

CHAPTER V

CONCLUSION

"But the finding that emerges most clearly from a study of methods is that we all share a common failing as linguists: we try too hard to prove ourselves right. In this strenuous effort we inevitably overlook the errors concealed in our assumptions, built into our methods and institutionalized in our formal apparatus... a permanent concern with methodology means living with the deep suspicion that we have made a mistake at some crucial point in the investigation."

(William Labov)

Conclusion

5.0. The plan for the concluding chapter

This concluding chapter is divided into three parts. The first part tries to summarize some major and new developing approaches in the field of phonology. It is intended to show here that autosegmental phonology and dependency phonology can be more adequate in tackling some of the issues discussed in the earlier chapters. The second part gives some tentative rules where murmur, nasalization, stress and length are treated as autosegments. The last part gives a few claims, tentative proposals regarding this work and suggestions for the future work.

The fact that there have been many different schools of phonological descriptions can force us to ask a question: 'what mode should be selected for the description of the issues discussed here'? The answer to the question is not going to be a final solution but merely a tentative proposal.

5.1. Major recent approaches to phonological theory

Almost all the approaches are under the impact of generative phonology (i.e. standard theory). It has been universally accepted that 'The Sound Pattern of English' is responsible in directing the various new developments. These developments show either a radical revision or the complete rejection of the standard theory. This activity is very extensive and has resulted into many view points, some of which are distinctly different and others are superficially different from each other.

The standard theory like any earlier phonological theory agrees upon two levels of speech sounds: phonological and phonetic. This theory wants to make explicit the principles governing the association of phonological representation with phonetic representation. These principles are conceived as 'a system of rules of algorithm which converts phonological representations into phonetic ones.¹ Chomsky and Halle avoid placing specifiable restrictions on the correspondence between underlying phonemes and their systematic phonetic realizations. In SPE both are represented by distinctive features and the rules of correspondence satisfy certain formal requirements. The generative grammar insists on being a highly formal system hence the phonology part also cannot avoid having an explicit notational system of description. This formal system which is descriptively motivated consists of a set of rules. These rules map one level onto the other and there is a precise and definite procedure of applying these rules. The most difficult requirement of Chomsky's grammar is to achieve explanatory adequacy. In Chomsky's grammar the problems of producing correct descriptive grammar and achieving explanatory adequacy have not remained separate from one another. Due to this entanglement it is difficult to decide if the problems arise due to the methodological drawbacks or due to the faults in the basic frame of the theory.

The post-Chomskian (post-Standard) theories have realized that in achieving explanatory adequacy enough attention should

1. Anderson, (Ed. Dinnsen), 1979.

be paid to the phonetic substance. The data from a number of languages disclosed the facts which made it incumbent for the phonologists to revise the notational conventions. The phonologists then realized that the revisions should not be merely short cuts to present the facts of the language. As a result a number of issues cropped up; the question such as curly brackets, Greek variables, simultaneous and disjunctive/sequential and conjunctive rule ordering, feeding order/bleeding order etc. are some of the important ones discussed again and again. The consequence is confusing. In trying to attain internal coherence in the system and to be explanatory the new approaches have created enormous rigmarole in the field.

Dinnsen has rightly said that "the terminology of the descriptive devices used by them differ from standard theory but it is not clear what the differences mean in the larger contexts"².

Nevertheless there are a few extremely pertinent points on which all the approaches agree:

- (1) If the phonetic substance is not taken into account then the most valuable function of phonetics to linguistics (i.e. to explain linguistic facts) is denied. Phonetic theory has not been used in a maximally efficient manner for explaining 'how language is built'.³ Especially the proponents of natural generative phonology and natural phonology have agreed upon having "a more comprehensive substance-based theory formalizing the phonetic mechanism of language".⁴ The new approaches are in search of

². Dinnsen, 1979, p. ix.

³. Lindblom, 1971 (PSICPS) p. 66.

⁴. *ibid.*

explanatory phonology and are investigating the possibilities of evaluating the notion of linguistically relevant phonetic facts.

- (2) There has been a consensus that syllabic structure has a very important role in ^{the} language phonology.
- (3) By and large it is accepted that a phonological description should try to be equipped to account for diachronic issues as well (and vice versa).

5.1.1. Atomic phonology

Dinnsen's atomic phonology proposes that all linguistic variations which require distinctly varied formulations of phonological rules are predictable from a set of atomic rules. These rules are independent rules. They are the most basic and specific rules which are motivated on empirical grounds. These rules are like all the necessary initial conditions from which the variations on the process in natural language can be predicted. The non-atomic rules are dependent on atomic rules. They are in complement relation with atomic rules. Dinnsen defines the complement relation like this: Two rules are in a complement relation if just those commonly shared features in the structural descriptions of the two rules are sufficient to define precisely the same set of input representations defined by the two rules jointly. The further claim is that there cannot be a situation such that a rule is postulated as an atomic rule in one language (i.e. independent) but another language considers the same as a complement rule which is an equally independent and necessary rule of grammar.

The complement rule has many significant empirical consequences.

- (1) Atomic theory predicts that rule generalization is a special case of rule addition.
- (2) Complement rule can achieve the generalizations of standard theory e.g. generalization by feature loss or generalization by Greek variables.
- (3) Complement relation can also explain implicational hierarchies and certain diachronic issues such as 'drag chains' etc.
- (4) Due to complement relations this phonology can provide explanation regarding related language facts.

The most distinguishing claim of this phonology is that the constraints on rule formulations are relatively independent of constraints on inventories.

The interesting outcome of this theory is that it gets rid of the complications of the issue of rule ordering or to put it clearly it does not face such a problem. Atomic rules substantially limit the range of possible analysis by establishing clear case of necessary and independent rules. However, it still is at a stage where the character of any phonetic explanation is nebulous in determination of atomic rules. But we have considered the phonetic substance as the fundamental requirement throughout the discussion of Gujarati vowels. Moreover atomic phonology does not hint at the possibilities of accounting prosodies of 'speech'. Hence this approach cannot be accepted for the work here.

5.1.2. The phonological component as a parsing device

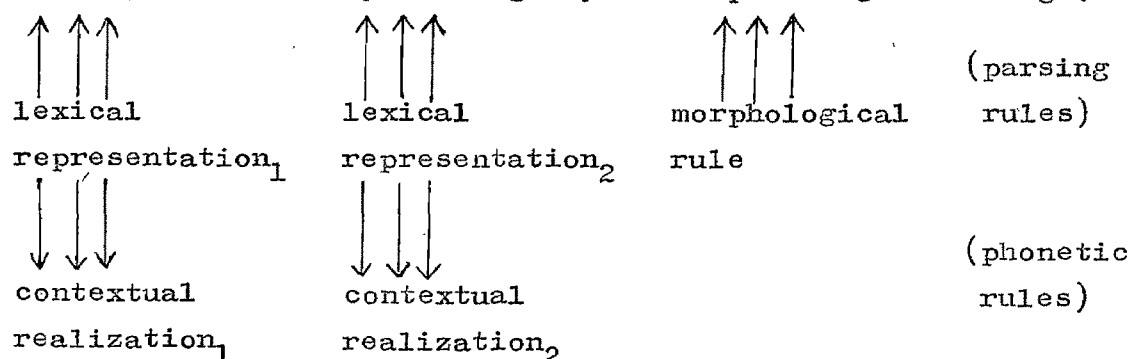
This approach claims a solution for idiosyncratic morpho-phonological properties of words. Such properties are also described by natural phonologists as productive alternations. Leben suggests that these properties cannot be taken care of unless we reconsider the phonological rules as being applied in two blocks: (1) phonetic rules and (2) parsing rules.

Phonetic rules are productive rules which convert underlying representations into phonetic realizations. Parsing rules operate in reverse direction i.e. they provide a way of capturing systematic morphological relationships among words by parsing morphologically complex words. Leben is the chief proponent of this theory. He claims that on the one hand this model makes for a more adequate treatment of morpho-phonemic alternations than the system of standard theory and on the other hand it provides appropriate complement to the treatment of phonetic rules. He also claims that his model can answer the question such as "if we grant that underlying representations should be closer to surface representation how do we deal with abstract phonological relation captured by standard theory"?⁵ Leben insists that any phonology should capture the fact that knowledge of the language permits speakers to relate the two words 'sane' and 'sanity' without having been taught that they are related. Leben's model attempts to do this quite successfully.

His model takes arbitrary pairs of lexical representations and makes them satisfy the environment of morphological

5. Leben (Ed. Dinnsen) 1979, p. 178.

rule by successively undoing layers of phonological change.



The condition of the model is that only those parsing rules are undone as are required to establish that a pair of lexical representations jointly satisfy the environment of an appropriate morphological rule, e.g. solo-soloist, obese - obesity can be given straight away at lexical level without undoing any morpho-phonemic rule. But for cello-cellist, profane-profanity certain undoing has to be done before they fit the environment of proper morphological rule.

Leben's parsing model basically remains within the standard theory framework. Its fundamental aim is to provide for the morphophonological properties.

5.1.3. Natural Generative Phonology

Vennemann and Hooper are the strongest propagators of this natural generative theory. Like Leben they mainly want to do away with the drawbacks created by the abstract representation issue of standard theory. The thrust of their argumentation is that certain formal principles of standard theory are not at all necessary. The extrinsic rule ordering is absent from their approach. This prohibition of extrinsic rule order is called

'No order' condition. In natural generative phonology there can be no difference between lexical redundancy rules and phonological rules. In order to prohibit meaninglessly abstract underlying forms Vennemann proposes a strong naturalness condition. The condition says "lexical representations of non-alternating parts of morphemes are identical to their phonetic representations: lexical representations of roots are identical to one of the radical allomorphs of the paradigm plus (an often empty) set of suppletion rules". The second part of this requirement stops absolute neutralization. Natural generative approach requires that lexical representation be ^a fully specified surface form. Hooper says that "an interest in the way speakers analyse their language seems to lead inevitably to the study of substantive rather than formal principles of analysis and substantive ⁿ rather than structural evidence".⁶

The rules in this approach are divided into two types:

- (1) Rules or processes where statement contains only phonetic information. These are phonetically motivated processes and are referred to as P-rules.
- (2) Rules of this type have reference to morphological/syntactical and lexical features. These are called MP-rules.

Hooper compares this division with the division of natural phonology where the distinction is between processes and rules. Hooper's P-rules are like processes (Stampe and Donegan. See 5.1.4.), natural, productive and unsuppressible. Her MP-rules are unproductive and make some larger structural changes.

⁶. Hooper, (Ed. Dinnsen) 1978, p. 106.

5.1.4. Natural Phonology

Since early 70s Stampe⁷ has been trying to modernize the age old thesis that the living sound patterns of languages in their development in each individual as well as in their evolution over the centuries are governed by forces implicit in human vocalization and perception. Donegan⁸ has considered several substitutions as reflecting the operation of one or more of a set of 'natural' phonological processes-natural because they respond to innate limitation of the human speech capacity.

They accept Sapir's suggestion regarding mental substitutions which systematically but subconsciously adapt our phonological intentions to our phonetic capacities. For Stampe and Donegan a phonological system is the residue of universal system of processes reflecting all language innocent phonetic limitations of the infant. This phonology excludes unmotivated and morphologically motivated alternations, but it includes all and only what the theory can explain and they claim that their theory can explain everything that language owes to the fact that it is spoken.

The processes apply in the way that follows from their nature and teleologies. They apply to natural classes of segments because processes are responses to phonetic difficulties; and all the difficulties of similar type will undergo similar changes. Hence a process applying to a natural class has a natural connection i.e. phonetic teleology of the process.

7. Donegan and Stampe, (Ed. Dinnsen) 1979.

8. Donegan, 1978.

There are three main types of processes: prosodic, fortition and lenition. Prosodic processes map words, phrases, and sentences onto prosodic structures, rudimentary patterns of rhythm and intonation. Fortition processes intensify the salient features of segments and their contrast with the adjacent segments. Lenition processes have articulatory teleology and make segments easier to pronounce by reducing the articulatory distance between features of the segments or their adjacent segments.

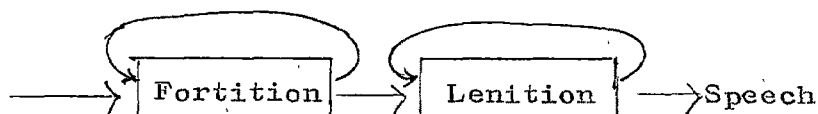
The phonological alternations which are not process governed are phonological rules. Processes are synchronic motivations but rules lack such motivations. On the other hand processes lack positive, semantic or grammatical functions. Processes are natural responses, rules are learned.

Using Kiparsky's terminology of feeding/bleeding order, Donegan and Stampe arrive at certain order of application between processes and rules:

- (i) Fortition first, Lenition after.
- (ii) Rules first, Processes last.

Lenition cannot be prevented from applying to the output of Fortitions. See the diagram of applicational sequence.

GR



Lexicon

Sapir⁹ had pointed out that the phonological intentions are far more readily brought to consciousness than actual rumble

⁹. Sapir, 1921.

of speech. For Sapir phonological representation is phonological intention of speech. The fact that many languages have identical processes, is considered by Hooper¹⁰ as one of the most significant results of viewing phonologies as consisting of rules and processes.

Donegan and Stampe admit that their approach lacks any methodology and formalization.

5.1.5. Dependency Phonology

Though this approach is not a result of an attempt in revising the standard theory it certainly tries to compare itself with the standard theory and claims that the phonological representations are more structured than the standard theory shows them to be. This approach is distinctly different from all the other approaches developed in America.

Anderson and Jones claim that their "model has the power to capture generalizations within process resistant to standard theory".¹¹ They claim that their set of hypothesis allows for the demonstration of the existence of phenomenon such as 'phonological recurrence' between and within synchronic grammars. Phonological segments are non-linearly as well as linearly ordered in relation to each other and the relationships into which they enter are dependency (\Rightarrow) and precedence (\Leftarrow). The assumption is that the phonological segment can be complex. Anderson and Jones (1974) and Lass and Anderson¹² recommended

¹⁰. Hooper (Ed. Dinnsen) 1979, p. 109.

¹¹. Anderson and Jones, 1974, p. 15.

¹². Lass and Anderson, 1975.

a phonatory as well as an articulatory gesture for each segment. A segment can incorporate sub-trees containing more than a single node. A segment is a set of nodes. These nodes are related to each other in a relationship which is subjunctive dependency, but these nodes are equivalent in precedence. They propose a scalar, proportional relationship.

Some segments are to be viewed as complex structures, i.e. they are not simply columns of features. This approach has considered the viability of the syllable as a phonological unit and this viability essentially helps dependency interpretation of phonological structure. The feature 'syllabic' is a combinatorial notion. 'Syllabic' element serves to characterize syllable, "syllable without a syllabic element is not a syllable."¹³ Dependency grammar provides the formalism to describe such syntagms. This theory conveniently attempts to investigate syllabicity hierarchy in relation to the other elements. Lass and Anderson¹⁴ extend Lenition process and Lenition hierarchies. Two common sequences of change that tend to repeat themselves again and again in the history of languages are:

I

- (a) inter^vocalic voiceless stop
- (b) voiceless stop → voiced stop
- (c) voiced stop → voiced fricative
- (d) voiced fricative → approximant consonant
- (e) approximant → vowel
- (f) vowel → ∅

¹³. Anderson and Jones, 1977, p. 117.

¹⁴. Lass and Anderson, 1975, p. 150.

II

- (a) word initial voiceless stop
- (b) voiceless stop \rightarrow aspirated stop/affricate
- (c) aspirate/affricate \rightarrow voiceless fricative
- (d) voiceless fricative \rightarrow h
- (e) h \rightarrow \emptyset

Lass and Anderson suggest that in these two developments there are two basic options, such as,

- (1) opening i.e. progressive continuantization without change in glottal attitude.
- (2) sonorization i.e. voicing and the progressive opening with increasing output of acoustic energy.

The last stage of weakening/lenition is deletion.

I. Lenition hierarchies:

- 7. voiceless t
- 6. voiced d
- 5. spirantized z
- 4. liquid r
- 3. approximant j,
- 2. vowel i
- 1. deleted \emptyset

II. Weakening of closure: no glottal change

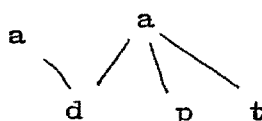
- 4. voiceless t
- 3. spirantized s
- 2. dearticulated h
- 1. deleted \emptyset

These two hierarchies can interact, e.g. 't' may become 's' (by II.3) 's' may become 'z' (by I.5).

Anderson and Jones have tried to formalize syllable structure and to sum up this formalization in a simple way. They introduce a graph-theoretic interpretation of dependency structure. Each syllable is a simple structured string, and has a centre (root) which is the governing segment, e.g.



Adjacent syllables show overlap, e.g.



They propose that the stress rules will select the centre among a set of syllabic governors. Different dependency relations such as 'subjoined' 'adjoined' can express the complicated stress syllabicity relations.

This phonology claims to answer some of the issues which have remained unsolved in standard theory:

- (a) it reorganizes syllable as a phonological entity,
- (b) it establishes a lenition hierarchy of various segment-types,
- (c) it deals with phonatory gestures thus establishing the relations of various elements within each segment. In this sense this phonology is a viable alternative to all other phonologies based on the distinctive features.

5.1.6. Autosegmental phonology

Autosegmental phonology is basically an approach which remains within the framework of generative phonology. It principally wants to extend a formalized theory. But it also insists on

providing more adequate understanding of the phonetic side of linguistic representation. As Goldsmith^{15a} puts it, for generative linguistics the search for relation between sound and meaning begins with the hypothesis about the type of formal representation that counts as a faithful rendering of the phonetic or the semantic aspects of a word, sentence, discourse and so forth. Autosegmental approach is a proposal,

- (i) at the same logical level as the proposal that phonetic representation is a linear sequence of atomic units, call them segments.
- (ii) at the same level as the suggestion that these atomic units are cross-classified by distinctive features.

This phonology assumes that the phonetic representation is composed of a set of several simultaneous sequences of the segments. The sequences of different levels are interrelated, and associated. In this phonology there is a claim about the geometry of phonetic representations. More specifically this theory shows how all different components of vocal tract-tongue, lips, larynx, velum-are coordinated. The linguistic signal is split into large number of separate information channels. This means specific commands to larynx, velum, tongue etc. However the standard assumption says that the phonological representations of the Gujarati word [b^han] 'sense' would look like,

15. Goldsmith, 1976^a, p. 23.

1.	$\begin{bmatrix} + \text{ cons} \\ - \text{ nasal} \\ + \text{ labial} \\ - \text{ coronal} \\ + \text{ aspirated} \\ + \text{ voice} \\ \vdots \\ \text{'b'}^{\text{h}} \end{bmatrix}$	$\begin{bmatrix} + \text{ syllabic} \\ - \text{ nasal} \\ - \text{ coronal} \\ - \text{ aspirated} \\ + \text{ voice} \\ \vdots \\ \text{'a'} \end{bmatrix}$	$\begin{bmatrix} + \text{ cons} \\ + \text{ nasal} \\ - \text{ labial} \\ + \text{ coronal} \\ - \text{ aspirated} \\ + \text{ voice} \\ \vdots \\ \text{'n'} \end{bmatrix}$
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The coordinated activity of velum, lips etc. for this word will look like as expressed in (2).

2. A score for orchestration of $[\text{b}^{\text{h}}\text{an}]$

Lips: close up..... open.....

Tongue: high.....low, back..... touch the upper teeth

Velum: raise.....lower.....

The standard assumption "implies that the process of language acquisition includes the development of the ability to take a representation like (2)"¹⁶ and slices it vertically into columns deriving a representation like (1) $\text{b}^{\text{h}}\text{-a-n}$. This assumption is called 'absolute slicing hypothesis' by Goldsmith. Now suppose that for murmured dialect of Gujarati an additional information regarding the activity of larynx is added to (2) then 'b'^{h} will spill a lot of voiced aspiration on the adjacent vowel 'a' and the score will look like (3).

3. A revised orchestral score for $[\text{b}^{\text{h}}\text{an}]$

Lips: close up..... open.....

Tongue: high.....low, back..... touch the upper teeth

Velum: raise.....lower.....

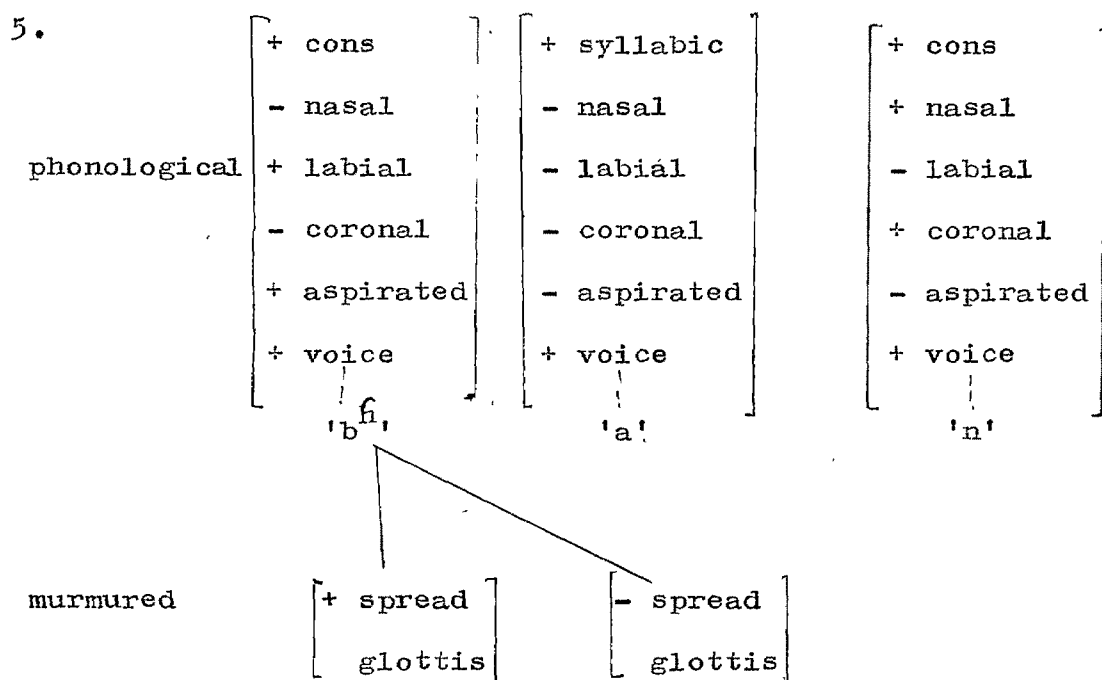
Larynx:	lowered with spread glottis	lowered without spread glottis	lowered without spread glottis
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¹⁶. Goldsmith, 1976^a, p. 24.

The assumption of absolute slicing cannot work in such utterances. The laryngeal commands in (3) cannot give the standard phonological representation in (1). (3) will correspond to a more abstract segmental level as follows:

- (4)
- | | |
|---------|------------|
| spread | not spread |
| glottis | glottis. |

It is proposed here that the level of linearly ordered segment as in (1) will correspond to the autosegmental representation (5) by the association lines which link murmured and phonological levels.



This kind of phenomenon is impossible to account for in the standard frame work. The most crucial difference between this approach and other approaches lies in the treatment of what has been called suprasegmentals. This approach insists on considering suprasegmentals as 'segmentals' in their own right i.e. the

so called suprasegmentals form parallel sequences of segments none of which 'depend' or 'ride' on the others. Each level being independent it should be called autosegmental.

The aim of this phonology is to investigate the consequences of having more complex and articulated structures in phonology. It does away with the assumption that phonological and phonetic representations consist of a single string or concatenation of segments. In this phonology there are parallel strings of segments arranged in two or more tiers. Firthian phonology also similarly proposed the rejection of strictly linear view. Firth called his approach 'a prosodic' approach. He was the first to have thought of this aspect of live speech: where 'sounds' along with the 'prosodies' only can turn into real speech sounds. Firthian phonology lacks Goldsmith's well-formedness condition. Firth's phonology is criticized as being programmatic rather than definitive, allusive rather than explicit and "sometimes infuriatingly obscure on points obviously vital to the theory".¹⁷ Having no methodology it discouraged potential researchers in the past.

In general the autosegmental approach arose out of some of the inadequacies of familiar generative approach and seems to be answering exactly those issues which are discussed in the earlier chapters. Nonetheless a slight objection can be raised regarding the use of the term 'independent'. Throughout this dissertation it is emphasized that speech sound continuum has a horizontally (linearly ordered sequence of the segments) as well as vertically (scalar dependency) developed relationship of its elements. Each level from the actual production

17. Langendoen (1968)

point of view i.e., from the phonetic point of view, is woven together and presents an entangled net work, proving the dependency between the levels and segments and within the segments themselves. Hence, the term 'independent' has to be clearly defined. By this word Goldsmith means independence from any language specificity. His hypothesis is that at the first stage in child's acquisition of phonology the phonological features are assumed independently.

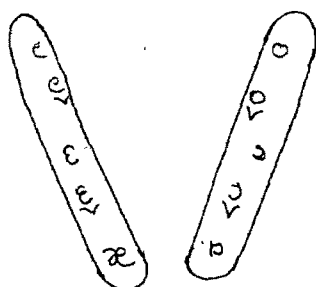
5.2. Selection of the approach

In the midst of these differences, one can see a few very sound and fruitful efforts. One can take the best from them and attempt to form a mode of description appropriate to the requirements of the language under study. A synthesis has been attempted here as it was incumbent to arrive at some cohesive point in order to give 'Form' to these findings.

From amongst all the new developing theories of phonology some of the important assumptions of autosegmental phonology are considered more appropriate for the description of the issues in this work. For several obvious reasons selection of one position against others cannot have full empirical justification. The most visible reason is that the topics of this work do not cover the whole of phonology and hence the rejection or selection of any theory cannot have any complete, all-pervading evaluative justification. This is a drawback of this work. The strength of this work is then not in the selection of any one theory or in proving the correctness of the same but in pointing and explaining some of the ticklish issues which go to reveal insufficiencies of some of the phonologies.

It is sufficiently elaborated in chapter I that murmur is a kind of laryngeal prosody resulting out of dearticulated - deoralized 'h'. This deoralization leaves the voiced breath behind (i.e. the larynx is in spread and lowered position). This breath which merges with the adjacent vowels is called the murmur prosody. The phonologies with absolute slicing hypothesis can never take care of such prosodies.

The contextual lowering of mid-vowels discussed in chapter II indicates that the lowering gesture is the preparation for the production of the following consonants. The natural phonetics of vowels show that phonological features cannot fully describe the vowel behaviour in the language and there is no one-to-one relationship with the minimal sets of parameters that are necessary for actual sounds. To every phoneme-point of a vowel there can be several contextual language specific alternants forming 'phonemized clusters' e.g.



mid-vowel range of
lowering.

The tongue and mandible form a very complex system with a wide variety of potential action,¹⁸ which results into these 'phonemized clusters'. The lowering cannot be explained merely by a segmental feature-changing rule.

18. Ladefoged, 1980, p. 488.

It is also fully discussed in chapter III that n-loss nasalization is like a tendency of the nasality feature to persist after the erasure of the nasal. This phenomenon^e is referred to as a 'stability' phenomenon. The velopharyngeal dynamics of the nasality is such that when sonorance and nasality as persistent features merge with the adjacent sonority of vowel the velum continues to remain in lowered position throughout the syllable.

The question of asegmental issues arises while dealing with the vocalic elements of the language. The syllabication suggested in chapter IV also shows that length and stress cannot be accounted for by segmental phonology.

As has been sufficiently hinted in the earlier chapters Natural phonology, Dependency phonology and Autosegmental phonology hit upon some very crucial issues unsolved by the familiar standard generative frame-work. The issues are:

- (1) Sound substitutions due to natural phonetic processes which are always active in the language indicate sound change in progress.
- (2) The laryngeal dimension of articulatory sounds can result in asegmental features, indicating bigestural phonatory character i.e. within the segment there are dependency relations between these gestures. Dependency 'bonds' are the results of natural phonetic tendencies and these bonds conform to language specific structures. On the one side there is the nature and on the other side there is the culture.

- (3) The so called suprasegmentals are woven in the rhythmic structure of language. Syllables are the basic units of articulation and hence the natural rhythmicity as well as language specific rhythmicity take 'syllable' as a minimum unit carrying the suprasegmentals.

As noted earlier natural phonology and dependency phonology do take care of such issues. Natural phonology lacks precise methodology and dependency phonology does not propose any solution for multi-linear factors of language.

In this sense autosegmental phonology has more workable hypothesis. In this dissertation it is assumed that the natural phonetic processes and dependency relations are present in all speech events.

Here we suggest a 'blend' between the dependency hypothesis and autosegmental hypothesis. Dependency hypothesis is an assumption for entire language structure hence 'syllable' enters into dependency relations with higher level constituents i.e. words, phrases, etc. Autosegmental hypothesis (as the name itself indicates) is only the reframing of the phonology part in the generative frame. However, this dissertation will conform to standard (generative) theory only to the extent of accepting that phonological approach should try to convert phonological representation into a phonetic one and should try to explain the phonological facts of language. Hence autosegmental hypothesis is used here with the preaccepted condition that the attempt here will disconform strongly with the standard theory which is negligent towards substance based requirements.

The scalar, non-linear relations between decomposable elements of segment and multi-linear wellformed presentation of the asegmentable elements (as autosegmentals) are blended here. This can have enormous theoretical potentialities. The segments have dependency relations with other segments in syllables and there is no more an issue of absolute slicing. The dependency relations between the decomposed elements of segment can explain what is asegmentality and multilinear presentation can explain with association lines how an autosegment is related to a segment. Dependency and autosegmental analysis are done in terms of rules that reorganize and readjust the phonological elements. Autosegmental analysis speculates that language acquisition on the part of a child is a deautosegmentalization process. A child acquires language by merging the levels to form a minimal number of levels and realizes the phonemic inventory. The phonemes are then the psychologically real elements of the phonological system. The autosegmental status of features such as tone, nasality, murmur, is not learnt late in the process of language acquisition but is rather the stage through which all learners of all languages pass and later when they find the feature/features wrong for their own language they deautosegmentalize them. This speculation seems to be very strong in suggesting psycholinguistic reality. It is convincing only to a certain point that ^a learner (of anything) goes through a process of learning by unlearning something - i.e. acquisition by elimination. Nevertheless any such assumption is tentative and challengeable as it is not fully testable. Hence

Goldsmith's such claim is rather too ambitious. Goldsmith's¹⁹ approach which mainly attempts to characterize suprasegmentals ('autosegmentals' in Goldsmith's terminology), is considered highly relevant to the issues in this dissertation.

5.2.1. Scheme of rules

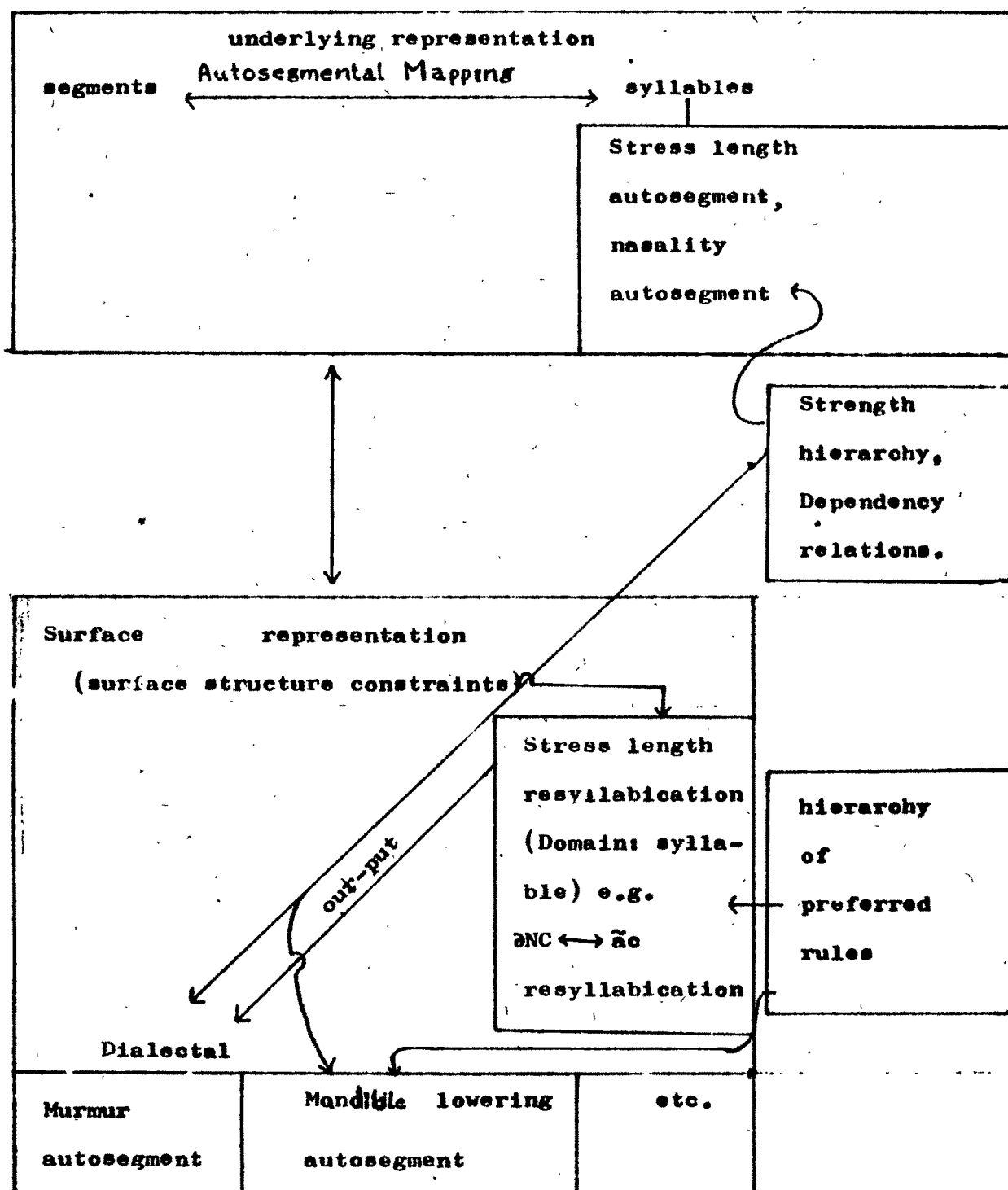
Autosegmental approach advocates multilinear analysis to account for suprasegmental issues. The term 'linear' is not discarded as it is essentially applicable to all sounds produced from the vocal tract. But by autosegmental we mean that for explaining segmental - plus asegmental phenomena, at every point on the temporal axis (i.e. linearly ordered) there are more than one levels of representation. Temporality automatically makes the sounds linear but not necessarily only segmental. By accepting dependency and autosegmental hypothesis we get a provision for treating the relations between different levels - which means between multilinear sequences.

Here it is considered appropriate to have syllables and segments both as underlying components. Since the syllable has been shown to be a valid and useful unit in phonology it means that syllable boundaries (and/or overlapping boundaries?) will be needed to state further rules in phonology. Hence, syllables are assumed to be there before the other phonological rules operate. Syllabication done in chapter IV is done keeping in mind some language specific requirements and some universal principles regarding 'initials and codas' in syllables. The features of stress and length are interwoven with

19. Goldsmith, 1979, p. 5.

We assume the following schema²⁰

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²⁰. After Banti's proposal (from 'the syllable in Phonological Theory')

syllabicity, forming a predictable rhythmic pattern. These features shift along with the inflectional and derivational syllabic extensions. The stress and length get associated with appropriate syllables when resyllabication takes place due to extensions. The rule for resyllabication (i.e. stress + length) applies to syllables at underlying level itself. The learner acquires these features at the same time; no child ever can or will speak without the patterned rhythm of his language.

The nasality feature is also an underlyingly present phenomenon. Nasalization is not a contrastive feature yet it is absolutely required of any learner to acquire nasality relations between nasal effacement and nasality. Also there is a two-way relationship between 'əNC' and 'ãc,' implying that it has to be an underlying representation. It has been shown how the homorganic 'N + C', nasal effacement - nasalization and denasalization are ^{the} live sound changes in progress. We extend a hypothesis that any such sound change cannot be a mere surface (phonetic) manifestation.

Reverse to this, as murmur is a dialectal feature the underlying representation is considered to be devoid of it. In the same way, the lowering of mid-vowels being contextual as well as dialectal, would be considered as the feature manifested at surface level.

To put it clearly the nasality autosegment is ^{at the} underlying level and the stress-length, the murmur and the lowering of mid-vowels are autosegments at surface level.

Here we accept some of the allusions made by Goldsmith. He considers association lines and their function as a technical device to relate two tiers. The multilinear geometry is needed to deal with what have traditionally been called suprasegmentals. It is assumed that all associations are to be introduced at some point in the derivation after the underlying segmental representation. There is one further assumption that even when the child's model for underlying structure is not fully deautosegmentalized child begins to adopt rules for phonology. Deautosegmentalization need not be a final stage. We propose that the nasality autosegment is derived and deautosegmentalized by resyllabication rule. Both these levels exist synchronically. In chapter III p.540 we have shown that the higher the degree of sonorance in the segment the greater the possibility of its becoming asegmental. In terms of dependency phonology this sonorance can be equated with 'v-er' quality of segments - the decomposed 'v' element can play the role of (traditional) 'suprasegmentals'.

5.2.2. Rules

(a) Nasality autosegment

The persisting tendency of the nasality feature is a stability phenomenon.²¹ When the erasure of the major segment does not erase one of its features and the feature is retained in the nearest segment then this feature could be considered as an autosegmental feature.

²¹. Goldsmith, 1979, p. 27.

e.g.,

$\text{---} \text{V} + \text{N} \text{---}$
 $\text{---} \tilde{\text{V}} + \text{N} \text{---}$ Nasality spread, lowered velum
 $\text{---} \tilde{\text{V}} + \emptyset \text{---}$ N-effacement, 'lowered velum' persists.

If 'V' is 'ə' then in syllabic extensions, the effaced 'N' is secured and 'nasality' is deautosegmentalized. This proposal here very strongly supports Goldsmith's hypothesis of deautosegmentalization. The child in the process of learning the language will reach a point when he can secure 'ə + N + C' from 'ã C' by resyllabication rule i.e. he would have both; the autosegment and the deautosegmentalization in his language. He begins to undo 'ã C' when required, e.g.

$\tilde{\text{v}}\text{ãk} \longleftrightarrow \text{v}_{\text{ə}}\text{nka}j$
 $\tilde{\text{s}}\text{ãk}^h \longleftrightarrow \text{s}_{\text{ə}}\text{n}^h\text{k}^h\text{aj}$ etc.

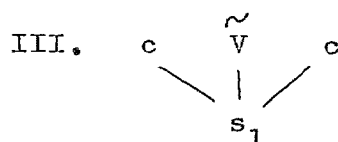
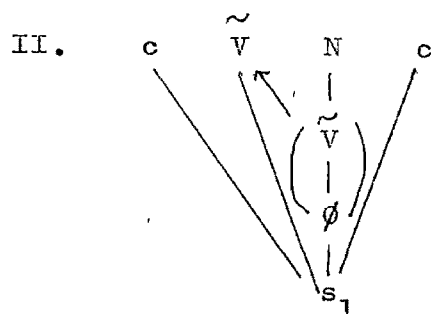
This also supports the assumption that intermediate autosegmental levels of representation are present even in the adult language, e.g.,

underlying representation

I. $\begin{array}{cccc} \text{c} & \text{V} & \text{N} & \text{c} \\ & | & | & / \\ & \text{S}_1 & & \end{array}$ (after syllabication)

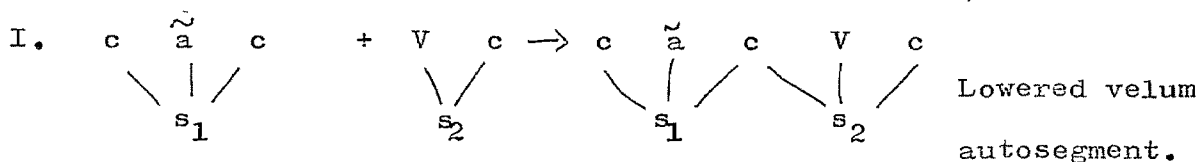
$\begin{array}{cccc} \text{c} & \tilde{\text{V}} & \text{N} & \text{c} \\ & | & | & / \\ & \text{V} & \text{V} & \\ & | & | & \\ & \text{c} & & \\ & | & & \\ & \text{S}_1 & & \end{array}$

by dependency relation and
by nasality autosegment
i.e. lowered velum.

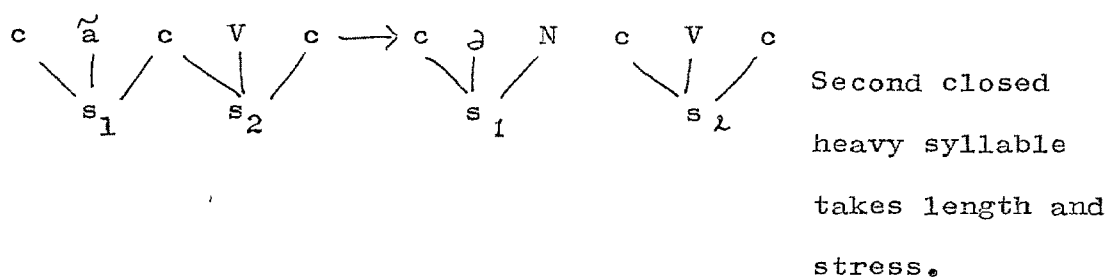


Lowered velum stability persists.

Surface - resyllabication



II. Stress-length resyllabication and deautosegmentalization.



(b) Murmur autosegment

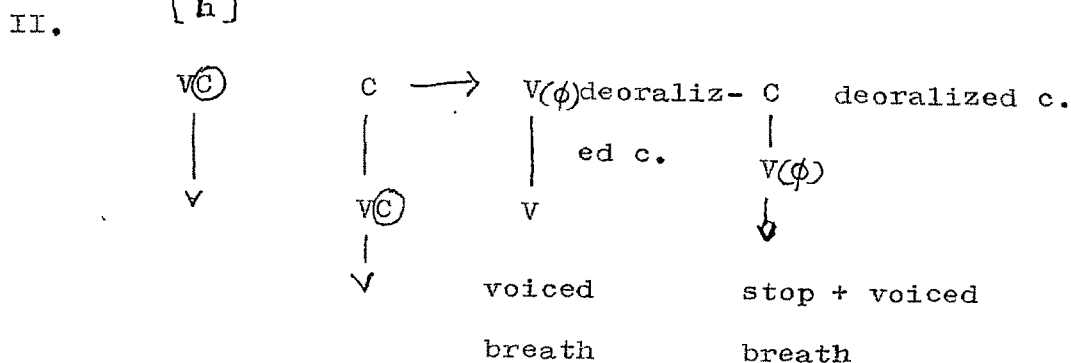
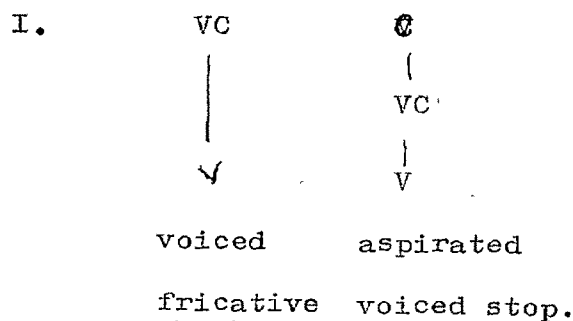
Murmur feature as it functions in Gujarati is proposed to be an autosegment. In autosegmental terminology it can be considered as a feature of a sub-segment. The sub-segment is supposed to be bearing a totally different relationship with the segment - because it subcomposes the entire segment. Murmur sub-segment is here factored out to another level. The relation of murmur feature i.e. spread glottis with vowel to which it is associated is of simultaneity in time. However, this feature being a dynamic element can cross the boundaries of syllables,

by associating itself with sonority elements. By taking murmur feature off on a separate level we are forced to introduce association lines to coordinate the two levels in time. Lowered state of glottis is a position to be assumed for assimilating the feature murmur. So if the segment is voiced then only it can be murmured. Raised glottis of voiceless segments hinder the murmur spread. The conditions for this autosegment are:

- (1) spread glottis autosegment is factored out from the segments having spread glottis.
- (2) the segments with low glottis get associated with this autosegment.
- (3) voiceless stops (raised glottis) hinder such association of the following vowels.
- (4) therefore the association lines cannot cross.

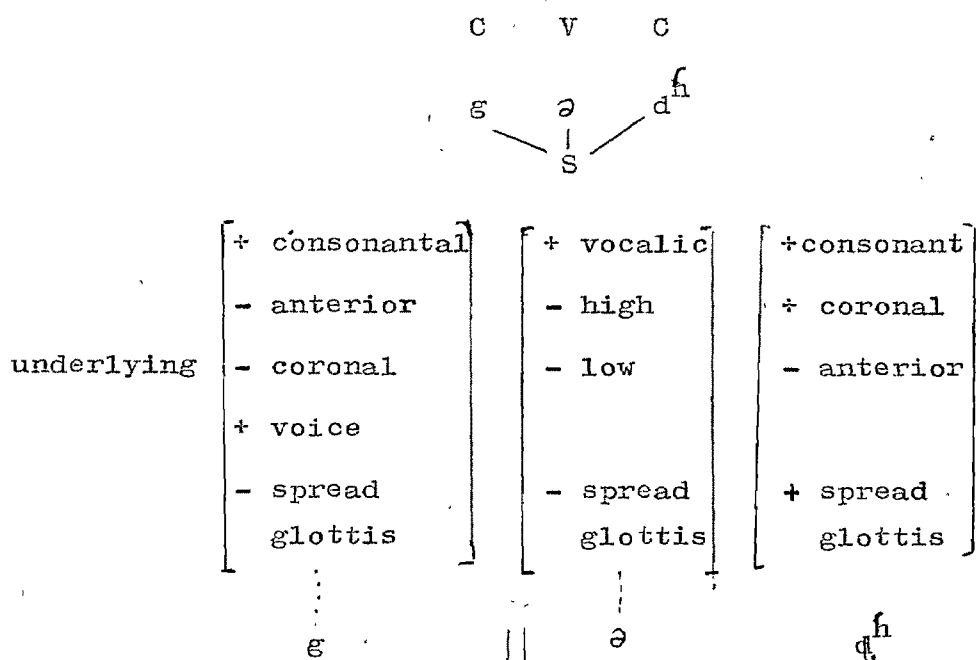
We are adding one more dimension to these conditions.

Voiced aspirated stops in terms of the dependency relations can be stated as:

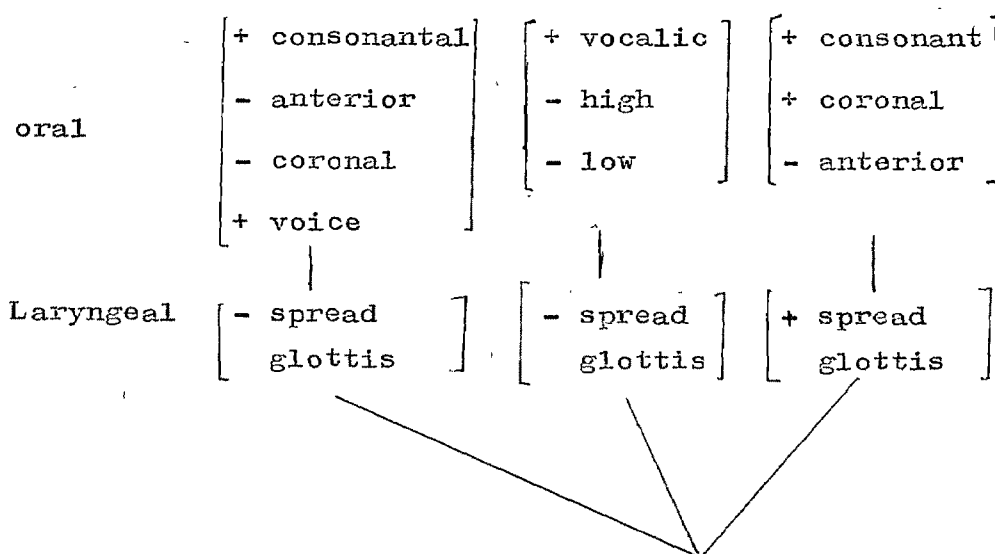


voiced breath is isolatable laryngeal aspect. These dependency relations can explain that, decomposed voiced breath can be our [spread glottis] autosegment. The autosegmentals are normally 'v-er' type of elements (in dependency terminology), e.g.,

Underlying representation

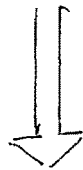


Autosegmentalization



Murmur autosegment here reaches upto the first segment as a result we get voiced stop [g] almost becoming aspirated. A voiceless stop does not allow the autosegment to spread, e.g.,

underlying	[+ consonantal	[+ vocalic	[+ consonant
		- anterior		+ back		+ coronal
		- coronal		+ low		- anterior
		+ voice				
		+ spread		- spread		- spread
		glottis		glottis		glottis
		⋮		⋮		⋮
		h				t
		g		a		



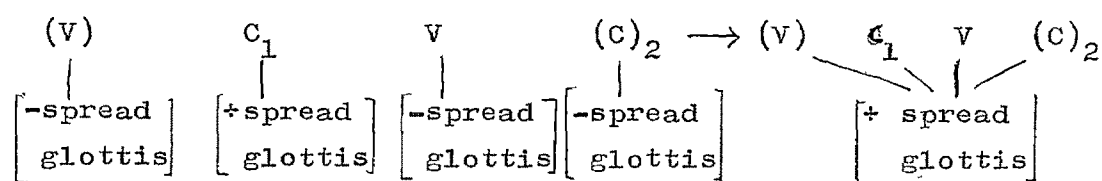
Autosegmentalization

oral	[+ consonantal	[+ vocalic	[+ consonant
		- anterior		+ back		+ coronal
		- coronal		+ low		+ anterior
		+ voice				
Laryngeal	[+ spread	[- spread	[- spread
		glottis		glottis		glottis



These examples show how some phonetic facts may be significant parts of phonology. As Goldsmith says when 'articulatory organs are relatively independent',²² they may be autosegmentalized. Murmur is a dialectal subsegment. Nonetheless for the rest of the speakers of Gujarati this laryngeal information has no phonological significance. For them, the feature [constricted glottis] is relevant.²³ However, it should be noted that the speakers of tight phonation dialects show varied degree of constriction in glottis and this state of glottis is maintained throughout the whole speech. It would be more appropriate to consider this feature as a 'Register' feature than an autosegment.

The rule for the murmur autosegment would be:



The condition would be: c_2 should not be voiceless.

(c) Front/Back lowering autosegment (Mandible lowering)

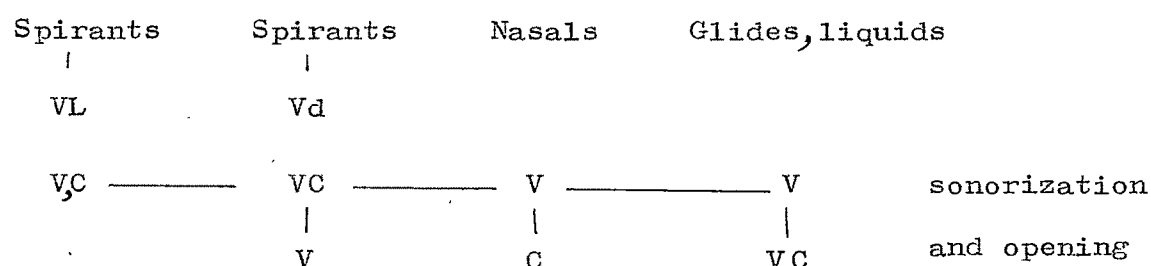
Gujarati mid-vowels are shown to be contextually lowering. Without going into the details of the dialectal differences in the degree of lowering amongst the variants of 'e' and 'o' we can say that Ladefoged's²⁴ parameters, front lowering/back lowering (Mandible lowering) can be aptly used to show that in the contexts of other sounds there are many possible compensatory

²². Goldsmith, 1970, p. 219.

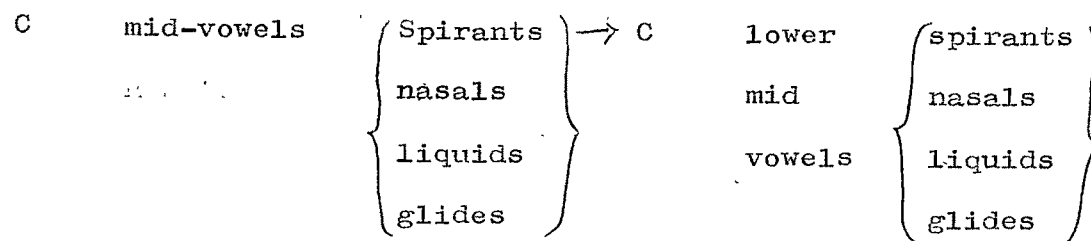
²³. Kim, 1978, p. 188.

²⁴. Ladefoged, 1980, p. 488.

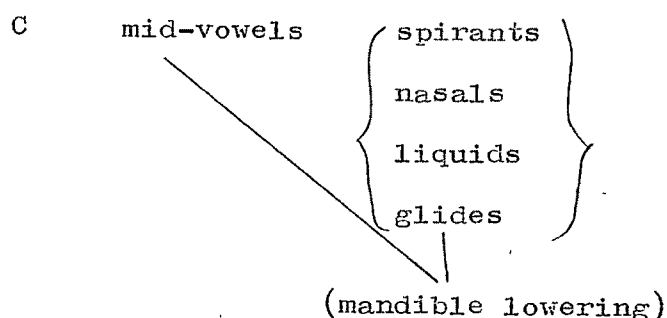
actions of the jaw and the tongue muscles. These parameters can be thought of as parameters that determine the synergistic actions required for the skilled motor movements. The front and the back lowering takes place in the context of spirants, nasals, liquids. It is proposed here that the sonorization or v-er components (in comparison to stops) of these contexts means 'the opening' in the dependency terminology,



The opening (i.e. voicing and progressive opening) of the contextual sounds can bring the effect on the preceding mid-vowels. The opening involves mandible lowering which is regressively associated to the vowels. We demonstrate the lowering like this:

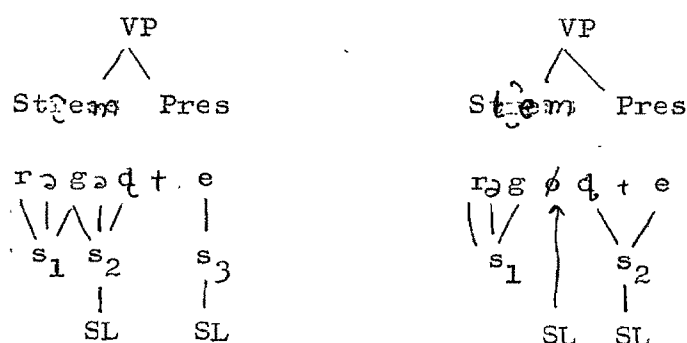


By well formedness condition (mandible lowering autosegment):

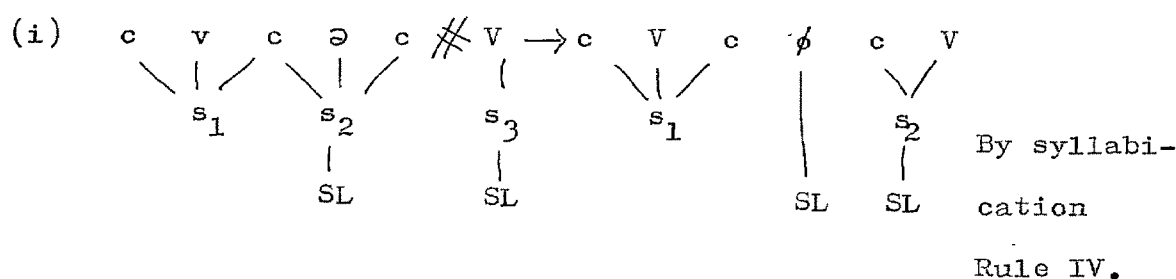


(d) Stress-length (resyllabication)

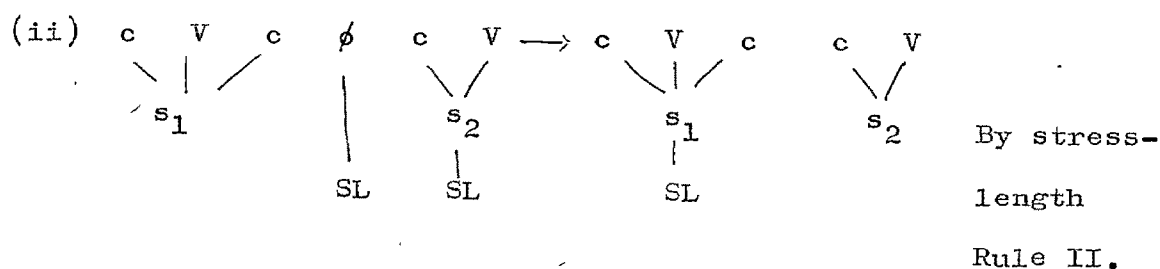
In the last chapter stress length rules for the simple words have been given. At surface level, when the derivational/inflectional extensions bring syllabic extensions the original stress/length bearing syllables undergo modifications and that automatically causes stress-length modification, e.g.,



Resyllabication Rule I



By WFC



5.3. Concluding Remarks: Admissions, claims, proposals and suggestions

Admissions

It is admitted here that to a certain extent the approach of this dissertation remains tentative and experimental.

The study is mainly concerned with phonological description but while dealing with that it was confronted with large number of different issues: 'dialectal variations to standard dialect, extremely specific issues of the language such as phonation issues to universal issues of 'segments and syllables', 'synchronic' issues to diachronic issues (showing sound change in progress). All these areas are so much entangled with one another that one led to the other and many possibilities of doing different aspects of phonology cropped up. It was soon realized that the complete phonological description of the language was beyond the scope of this dissertation. One is aware of the fact that while going through the chapters, one might find them a bit lengthy or cumbersome. The reason for such a feeling is that the above mentioned dimensions did not let the work to develop unidirectionally.

Secondly it should be admitted with regret that the dissertation is not able to cover the complete account of the vowel phonology. Although in defense we can say that the most crucial issues of the vowels are covered.

One more admission is about the 'language' of the dissertation. The language has more a form of explanation than of statements. Nonetheless, wherever possible the conclusive parts have been made precise. As the rest involves refutation and justification it was difficult to remain short and formulative.

Claims

Though the approach is tentative the claims regarding the findings are not. The data has been carefully worked out and

findings are evidenced from ancient as well as modern phonetics.

It is claimed that

- (1) we have to our best tried to justify the observations depending upon phonetics.
- (2) the language will have to be divided on the basis of 'phonation' differences due to which variations^a in the dialects develop.
- (3) few x-rays taken go to prove that some of the conclusions here are the beginnings of substance based work.
- (4) Gujarati in general has a six vowel system (chapter II).
- (5) murmur and nasality processes continue to spread; they are sound-change in progress (chapter III).
- (6) syllable remains the crucial phonological domain.

Finally we are confident and rightly so that the work here opens some new directions of studies in Gujarati phonology. It certainly poses the challenge before the existing phonological approaches, thus confirming that no approach is fully 'equipped'.

Proposals

It is proposed that

- (a) the blending and synthesis of several approaches is required to give a convincing description of the language (chapter I)
- (b) ~~the~~ substance-based approach can explain the facts of the language (chapter II)
- (c) in all the languages their prosodies should be properly included in their phonologies (chapters, I, IV).
- (d) no linguistic material is homogenous and every synchronic study has to be a part of spatio-temporal situation (chapter III).

Suggestions

It is suggested that,

- (a) any future study of Gujarati phonology will have to take into account the phonation divisions,
- (b) all sound substitutions/changes 'in action' should be studied; only the substance based studies give an extremely satisfying experience by enabling us to see the LIVE part of the language,
- (c) no phonology of living language is ever fully done. A claim such as that would be an absurdity. Synchronic phonology much depends on diachronic developments and any conclusion regarding a diachronic stage is incorrect without taking into consideration synchronic processes. Synchronicity is a history in the making and diachronicity is the reflection of the present.