil]	'lawyer'
[vəkʰan]	'praise'
[vəkʰar]	'godown'
[vəgər]	'without'
[vəgʰar]	'seasoning'
[vətʃən]	'promise'
[vətʃeʈ]	'the middle one'
[vədʒən]	'weight'
[vədʒir]	'minister'
[vəɳik]	'bania'
[vəɳaʈ]	'weaving'
[vətən]	'native place'

[vəmən]	'vomit'
[vəməɭ]	'whirlpool'
[vərək^{h}]	'paper thin sheet'
[vərɦəd^{ɦ}]	'liver disease'
[vəraɭ]	'steam'
[vãtʃək]	'reader'
[vadən]	'playing of music'
[vadəɭ]	'cloud'
[vapəs]	'return'
[vapər]	'use'
[vaman]	'short/dwarf'
[vajəl]	'a kind of cotton'
[varəs]	'heir'
[vavəɖ]	'news'
[vasəɳ]	'vessels'
[vaɦən]	'conveyance'
[vikas]	'development'
[vigət]	'details'
[vitʃar]	'thought'
[vidaj]	'parting'
[vid^{ɦ}an]	'statement'
[vinəj]	'politeness'
[vinaʃ]	'destruction'
[vinit]	'polite'
[vipin]	'name'
[vib^{ɦ}ag]	'division'
[vib^{ɦ}av]	'notion'
[viman]	'plane'
[vimuk^{h}]	'averted'
[vijog]	'separated'
[virəl]	'unique'
[viraɭ]	'huge'
[viram]	'rest'
[virod^{ɦ}]	'opposition'
[virup]	'ugly'
[vilap]	'crying'
[vilas]	'gaiety'
[vilin]	'merging'
[vivaɦ]	'marriage'
[viʃəd]	'elegant'
[vivek]	'manners'
[viʃaɭ]	'broad'
[viʃeʃ]	'more'
[viʃəj]	'subject'
[viʃad]	'sadness'
[viɦar]	'pleasure/walking'
[vigət]	'particulars'
[viɦin]	'without'
[vɛtʃaɳ]	'sale'
[vetən]	'salary'
[vepar]	'business'
[verəɳ]	'enemy' (she)
[veran]	'barren'
[veləɳ]	'rolling pin'
[ʃəkəɽ]	'cart'
[ʃəpət^{h}]	'oath'
[ʃəmən]	'extinguish'
[ʃəjən]	'bed'
[ʃərəɳ]	'refuge'

[ʃərət]	'condition'
[ʃərəd]	'autumn'
[ʃərəm]	'shyness'
[ʃərab]	'wine'
[ʃərif]	'gentleman'
[ʃərir]	'body'
[ʃasək]	'ruler'
[ʃasən]	'rule'
[ʃikar]	'hunting'
[ʃikʰər]	'peak'
[ʃitʰil]	'cold'
[ʃijəɭ]	'chastity of woman'
[ʃiʃi r]	'a season'
[ʃukɔn]	'auspicious'
[ʃotʃɔ k]	'thinker'
[ʃonit]	'blood'
[ʃodʱən]	'search'
[ʂəkəɭ]	'all'
[səgir]	'underage'
[sətʃet]	'precautions'
[sətʃoɭ]	'exact'
[sədʒəɭ]	'with tears'
[sədʒiv]	'living'
[sədɻək]	'road'
[sədər]	'respective'
[sədəj]	'kindly'
[sədʱən]	'wealthy'
[səpaɭ]	'flat'
[səʃed]	'white'
[səʃər]	'tour'
[sabut]	'proof'
[səmədʒ]	'understanding'
[səməj]	'time'
[səmadʒ]	'society'
[səman]	'equal'
[səmar]	'cutting vegetables'
[səmas]	'compound'
[sɜmip]	'nearby'
[sə met]	'alongwith'
[səɾəɭ]	'simple'
[sərək]	'slip'
[sərodʒ]	'lotus'
[səlaɭ]	'mason'
[sərod]	'a musical instrument'
[səlam]	'salute'
[səlil]	'water'
[sʱəvar]	'morning'
[səval]	'question'
[səʱədʒ]	'easily'
[səʱaj]	'help'
[sakər]	'sugar'
[sagər]	'sea'
[sadʒɜn]	'lover/husband'
[satɜ̀m]	'seventh day'
[sadər]	'present'
[sadʱək]	'a worshipper'
[sabər]	'stag'
[sabit]	'proved'
[sabaʃ]	'bravo'

[saman]	'luggage'
[sabʰar]	'with thanks'
[ɦakar]	'affirmation'
[ɦəkim]	'a doctor'
[ɦədʒəm]	'digest'
[ɦədʒam]	'barber'
[ɦədəp]	'grab'
[ɦənən]	'killing'
[ɦəjat]	'existing'
[ɦərəkʰ]	'joy'
[ɦərəɳ]	'deer'
[ɦərəf]	'word'
[ɦərəs]	'piles'
[ɦərif]	'competitor'
[ɦərek]	'each one'
[ɦəroɭ]	'line/queue'
[ɦələk]	'style of singing'
[ɦəvən]	'sacrifice'
[ɦəɭəd]	'turmeric'
[ɦakəl]	'shout'
[ɦadʒər]	'present'
[ɦəmal]	'coolie'
[ɦisab]	'accounts'
[ɦikəɭ]	'cold'
[ɦiməʤ]	'a herbal medicine'
[ɦevan]	'animal'
[ɦeval]	'narrative'

4.6. Strength hierarchy of consonants

Most attempts of syllabication have taken into account the initial and final consonant clusters. It is proposed here that the order of consonants in such clusters in Gujarati will follow the strength hierarchy. It is accepted here (following the earlier attempts) that as many consonants as necessary should be transferred from the second syllable onset to the first syllable coda so that the beginning of the second syllable becomes a possible word initial cluster. But these attempts have assumed that segmental boundaries coincide with the syllable boundaries. Gujarati issues such as murmur (spreading both the ways), doubling of the medial consonants, ambisyllabicity of single medial consonants, will not allow such absolute slicing based merely on initial - final clusters and strength hierarchy.

Some modifications in earlier proposals are essential here. It is shown here that,

(1) Hooper's strength hierarchy is inadequate for Gujarati as it does not take care of sequences such as [#'s' + consonant (+ liquid)]. Hence a hierarchy which takes into account dependency relations is proposed. Evidences for this hierarchy are also given.

(2) Anderson and Jones' proposal for interlude and Goldsmith's autosegmental frame may be effectively used together to a certain point and rules for the syllabication can be framed.[63] Gujarati initial clusters beginning with 's' are

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63. Theoretical differences between these two are discussed with the conclusions. (Chapter V).

listed in 4.3.1. Behaviour of 's' calls for a strength hierarchy as below:

voiceless stops	ʃ	s	voiced stops	nasals	liquids	glides	h*
←							
8	7	6	5	4	3	2	1

* = only for murmured dialects.

The strength of consonants in initial cluster will show same descending order except that initially /s/ may precede any other consonant but not itself, even if that consonant is of greater strength. (medially 's + s' does appear as already noted in [lissũ]). Barri[64] gives such 's' for Italian strength hierarchy. This strength hierarchy will have a condition,

cm_i= (s) c_m, c_n, c_p V where m>n>p, and

where c_m, c_n, $c_p \neq$'s', if 's' is present.

The strength of the segments is better explained within the paradigm of dependency phonology. Anderson and Jones[65] have suggested two phonatory components,

(1) |V| "a phonatory component" which can be glossed as "relatively periodic".

(2) |C| is a component of "energy reduction". They claim that the segments are made of various combinations of these phonatory components. The combinations are:

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64. Barri, 1979, p. 75.

65. Anderson and Jones, 1977.

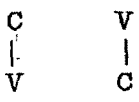
I. $|C| \rightrightarrows |V|$, $|V|$ may be dependent on $|C|$

i.e. $|C|$ governs $|V|$.

$|V| \rightrightarrows |C|$, $|C|$ may be dependent on $|V|$

i.e. $|V|$ governs $|C|$

The graphs for these are :



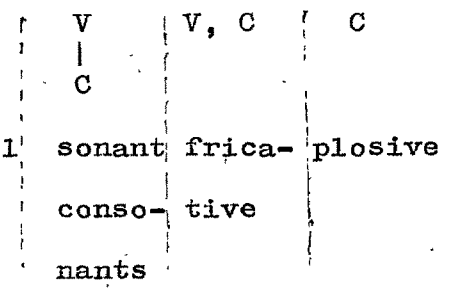
II. $|V|$ and $|C|$ can occur alone;

III. $|V|$ and $|C|$ may be mutually dependent.

$|V| \leftrightarrows |C|$, or $|C| \leftrightarrows |V|$

i.e. V, C or C, V

Hence,



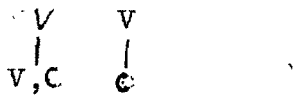
Here the left to the right order is the hierarchy of 'syllabicity' i.e. the segments containing $|V|$ are more likely to be syllabic than those not containing $|V|$. Vowels are V-er than sononant consonants as they don't contain $|C|$ and sonants are more V-er than fricatives as $|C|$ is governed by $|V|$ in sonants, while as in fricatives $|C|$ and $|V|$ are mutually dependent.

Voicing is an additional component which when subjoined will make the segment V-er and also weaker, e.g.

voiced fricatives are:

and voiced stops are:

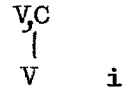
Liquids which are continuants and nasals which are non-continuants (but sonorants) are:



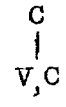
Liquids nasals

Glides which are sonants are:

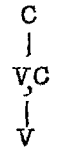
Gujarati 'h' can be very well explained if we takes Lass' treatment into account. It is already noted in chapter I that 'h' is 'dearticulated' and 'deoralized'. Thus it appears in the form of a laryngeal gesture. It involves deletion of all supra-laryngeal information. 'h' which is an aspiration going with voiced stops and 'h' occurring as an independent segment, both delete supra-laryngeal information. Hence 'h' is:

 i.e. [ɦ]

all the voiceless aspirated stops are:



and voiced aspirated stops are:



Theoretically there is no objection to more than one subjunction path.[66] Lass has suggested that the feature 'laryngeal' is retained and the feature 'oral' is deleted in a weakening

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66. Ewen, 1977, p. 316.

process.[67] Ewen has accepted Lass' two-gesture representation.[68]

4.6.1. Evidence for the strength hierarchy

The dependency relations between these phonatory components help to form the criteria for strength hierarchy parameter. It could be considered universally true that in prescribed environments if the segment gets V-er, it is undergoing a weakening process and vice-versa. Inherent potentiality in some of the segments to get V-er moulds the sequential constraints on the consonants.

Criteria by which Gujarati strength hierarchy is decided can be given as:

(a) In Gujarati murmured dialects 'ɦ' is the weakest. It is weaker than all the other consonants because it alone gets deoralized and merges with the adjacent vowels.

(b) Glides are (stronger than 'ɦ' in murmured dialects) weaker than all other consonants because (1) they can substitute high vowels when they occur in final position, e.g.

nəu / nəv 'nine'

soi / soj 'needle'

(2) 'j' can occur as the second member of the clusters with all the consonants (3) in vowel sequences having a high vowel, the glidal elements appear (4) glides occur as remnants of nasality (dialectally).

(c) Liquids are stronger than glides and weaker than other consonants because they don't substitute vowels as glides do and 'r' occurs as the second member of CL clusters

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67. Lass, 1976, p. 163.

68. Ewen, 1977, p. 316.

or the first member of LC clusters with most of the consonants.

(d) Nasals are stronger than liquids and glides and weaker than stops because (i) they cannot occur in cluster with every consonants as liquids and glides do (ii) when they occur as a first member of the CC clusters, they get assimilated to the following sound. Assimilation is the first stage of weakening of nasals in Gujarati. They are weaker than stops and fricatives in the sense that their sonority component can convert them into merely a nasality element and further still denasalization also can begin.

(e) Voiced stops are weaker than the fricatives and voiceless stops because they spirantize in the medial position.*

g → ɣ	[aɣəl]	'in front'
d → ɾ	[vaɾəL]	'cloud'
b → β	[aβru]	'prestige'

* This is in murmured dialects.

The voiced aspirated stops spread murmur and create a V-er continuum.

(f) 's' is weaker than 'ʃ' and voiceless stops because

(1) only 's' can come initially followed by stops.

(2) only 's' can become 'h' (dialectally) i.e. it deletes the supralaryngeal information.

(g) This leaves the voiceless stops as the strongest consonants of the language. Out of the words having geminated consonants 39.4% words have voiceless consonant doubling (gemination is for stressing and here is a strengthening process.)

4.6.2. Rules for syllabication

The suggested syllabication of Gujarati draws from various proposals but it is intended to show that prosodicity due to sonorants cannot be handled by all these proposals rich though they are in many ways. Firthian prosodic approach is in many ways inadequate for methodological purposes though it is from his prosodic 'approach' that this work began.[68,69] Goldsmith has correctly seen the lack of well-formedness condition in Firthian approach. Goldsmith's autosegmental approach is partly accepted here for its insistence on well-formedness condition.

Syllable boundaries can be stated as in the following rules:

Syllabication 1

Every [+syll] segment be assigned one syllable, e.g.

/v ɔ ɖ o d r a /
| | |
s s s

The use of features [+syllabic] as well as [+vocalic] for vowels is discouraged by many linguists. It is felt that phonetic properties of syllabicity features are difficult to define. Anderson and Jones consider 'syllabicity' as a combinatorial rather than inherent phonetic property.[70] For the phonological approach here [+syllabic] feature is preferable to [+vocalic] feature for vowels. It is certain that syllabic element is significant in determining syllabic boundaries. Each syllabic

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68. Goldsmith (Ed. Dinnsen) 1979, p. 204.

69. Langendoen, 1968.

70. Anderson and Jones, 1977.

element is the 'obligatory' nucleus' of syllabic 'syntagm'.

Gujarati [+syllabic] sequences can be presented as suggested by Anderson and Jones. The general phonetic rule applicable to two vowel sequences is that in such a sequence when the second vowel is [+high], it is [-syllabic]. The second vowel will be [+sonorant-consonantal] but [-syllabic] i.e. [w] and [j]. [w] and [j] in presyllabic position function as consonants when the second vowel is [-high] both the vowels are [+syllabic] and we get two syllables, e.g.

second vowel is [-syllabic] in

[piũ]	'drink'
[nəu]	'nine'
[k^haũ]	'eat'
[beu]	'both'
[dʒoũ]	'see'
[pəi]	'a pie'
[bai]	'woman'
[soi]	'needle'
[dʒui]	'a flower'

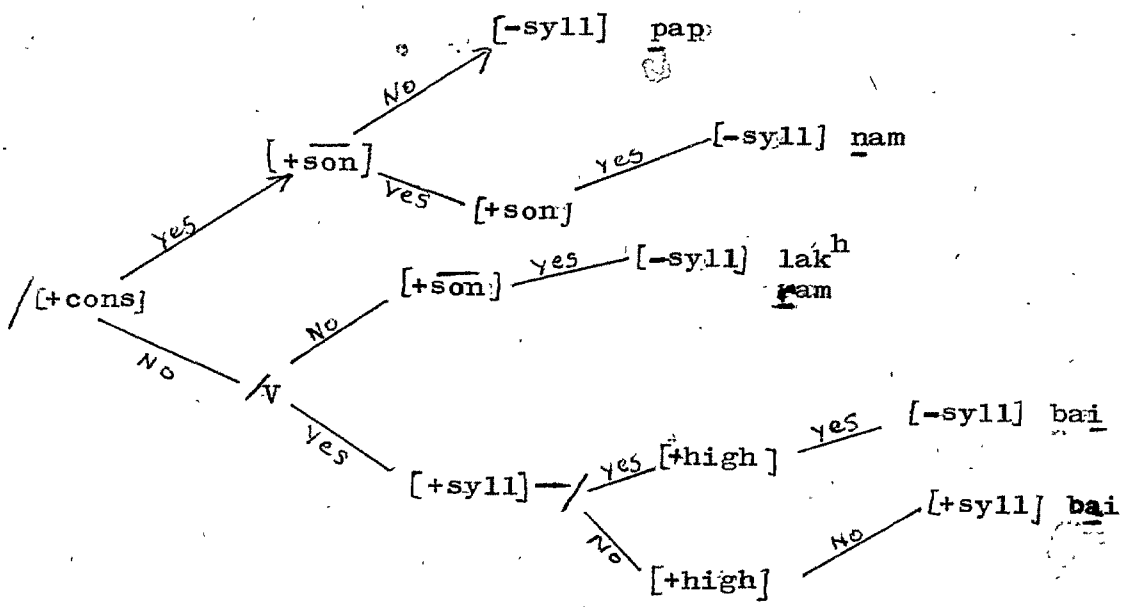
This [-syllabicity] of the second vowel remains only in the fluent speech with natural speed. Yet it is also certain that the values of syllabicity of such vowels may change in longer stretches. If [+syllabic] follows these words the second vowel will get syllabicity, e.g.

In [bai], [i] is [-syllabic],

but in [bai avja] 'woman came',

[i] gets [+syllabic] value as [ai] does not remain diphthongal any more. Although this change does not come under the syllabication rules given here.

Following Anderson and Jones[71] formulation for syllable segment selection (SSS) a tentative flow diagram is proposed as below:



e.g. Now the process of syllabicity assignment for /bai/ will be:

/b/ is 'Yes' to [+cons] and 'No' to [+son]: it is therefore [-syll]. The vowel /a/ is 'No' to [+cons] and 'Yes to 'V', 'No' to [+syll] - 'No' to [+high] and thus is [+syll]. The vowel /i/ is same as /a/ but it is 'Yes' to [+high] and hence [-syll].

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71. Anderson and Jones, 1977, p. 115.

Syllabication 2

(a) $c_1 \text{----} c_n$ V $\Longrightarrow$ $c_1 \text{---} c_i + c_{i+1} \text{---} c_n$ V

s s

where $c_{i+1} \text{---} c_n$ is a permissible cluster but

c_i, $c_{i+1} \text{---} c_n$ is not.

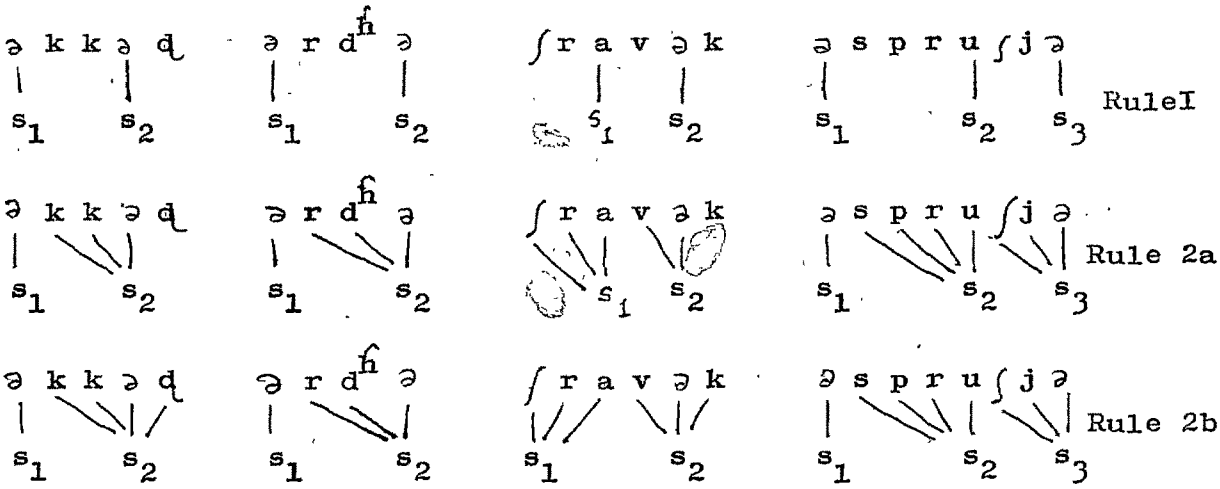
(b) V $c_1 \text{---} c_n$ $\Longrightarrow$ V $c_1 \text{---} c_j$, $c_{j+1} \text{---} c_n$

s s

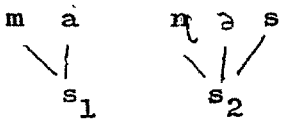
where $c_1 \text{---} c_j$ is a permissible cluster but

$c_1 \text{---} c_j$, c_{j+1} is not.

The application of rules:



These rules are too exclusive as the medial consonant sequence is completely assigned to the following vowel. As a result a very large data in Gujarati will be syllabicated as,



This satisfies minimalist view of syllabification[72] where initial

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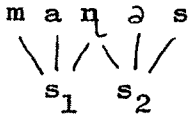
72. Anderson and Jones, 1977, p. 94.

boundaries are pushed forward as far as possible. So one more rule will have to be added;

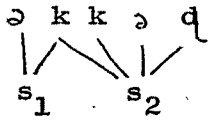
Syllabication 3

In [-cons] c c_o [V, +stress] (c) associate c and s_1

so now we get



This also rectifies the results of the application of rule IIa,b to words like [ə kkəɖ] , [ə ʂʈə] where -kk- and -ʂʈ- were syllable initial clusters. Now we get,



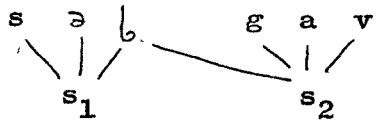
Still one more rule is required to remove incompatible clusters from syllable initial position.

Syllabication 4

In c_1 c_2 [V, +stress] (c) associate c_1 and s_2

Condition: cc_2 must not be the member of universally prohibited clusters and so also not the member of incompatible language specific clusters.

This rule will be too inclusive, e.g.



and will give -ŋg- sequence, but the condition will block the application of this rule. (See the list on p.588-589

4.6.3. The functions of syllable

The rules for syllabication compel us to see how the syllable rhythm functions in the language. Constraints on phonological representation are related to constraints on syllables, i.e. framework constraints.

Donegan and Stampe[73] give two very important 'universal and absolute' restrictions on the order of language rules and processes. These restrictions throw light on many puzzling issues. Issues such as murmur, nasalization, stress and length are unsolvable at segment level. If looked upon as 'processes' these issues become quite clear. Donegan and Stampe consider the domain of processes asegmental. They feel that prosodic domains are hierarchic and the processes are obligatory within syllables.

It has been noted in Chapter III that the process of assimilation of nasalization is blocked by voiceless consonants in progressive direction. Such retardation of assimilation means regressively functioning process. The regressive domain is obligatorily the 'syllable'. Nasalization in Gujarati though induced by segmental phonemes is a prosody.

Gujarati has two such natural prosodies: one is the process of murmur (against this is tight phonation process); the second is nasalization. Murmur is a result of lenition process induced by segments which results into vocalicity - sonority - spread. The tight phonation is the result of fortition process not induced by

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73. Donegan and Stampe (Eds. Bell and Hooper) 1978.

any segment and hence the domain is not restricted to any measure. Nasalization is common to both the phonation types and it has syllable as its domain. Nasality can cover many more segments than points of articulation can involve. Donegan and Stampe[74] do not consider nasalization (or even for that matter 'murmur') as 'truly prosodic' because of its assimilative tendency. According to them syllabicity, stress, duration etc. are not assimilative and hence are truly prosodic. Nevertheless nasalization and murmur have been referred to as prosodies in earlier chapters because we have not followed this differentiation. In fact it is presumed here that any speech phenomenon which spreads over longer stretches of phoneme sequences and has nondiscrete character is prosodic. However it is not a controversial issue. The fact is that syllable serves as a carrier of prosodic qualities.

Syllables in all the languages often undergo 'across-the-board' changes. These changes may seem irregular but actually they are balancing forces of the sequential continuum. These changes in syllable quantity are related to vowel shortening (reduction), deletion of final consonants, monophthongization, vowel nasalization, etc. In other words changes in segmental sounds can be better explained in terms of changes in prosodic mapping. Syllables which had long vowels with consonantal closure and which mapped in double beats may now be mapped into single beats after such changes have taken place. This viewpoint suggests that 'syllables' may be the basic element in speech. The Gujarati issues of stress and length are predictable in such syllabic mappings.

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74. Donegan and Stampe (Eds. Bell and Hooper) 1978, p. 29.

4.7. Stress, length and syllable

Here we want to show that the phonology of the language is the adjustment where segmental phonological processes fit into the syllable - rhythmic patterns of the language. Stress is predicted in Gujarati as thus:

(1) All the mono-syllables have the stress which has a 'neutral-stress' status i.e. comparisonless stress or acompared stress, unless paralinguistically an intentional stress is added, e.g.

[mə́n]	'mind'	[é]	'he'
[tál]	'beat'	[á]	'this'
[píp]	'drum'	[tó]	'then'
[kém]	'why'	[tṹ]	'you'
[tól]	'measure'		
[púl]	'bridge'	[g^{ɦ}í]	'ghee'

Intentional stress can bring heavy stress on the syllables, e.g.

kém↑ 'why?' (what cheek!)

(2) (a) In all the disyllabic words having the second open syllable, the first closed syllable takes the stress except when the first vowel is the reducible vowel 'ə', e.g.

[ká˛o]	'black'
[tára]	'stars'
[pú˛o]	'bundle of grass'
[pélo]	'he'
[kí˛o]	'insect'
[pólo]	'hollow'

Examples with 'ə' in the first syllable,

[ʃəníˈ]	'saturn'
[ʊəvíˈ]	'sun'
[səʤáˈ]	'punishment'
[məʤʰáˈ]	'fun'
[məné]	'to me'
[pəté]	'gets finished'
[gəɭóˈ]	'a tree'
[səɖóˈ]	'rotten (n)

(b) If the second syllable is closed, the second is stressed, e.g.

[mənə́n]	'concentration'	[kʰənídʒ]	'mineral'
[vaɦə́n]	'conveyance'	[dʒəmín]	'ground'
[kʰarék]	'dry date'	[nupúr]	'anklet'
[paléʤ]	'a place'	[kəbúl]	'agree'
[bʱugóɭ]	'geography'	[səpáʈ]	'flat'
[səródʒ]	'name'	[vəkʰár]	'godown'

(c) If the second syllable ends in a vowel and is followed by a morpheme which begins in a vowel then automatically the second syllable gets stressed. Any vowel sequence is heavier and is stressed.

(3) In trisyllabic words also the second closed syllable takes the stress.

[mənúʃjə]	'man'
[kəróɭijo]	'spider'
[məsálo]	'spice'
[əkʰétro]	'experiment'
[musəlman]	'muslim'
[əkɭáwũ]	'to get impatient'
[məŋkóɖo]	'insect'.

(4) (a) In polysyllabic words stress is adjusted according to the syllabic rhythm. Nevertheless the stress on the second closed syllable seems to be steady, e.g.

dəʃə́n	'burry'
dəʃnáv	'get burried'
dəʃnávnár	'one who burries'
dəʃnávnára	'those who bury'
dəʃnávnarámã̃	'in those who bury'
dəʃnávnará mát^{h}i	'from those who bury'

The syllables in the extended formation get stress when it is closed. The verbal inflections will also have such stress pattern.

kəkə́ɭ	1	'cry'
kəkɭé	2a	'(he) cries'
kəkə́ɭie	4	'(we) cry'
kəkɭíʃũ̃	4	'(we) will cry'
kəkɭíʃ	2b	'(I) will cry'
gəb^{ɦ}rá-ũ̃	2c	'(I am) affraid'
gəb^{ɦ}rá j	2b	'(he is) affraid'
gəb^{ɦ}ráie	2c	'(we are) affraid'
gəb^{ɦ}raíʃũ̃	3	'(we will be) affraid'

(b) If the vowel in the first syllable is nasalized the stress tends to remain on the already 'heavy' vowel, e.g.

g^{ɦ}ṹɬ	1	'pound'
g^{ɦ}ṹɬũ̃	2a	'(I) pound'
g^{ɦ}ṹɬie	4b	'(we) pound'
g^{ɦ}ṹɬíʃũ̃	4b	'(we will) pound'
g^{ɦ}ṹɬíʃ	4b	'(I will) pound'

tʃõʈ	1	'stick'
tʃõʈiʃ	4b	'(I will) stick'
tʃõʈ iʃũ	4b	'(we will) stick'
tʃõʈie	4b	'(we) stick'

All these examples show that,

(1) Gujarati syllable is heavy

(a) if it is closed

(b) if it has a nasalized vowel.

(2) and heavy syllables are stressed.

Ohsiek[75] felt that there must be some intrinsic characteristics of heavy syllables either phonetic or phonological in nature which is responsible for their propensity to receive or attract word level stress. The main features of heavy syllable are diphthongized vowels or one or more syllable final consonants.

As noted in Gujarati the stress assignment strategy allows stress to shift leftwords or rightwords depending on the heaviness of the syllable. Heavy syllables usually siphon off the stress and non-heavy syllables seem to rebuff the stress sending it over to the more receptive heavy syllables in the word, e.g.

manə́s	second close heavy syllable
+ ái	with stressed long vowel making
manə́s + ái	the syllable heavy

'sai' siphons off the stress and dissolves the second syllable altogether and we get,

manəsái

Ohsiek[76] has given a phonetic explanation for the affinity between

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75. Ohsiek (Eds. Bell and Hooper) 1978, p. 35.

76. ibid, p. 37. It was found by Ohsiek that heavy syllables play a major role in the determination of stress placement in thirty languages out of the forty examined by her.

heavy syllables and stress. Some of the phonetic correlates of stress are automatically present to a significant degree in all heavy syllables and these intrinsic characteristics of heavy syllable become phonologized into the linguistic feature of stress. Here it should be noted that we have not taken all the morphological formations into account. This issue of phonologized stress also bears on thematic formations. (Here such deviant phonology is not accounted for). It has been noted by Lehiste[77] that increased fundamental frequency and increased duration are strong cues for the presence of stress. Bolinger[78] has considered pitch prominence as a cue to stress, and duration as a covariable with pitch. In general more intense and longer the syllable more likely it is the that it gets stressed. Ohsiek's conclusion is similar to this. She feels that stress rule is likely to favour those syllables which already contain substantial measure of the phonetic features necessary for the production/perception of stress. The acoustic features of stress in syllables make them perceptually similar to heavy syllables with the effect of merging the difference between two syllable types.

Lehiste[79] has considered stress as having two characteristic features;

(1) stress serves to divide the speech chain into significant syntactic - semantic units. Stress has an organizing function.

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77. Lehiste, 1970, p. 131.

78. Bolinger, 1958.

79. Lehiste, 1970, p. 147.

(2) The occurrence and distribution of stress are describable in terms of units having phonetic or morphological criteria. According to her the smallest probable unit that may carry stress must be approximately the size of a syllable; and phonetically stress is not a property of single segment. Even if we considered syllable as the domain of stress placement the difference between the stressed and the unstressed syllables can only be found out comparatively. Thus a minimal unit of contrastive stress placement is a sequence of two syllables.

The tonal nucleus of syllable is very predominant. Thus predominance defines syllable as a minimum dynamic unit of a successive movement of speech in time. The syllabic activity of tonal element "depends on the length of the optimum phase (peak) which regulates the rhythmic prolongation of the syllable in time".[80]

In Gujarati stress is one of the crucial factors that conditions the duration. Correspondingly duration can be considered as one of the phonetic manifestations of stress. The tendency of these suprasegmentals to co-occur makes it difficult to decide which one is the independent variable. In Gujarati there is no phonological contrast between short and long vowels. In general the heavy and stressed syllables make their vowels long. (However, the vowel 'ə' is the weakest vowel and is prone to reduction and deletion in the syllabic extensions.)

It has been noted by many linguists that languages having phonetic vowel-length distinction only can allow closed syllables

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80. Kramsky, 1971, p. 47.

to function as heavy syllables. Ohsiek found some exceptions to this from some Australian languages. The claim that phonemic vowel length is a prerequisite for syllable weight should be reconsidered in the light of such exceptions. In Gujarati also the length appears to have value in rhythmic sequences and it is not a feature of contrast. Gujarati data provides enough examples to prove that the acoustic feature of increased duration is shared by stressed syllables which are heavy syllables as well. In languages such as Gujarati it is the length of syllables and not the length of the constituent segments which is relevant. No doubt it is customary to treat length as a property of segments. But if we study the data carefully it would show that the vowel being the most easily extendible segment it is lengthened to conform to its prosodic matrix. The selection of segmental processes i.e. the selection of segments or the deletion of segments is largely determined even in childhood by the way segmental representations are mapped onto prosodic structure in speech. The application of prosodic processes is the most important factor in the living phonological pattern of a language and its long-range phonological 'drift'.[81]

Summarizing the issues of the heaviness, stress and length in Gujarati we can say that at word level

(1) all closed syllables are heavier than the open syllables.

(2) all heavy syllables attract stress.

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81. Donegan and Stampe (Ed. Dinnsen) 1979, p. 142.

(3) all heavy and stressed syllables have duration - length - as a covariable.

(4) (a) length is non-contrastive feature

(b) stress is also non-contrastive.

See the examples below:

open mono-syllabic ★ acompared stress		closed-heavy-stressed syllable	
		[a]	
[gʰá]	'wound'	[gʰá:t]	'a blow'
[tʃá]	'tea' (D)	[tʃá:sɳi]	'sugar syrup'
		[tʃá:ki]	'wheel'
[dʰá]	'attack'	[dʰá:p]	'bluff'
		[dʰá:m]	'place'
[ná]	'no'	[ná:t]	'caste'
		[ná:d]	'sound'
		[ná:ɭ]	'umbilical cord'
[má]	'mother'	[má:p]	'measure'
		[má:ɭ]	'floor'
[pá]	'one fourth'	[pá:n]	'leaf'
		[pá:ɭ]	'parapet'
[bá]	'mother'	[bá:p]	'father'
		[bá:d]	'substract'
[ɦá]	'yes'	[ɦá:tʰ]	'hand'
		[ɦá:r]	'garland'
[va]	'gas'	[vá:ɭ]	'hair'
		[vá:t]	'story'

★ where mono-syllabic examples were not available, we have given the words where the respective vowels occur in open syllables.

[e]

[ké]	'or'	[ké:r]	'havoc'
		[ké:d]	'prison'
[tʃə gé]	'gets blown'	[gé:l]	'playful'
[ʁak^{h}é]	'keeps'	[k^{h}é:l]	'game'
		[k^{h}é:t]	'farm'
		[k^{h}é:s]	'scarf'
[ʁətʃé]	'arranges'	[tʃé:ɭ]	'itching'
		[tʃé:t]	'be cautious'
[tʃ^{h}é]	'is'	[tʃ^{h}é:l]	'dandy'
[dʒé]	'which/who'	[dʒé:l]	'prison'
		[dʒé:m]	'thus'
[məʈé]	'gets well'	[ʈé:v]	'habit'
[həʈ^{h}é]	'moves'	[ʈ^{h}é:l]	'push'
		[ʈ^{h}é:s]	'tripping'
[məɖ^{ɦ}é]	'frames'	[ɖ^{ɦ}é:l]	'peahen'
[pəɖé]	'falls'	[ɖé:le]	'at garage' (D)
[té]	'he'	[té:m]	'thus'
		[té:r]	'thirteen'
[məʈ^{h}é]	'struggles'	[ʈ^{h}é:pla]	'an eatable'
[dé]	'gives'	[dé:n]	'blessings'
		[dé:ʃ]	'country'
[bəd^{ɦ}é]	'everywhere'	[d^{ɦ}é:mu]	'cowherd'
[nné]	'and/to'	[né:k]	'honest'
[ápe]	'gives'	[pé:s]	'enter'
		[pé:ɭ]	'stomach'
[bé]	'two'	[bé:s]	'sit'
[nəb^{ɦ}é]	'gets maintained'	[b^{ɦ}é:ʈ]	'gift'

[mɦẽ]	'I' (instrumental)	[me:ʃ]	'soot'
		[me:l]	'dirt'
[ɔre]	'oh!'	[re:l]	'floods'
[le]	'take'	[le:p]	'plaster'
[ɦɔve]	'now'	[ve:ʃ]	'dress'
[vəse]	'lives'	[se:r]	'golden chain'
[kəʃe]	'somewhere'	[ʃe:k]	'fomentation'
[səɦe]	'bears'	[ɦe:t]	'affection'
[ʈəko]	'percent'	[ko:ɳ]	'who'
		[ko:p]	'anger'
[kʰo]	'a game'	[kʰo:ɭ]	'cover'
		[kʰo:ɖ]	'defect'
[dəgo]	'cheating'	[go:ɭ]	'jaggery'
[gʰo]	'lizard'	[gʰo:r]	'acute'
[rətʃo]	'arrange'	[tʃo:r]	'thief'
[tʃʰo]	'let it be'	[tʃʰo:ɭ]	'splash'
[paʈo]	'bandage'	[ʈo:p]	'a big vessel'
[miʈʰo]	'sweet' (M)	[ʈʰo:k]	'bang'
[vəɖo]	'chief'	[ɖo:k]	'neck'
[pəɖʰo]	'read'	[ɖʰo:r]	'animal'
[to]	'then'	[to:r]	'arrogance'
[kɔtʰo]	'say'	[ʧʰo:k]	'mass'
[do]	'give'	[do:r]	'rule'
[dʰo]	'wash'	[dʰo:m]	'scorching'
[pəno]	'breadth of the cloth'	[no:m]	'ninth day of the fortnight'
[ʤəpo]	'repeat'	[po:ɭ]	'lane'
[tabo]	'control'	[bo:r]	'a fruit'
[bʰo]	'danger' (D)	[bʰo:ʈʰ]	'naive'
[səmo]	'times' (D)	[mo:t]	'death'

[o]

[ró]	'cry' (D)	[ró:dʒ]	'everyday'
[ló]	'take'	[ló:ʈ]	'flour'
[rəvó]	'samolina'	[vó:ʈ]	'vote' (borrowed)
[rəsó]	'juice'	[só:m]	'Monday'
[kəʃó]	'some'	[ʃó:k]	'mourning'
[kəɦó]	'say'	[ɦó:t]	'might have been'
	[i]		
[vəkí]	'possibility'	[kí:l]	'grease'
[səkʰí]	'she friend'	[kʰí:l]	'pimples'
[səgí]	'relative'	[gí:t]	'song'
[gʱí]	'ghee'	[gʱí:tʃ]	'crowded'
[rətʃí]	'arranged'	[tʃí:ɖ]	'anger'
[pətʃʰí]	'afterwards'	[tʃʰí:k]	'sneeze'
[həʤí]	'yet'	[ʤí:t]	'victory'
[kaɖʱí]	'took out' (F)	[ɖʱí:l]	'loose'
[mətí]	'intellect'	[tí:r]	'arrow'
[mətʰí]	'tried'	[tʰí:ʤi]	'frozen'
[səʤí]	'century'	[ʤí:n]	'day'
[bəɖʱí]	'all'	[ɖʱí:r]	'patience'
		[ní:r]	'water'
[ʤəpí]	'repeated'	[pí:r]	'saint'
[bi]	'seed'	[bí:ʤ]	'the second day of the fortnight'
[ʃəmí]	'quietened'	[mí:ʈ]	'stare'
[kʰərí]	'dropped'	[rí:t]	'method'
[bəlí]	'sacrifice'	[lí:p]	'smear'
[ʧávi]	'key'	[ví:ʤ]	'lightening'
[mási]	'aunt'	[sí:l]	'seal' (borrowed)
[kaʃi]	'Benaras'	[ʃí:l]	'character'
[ʃáɦi]	'ink'	[ɦí:m]	'snow'

[u]

[nakũ]	'end'	[kú:ɬ]	'family lineage'
[rakʰũ]	'keep' (I)	[kʰú:l]	'open'
[lágu]	'applicable'	[gú:m]	'lost'
[agʱu]	'distant'	[gʱú:ɬ]	'sip'
[satʃũ]	'truth'	[tʃú:p]	'quiet'
[patʃʰũ]	'again'	[tʃʰú:ɬ]	'freedom'
[dʒú]	'lice'	[dʒú:dʒ]	'few'
[saʈu]	'return'	[ʈú:p]	'hammer' (v)
[maʈʰu]	'feel hurt'	[ʈʰú:ʂ]	'exhausted'
[moḍũ]	'late'	[ḍú:l]	'loss'
[poḍʱũ]	'sleep' (I)	[dʱú:m]	'with bustle'
[tũ]	'you'	[tú:t]	'farce'
[matʰũ]	'head'	[tʰú:k]	'spit'
[sádu]	'simple'	[dú:r]	'far away'
[sadʱu]	'sage'	[dʱú:ɓ]	'dust'
[ánũ]	'his'	[nú:r]	'brightness'
[ápũ]	'give' (I)	[pú:dʒ]	'worship'
[rəfú]	'darning'	[fú:l]	'flower'
[sábu]	'soap'	[bú:m]	'shouting'
[vibʱu]	'a name'	[bʱú:l]	'mistake'
[rámu]	'a name'	[mú:k]	'keep'
[rú]	'cotton'	[rú:ɖʱ]	'established'
[lú]	'sunstroke'	[lú:m]	'bunch'
[sú]	'sleep'	[sú:r]	'a note' (musical)
[ʃú]	'what'	[ʃú:ɓ]	'pain'

It has been noted that 'ə' never occurs finally in indigenous words. Only in some Sanskritic words it can occur finally in reduced form. Hence lengthening of this vowel in the closed syllable cannot be demonstrated pairwise. Neverthe-

less it is shown below that ' ə ' is lengthened when in the heavy and stressed syllables and when not followed by another syllable having any of the other vowels which are inherently heavier than 'ə' .

[ə]

[dʒə́:k]	'obstinacy'	[mə́:dʰ]	'honey'
[nə́:kʰ]	'nail'	[mə́:n]	'mind'
[rə́:g]	'vein'	[lə́:p]	'unwanted arrival'
[rə́:tʃ]	'arrange'	[nə́:bʱ]	'sky'
[rə́:dʒ]	'granule'	[nə́:m]	'bow'
[tə́:ʈ]	'bank'	[lə́:j]	'rhythm'
[mə́:ʈʰ]	'a pulse'	[kə́:r]	'do/tax'
[tə́:ɖ]	'a split'	[kʰə́:l]	'pestle'
[sə́:ɖʱ]	'mast'	[dʒə́:v]	'barley'
[pə́:ɳ]	'but/vow'	[kʰə́:s]	'move'
[mə́:t]	'vote'	[və́:ʃ]	'in control'
[mə́:tʰ]	'try'		
[mə́:d]	'pride'		

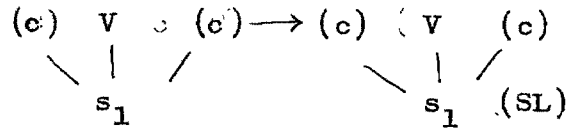
Nonetheless we can show that the vowel 'ə' in the second close syllable is longer than the 'ə' of the first syllable in disyllabic words.

[mə́ːn]	'mind'	[mənə́:n]	'concentration'
[bʱrə́:m]	'illusion'	[bʱrəmə́:ɳ]	'roaming'
[lə́:j]	'rhythm'	[prələ́:j]	'peril'
[dʒə́:n]	'person'	[dʒəɳə́:s]	'a thing'
[kʰə́:m]	'wait'	[kʰəmə́:ɳ]	'an eatable'
[nə́:m]	'bow'	[nəmə́:n]	'bowing'
[dʒʱə́:r]	'drip'	[dʒʱarə́:ɳ]	'welding'
[ʃə́:r]	'move'	[ʃərə́:k]	'difference'

4.7.1. Stress-length rules

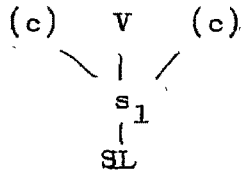
We have sufficiently demonstrated that stress and length are predictable in Gujarati. We extend here the rules for surface manifestation of stress-length.

I. Acompared mono-syllable stress-length rule



(SL = stress and length)

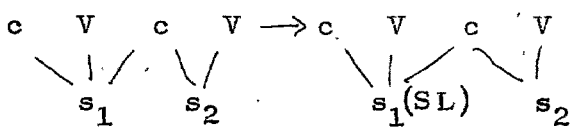
By WFC



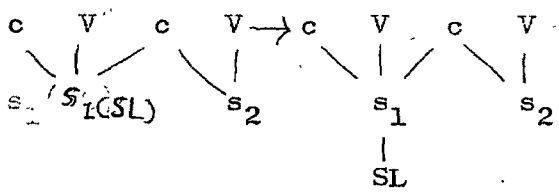
corrollary to I:

Any vowel of the open syllable in the disyllabic/polysyllabic word will loose its stress-length

II. Closed-heavy first syllable stress-length rule

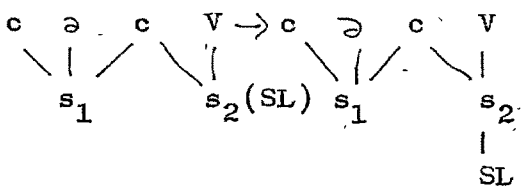


By WFC



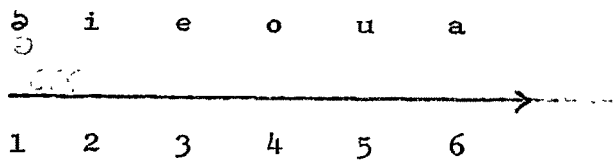
Condition: The vowel of the $s_1 \neq ə$ ('ə' being the weakest vowel it is incapable of associating itself to stress-length autosegment).

By WFC



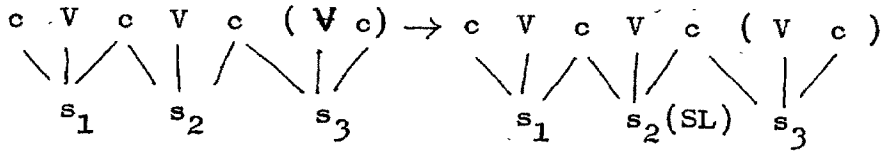
'ə' is the only deletable, reducible vowel, so on the strength

parameter it is considered the weakest as opposed to 'a' which is the strongest. 'ə' is incapable of holding nasality also.

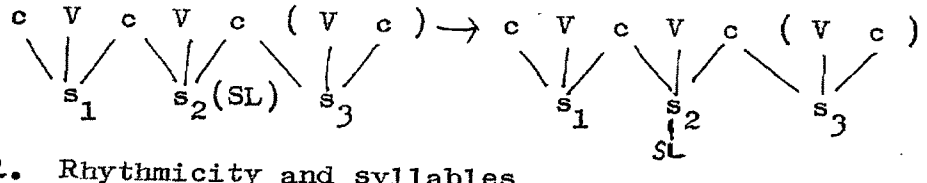


(Diachronically as well as dialectally 'a' has weakened to 'o' 'u' has weakened to 'a' and 'e' has weakened to 'i'. The details are not worked out here).

III. Disyllabic with second close vowel/polysyllabic stress-length rule.



By WFC



4.7.2. Rhythmicity and syllables

The length in Gujarati is 'the adjustment' process and this phonemenon of length provides a way of understanding how language sometimes undergoes changes in syllable quantity and structure. Looking at vowel length from such syllabic point of view, the issues of 'ə-a' relationship, [ə] vowel 'submersion', stress shifting, and 'ə-a' relationship in N-loss-nasalization process, all become clear to us.

The so called suprasegmental features of stress and heaviness "characteristically constitute patterns in time"... "The supra-segmental patterns define the phonological units and conversely

phonological units are characterized by suprasegmental patterns."[82] Phonology necessarily includes the description of 'performance' too and the speech performance certainly is a dynamic process. 'The neural and muscular systems impose a number of temporal constraints upon performance.'[83] Rhythm is of fundamental importance in the neural organization of performance".[84] Lenneberg's assumption that rhythm in speech serves as an organizing principle and as a timing device for articulation is highly convincing.[85] Physiological - neurological rhythmicity has been universally accepted for the vertebrate's brain. This rhythmicity and the language specific rhythmicity together interact. The internal rhythm i.e. physiological and neurological rhythm from human brain and the two external rhythms of human speech (one is syllabic rhythm and second is language specific rhythm) merge into one another. The failure to explain the exact connection between the syllabic unit and its physiological correlate has hindered the full understanding of suprasegmentals too. It has been assumed that ordering of speech events has a temporal dimension, along with the natural rhythm. "The rhythm is seen as the timing mechanism which should make the ordering phonemenon physically possible. The rhythm is the grid.. into whose slots events may be intercalated".[86] Lenneberg's hypothesis is that

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82. Lehiste, 1970, p. 154.

83. ibid p. 155.

84. ibid p. 155.

85. Lenneberg, 1967, p. 118-120.

86. ibid.

for the speech sounds, muscles must be activated at such a rapid succession that the neuronal firing order functioning with accuracy of milliseconds must be assumed. This automatism consisting of intricate time pattern is based on underlying rhythmic metric. It is also assumed that each motor pattern is somewhat similar to fundamental motor patterns that underlie speech mostly corresponding to syllables.

All these assumptions make a good case for understanding the suprasegmentals in general and the time dimension in particular. As for the description of the speech sounds and of their organization reference to, time dimension is inevitable.

It is assumed here that Gujarati rhythmic pattern and its syllabic organization run hand in hand. The stress, length and heaviness of the syllables get fitted into their respective, predictable grids thus helping the syllabic rhythm to function smoothly in the continuum. Donegan and Stampe do not consider syllabicity, stress, length, tone phrasing etc., as a part of the linguistic matter. These elements are determined by the prosodic mapping "which may be most easily described as an operation in real-time speech processing of which setting sentences to verse or music are special cases."[87] The small beginning is made here to understand syllables of the language. The assumption is that not knowing 'syllables' would mean not knowing phonology.

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87. Donegan and Stampe (Ed. Dinnsen) 1979, p. 142.