A CONTRASTIVE STUDY
OF FRICATIVES
IN ASSAMESE, BENGALI, ENGLISH AND MALAYALAM

by

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CERTIFICATE

This dissertation entitled ' A Contrastive Study of Fricatives in Assamese, Bengali, English and Malayalam' submitted by Paulose V.D., Department of Linguistics, Assam University, Silchar for the award of the degree of Doctor of Philosophy, is an original work and has not been published or submitted so far, in part or full, for any other degree of any University. This may be placed before the examiners for the award of the degree of Doctor of Philosophy.

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Dedicated

to

my parents.

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ABSTRACT

This thesis examines the various aspects of fricatives in Assamese , Bengali , English and Malayalam. Following the generative framework and employing scientific equipments in the study of speech sounds , this study has attempted to describe the fricatives of these languages. It has examined the nature of sound changes in fricatives , enumerated all the possible clusters involving fricatives and has specified their distribution. Using the results of the spectrographic analyses of the fricatives of these languages , a comparison of fricatives is made in Chapter 6. Keeping in mind the problems faced by the Indian learners of English , particularly the native speakers of Assamese , Bengali and Malayalam , their problems in articulating these speech sounds and the remedial measures are considered in Chapter 7 under the title 'Pedagogical Implications'. The findings of this research , possible areas for future research and some suggestions constitute Chapter 8 , entitled 'Conclusions'.

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1. INTRODUCTION

The present work makes an attempt to study the fricatives in Assamese, Bengali, English and Malayalam with regard to the phonological processes leading to sound change, the position of their occurrence in consonant clusters, specifying their accurate pronunciation with the help of spectrographic analysis, a contrastive study and finally their pedagogical implications.

Of these four languages, Assamese and Bengali are Indo-Aryan languages. These two along with English are descended from the Indo-European language. Malayalam, on the other hand, belongs to the southern group of Dravidian languages. More on the origin and development of these languages is given in Chapter 3.

The objective of this research is to ascertain the accurate pronunciation of the fricatives in these languages with the help of scientific instruments inorder to help the foreign and second language learner so that effective language communication can take place. It may be noted that the class of speech sounds that the Indian learners of English find it most difficult to pronounce, or pronounce wrongly is the fricatives.

Fricatives are a class of speech sounds in the production of which the active and passive articulators form a stricture of close

approximation and the air escapes through the narrow gap causing audible friction. Most of the known languages have fricatives and in some languages, like English, a major chunk of their speech sounds fall in this class.

While making a study of Fricatives it is essential to differentiate the fricatives from the plosives on the one hand and affricates on the other. On the basis of stricture we can differentiate plosives from the fricatives. "In the production of continuant sounds, the primary constriction in the vowel tract is not narrowed to the point where airflow past the constriction is blocked ; in stops (plosives) the airflow through the mouth is effectively blocked." (see Chomsky and Halle 1968 : 317).

The affricates are a combination of a stop and a fricative. Hence there is a complete closure of the vacal tract as in the case of a stop and then there is a delayed release. Stops have instantaneous release. "There are basically two ways in which a closure in the vocal tract may be released, either instantaneously as in the plosives or with a delay as in the affricates. During the delayed release, turbulence is generated in the vocal tract so that the release phase of affricates is acoustically quite similar to the cognate fricative. The instantaneous release is normally accompanied by much less or no turbulence " (see Chomsky and Haile 1968 : 318).

It is also essential to point out some of the most common classificatons of fricatives. These classificatons are :

a) Sibilant and non-sibilant fricatives.

The fricatives that are produced with a hissing sound are sibilant fricatives and others are non-sibilant fricatives. The number of sibilants varies from language to language. Proto-Dravidian had no sibilant at all, though the present Dravidian languages have acquired the sibilants of Indo-Aryan languages (Zvelebil 1970 : 8). English has four sibilant fricatives and five non-sibilant fricatives. Assamese and Bengali have three Sanskrit sibilants in the alphabet but these are reduced to one or two forms in pronunciation (Chatterji 1926 : 546). Malayalam has three sibilant fricatives. Some have still more, for instance Kurdish has five — [s] voiceless dental sibilant, [z] voiced dental sibilant, [ṣ] velarized voiceless alveolar sibilant, [š] voiceless alveo-palatal sibilant, and [ž] voiced alveo-palatal sibilant (Mc. Carus 1958 : 20 -21).

On the basis of frequency of occurrence we can say that the sibilant fricative / s / is the most common and frequently occurring fricative (See Emeneau 1994 : 349). Emeneau writes that the modern treatment of sibilants in general is rare and the most pertinent one is that of Nartey (1979). His data base is drawn from 317 languages. Some of the statements based on these data will be of much help in a study of fricatives in general and sibilants in particular. These

statements are as follows :

"If a language has only one primary fricative, its primary allophone is most likely to be / s /. The third statement and the following discussion show that the third most likely fricative is the palatal sibilant, the second being / f /."

b) Strident and non-strident fricatives.

Strident fricatives are marked by greater noisiness on account of the rougher surface, faster rate of air flow etc. Chomsky and Halle (1968 : 329) write, "strident sounds are marked acoustically by greater noisiness than their non-strident counterparts. When the airstream passes over a surface, a certain amount of turbulence will be generated depending upon the nature of the surface, the rate of flow, and the angle of incidence. A rougher surface, a faster rate of flow, and an angle of incidence closer to ninety degrees will all contribute to greater stridency." In other words in the production of stridents the constriction is such that the air stream strikes two surfaces producing a high intensity noise (See Jacques Durand 1990). The sibilants and labio-dental fricatives are strident fricatives in English and the rest (/ θ /, / ð / and / h /) are non-strident fricatives.

c) Weak and strong fricatives.

Weak fricatives are those in the production of which less energy is spent and strong fricatives are those for the production of which greater energy is spent. The spectrogram showing a strong

fricative will distinctly show darker formants and that of a weak fricative will show lighter formants. On the basis of this classification / f /, / v /, / θ /, / ð / and / h / are weak fricatives and the rest / s /, / z /, / ʃ / and / ʒ / are strong fricatives.

The rationale of this study can be stated briefly as follows. Every living language undergoes changes with regard to spelling, pronunciation, vocabulary and grammar. These changes occur first in the spoken language and these are recorded in the written language after many years. The spoken language is the primary form of the language while the written one is only secondary and the past form of the language. Therefore any proper study of language must be based on the spoken variety and that too must be conducted on scientific lines. Description of speech sounds based entirely on perceptive ears can sometimes give us wrong results. Hence these have to be tested with the help of scientific instruments in a language laboratory. Such kind of study is not done in Assamese. In Bengali, to the best of my knowledge, there is no such work except A Short Outline of Bengali Phonetics by D. Jordje Kostic and Rhea S. Das. However a contrastive study of fricatives across languages bringing out the pedagogical implications involved in second language learning has not been done.

The fact that Assamese, Bengali and English are descended from the common Indo-European language, makes us aware of the fact

that some features are bound to be common to all these languages. Similarly because of the fact that there is a gap of thousands of years after the separation of Sanskrit (from which Assamese and Bengali descended) and Primitive Germanic (from which English has its descent) some features of difference are also bound to happen. These differences and similarities with regard to fricatives are considered in the chapter, 'Comparison of Fricatives.'

Dravidian languages were greatly influenced by Sanskrit (See Kunjunni Raja 1992). The dravidian population, as they migrated from the north-west to the central and southern parts of India, mingled with the Aryan population who spoke languages descended from Indo-European langauge (see Andronov 1980). These influences have contributed to some similarities between Assamese, Bengali and English on the one hand and Malayalam on the other. It is for this reason that Malayalam, a representative of the dravidian language is brought into the purview of this study.

Cachar Bengali, the eastern dialect of Bengali language, has shown characteristics so different that it has become almost unintelligible to the speakers of standard Bengali. The plosives / p / and / k / and the affricate / t*ʃ* / in standard Bengali are changed to fricatives in Cachar Bengali. No study of speech sounds of this dialect is done with scientific equipments so far. Hence this study has taken up the analysis of the fricatives of this dialect with the help of

spectrograph.

English is brought into the purview of this study for another reason. It is an international language of increasing importance for communication across the world. It is a compulsory subject in schools and colleges. The knowledge of English provides an edge of advantage to job seekers. It has been and is likely to continue as the additional official language of the government of India, and it is the only official language in some states like Nagaland, Mizoram etc. A comparative study of English with other languages enables the second and foreign language learner to make necessary modifications and acquire the correct speech sounds of this all-important language.

Secondly, as mentioned earlier, a major chunk of English speech sounds falls within the class of fricatives, many of which do not have equivalent sounds in the Indian languages under consideration. Therefore Indians while articulating many of these speech sounds produce something else causing unintelligibility. This study looks into such problems faced by Indian learners of English and suggests remedial measures for better intelligibility during conversations so that effective communication can take place. This is taken up in the chapter, 'Pedagogical Implications.'

The data for this study chiefly consist of the spectrographic analyses of speech sounds conducted by me on Assamese, Bengali and Malayalam fricatives in the C. I. E. F. L. language laboratory. Part of

the data comes from the earlier researches done in English and Malayalam. Recorded speeches of native speakers of Assamese, Bengali and Malayalam have also been used as data.

Part of the methodology adopted for this research work can logically be understood from the data collection. But there are other factors which need to be mentioned here. These are given below.

Speech sounds had been studied in the past in the traditional way, that is, bringing out the similarities and differences of speech sounds with the help of three-term labels. Besides using such traditional methods occasionally, distinctive features are used to differentiate one sound from another and also to find similarities among two or more sounds. Thus every fricative can be differentiated from every other fricative by one or more distinctive features. The feature '+continuant' is the shared feature of all fricatives. But '+consonantal' is a feature that can be used to separate / h / (which is –consonantal) from the rest of the fricatives (which are +consonantal).

As already mentioned, I have made an extensive use of the spectrograms of the speech sounds. Thirty such voice prints are made use of in this study and these are incorporated in this thesis. Voice prints of all the fricatives in all contexts are not taken as it is neither required nor possible. What is too obvious and non-controversial

are not considered for laboratory analysis. The voice prints of all the fricatives in these three Indian languages in some contexts are analysed.

Similarly when a speech sound in one dialect has been changed to something else in another dialect of the same language it is taken up for spectrographic analysis. /p/, /k/, and /tʃ/ of standard Bengali being changed to fricatives in Cachar Bengali is a case in point.

The present study is in the generative framework. A brief note on the rise of generative grammar, particularly generative phonology and its basic assumptions may be mentioned here. By the late 1950s American Structuralism had weakened and the generative grammar made its appearance in the field of linguistics through the initiatives of Noam Chomsky and Morris Halle. "In 1957, a volume of Chomsky's notes for an undergraduate course at MIT was published in a new series which had been started with Jacobson and Halle's (1956) Fundamentals of Language. This was Syntactic Structures, a work which might have gone essentially unnoticed had it not been for a review by Robert Lees that was published by Bloch in Language. Lees's (1957) review forcefully brought generative grammar to the attention of the American linguistic community, and can be said to have initiated the process of change that eventually led to the replacement of structuralism by generative grammar in America" (Anderson 1985 : 315).

In Phonology too, it was Chomsky , Halle and Lukoff who first questioned the basic proposition that phonological structure was independent of grammar in their paper (1956). In the 1962 International Congress of Linguists held in Massachusetts, Chomsky presented his paper, 'The Logical Basis of Linguistic Theory' which put forward a strong argument in favour of generative phonology. Halle's two short papers (1962, 1964) further presented the case for a generative approach to phonology.

The 1960s were years of confrontation between structural linguists and the proponents of generative grammar. The most conclusive response to the structuralist criticism is The Sound Pattern of English (1968) by Chomsky and Halle.

Halle talks of the basic conditions which phonological descriptions must satisfy. "The first two of these require that representations be organised into sequences of segments and boundaries, where the segments are further specified in terms of a system of properties called the 'distinctive features.' The third condition then addresses the way in which the phonological representation is related to 'the observable data, i.e. to the actual speech events' " (Anderson 1985 : 319).

For the description of the fricatives I have followed the generative model in that I have attempted to describe the fricatives by

bringing out their distinctive features. Each phoneme is a bundle of features and in making a contrastive study of the fricatives, I have shown that it is the presence or absence of some of these features that make a particular phoneme different from another phoneme.

Finally a note on transcription may be given here. Throughout this thesis I have used only phonemic transcription. The symbols used here are the same as those used by Daniel Jones in his English Pronouncing Dictionary (13th edition). However, owing to the fact that some of the symbols are not available in the computer I have used other symbols. The description of all the symbols used in this thesis is given in three term labels in Chapter 3. The same procedure is followed for certain speech sounds that are found in Indian languages but not in English. Secondly it may be noted that I have substituted other set of symbols used by certain writes with the ones mentioned above. Thus / c / the voiceless palatal affricate is substituted with / tʃ /, / j / with / dʒ / etc. It may also be noted that though Chatterji says there is only one sibilant phoneme in Bengali, he has used two (/ s / and / ʃ /) in transcription. I have, however used only one symbol, / ʃ /, for both these. Thus the word for pillar in Bengali is transcribed as / ʃtɔmbɔ / by me whereas this is transcribed as / stɔmbɔ / by some writers.

2. LITERATURE REVIEW

There are many works on the phonology of Assamese, Bengali, English and Malayalam. Also, there are works on theories related to sound change, cluster formations and spectrographic analyses of speech sounds. Some of these works that are directly related to the present research are reviewed below.

In Assamese, its Formation and Development by Banikanta Kakati (third edition, 1972 ; revised and edited by Golok Chandra Goswami and published by Lawyer's book stall, Gauhati) the author gives a brief sketch of the land and its people, the influence of the neighbouring languages on Assamese, a chronological development of the language and a detailed study of the modern Assamese language in two parts — the first dealing with phonology and the second devoted to morphology. In chapter I under the heading 'Sounds and Letters', Assamese phonemes, their description etc. are taken up, but a detailed consideration of the fricatives is taken up in chapter XII under the heading 'Sources of Consonants'. Here the sources of / s / and / z / , the changes of O. I. A. sibilants, sources of / x / etc. are considered. It is based on personal observation and perception, and no scientific equipment was used. Still, this book is indispensable to any student of Assamese language.

Another work on Assamese phonology is An Introduction to Assamese Phonology by Golok Chandra Goswami (First edition, 1966 ; published by Deccan College Pune). It is a detailed consideration of the Assamese language more or less on the same line as Banikanta Kakati's Assamese, its formation and Development. As suggested by the title of the book, it is more concerned with the phonological study of the language. Besides phonemes and their distribution, a study of allophones, consonant clusters and their distribution, structure of a syllable, word stress, junctures etc is also taken up in this book. Fricatives are given a detailed consideration under section 2.324. It includes the description and distribution of fricatives. In this section Goswami makes a distinction among five allophonic variations of / s /. The first variety [s̄ˡ] is "Alveolar voiceless spirant, slightly fortis and half long ; a slit spirant in production of which the front of the tongue becomes flat and the blade rests against the roof of the alveolar region on both sides, keeping a slit for the air to come out. It occurs (a) utterance initially before and utterance finally after the vowels / i e ɛ a ɒ/ and (b) before / r / initially and medially". The second variety [sˡ] is "Alveolar voiceless spirant slightly fortis and half long ; a groove spirant in production of which the blades of the tongue touch the roof of the alveolar region on both sides keeping a groove passage for the air to come out. It occurs initially before / ɔ o u / and finally after / o u / ". The third

allophone of / s / is [s̪] which is a "Slit spirant, half long and a little palatalized ; it freely varies with alveo-palatal [š] ; occurs before / j / ; initially it is slightly fortis and lenis medially." The fourth allophone [s] is slightly lenis ; slit spirant before / i e ɛ a ɒ/ and before consonants in cluster ; a little groove before the back vowels / ɔ o u / ; slightly palatalized before / i /." The last variety [s –s̪] "freely varies with the palatalized spirant [s̪] ; occurs after / t / in a cluster."

In like manner six allophones of the fricative / z / , three allophones of / x / and four allophones of / ɦ / are given in this book.

The same writer's Structure of Assamese (First edition, 1982 ; published by Gauhati University, Gauhati) is a systematic description of the standard Assamese language on the lines of modern descriptive linguistics. This work is entirely given to the study of phonology and morphology with an approach to syntax. In this work too, one section (2.3240) is given to the consideration of fricatives which like in the other book, mentioned above, is dealing with the description and distribution of fricatives. The allophonic variations of all the fricatives are given here as they are given in his earlier book.

In Asamiya Bhasar Itihas by Dr. Ramesh Pathak (first

edition, 985 ; Journal Emporium, Nalbari) chapter V is entitled 'Asamiya Bhasar Dhani Tatwa' where he considers the sibilant fricatives. He says that the letters representing the sibilant fricatives have lost their special qualities in Assamese. Even in old Assamese too, these sounds were not used... But it has to be kept in mind that / ʃ / and / ʂ / were used just like / s /.

Asamar Bhasa by Dr. Bhimkanta Barua (first edition, 1990 ; students Emporium, Dibrugarh) is a general introduction to the languages spoken in Assam and its neighbouring states. Chapter IV has a part on Assamese language but there is no specialized treatment on different classes of speech sounds, or sound change and the cluster formations in the language.

Golok Chandra Goswami's Asamiya Varna Prakash (second ed., 1990 ; published by Bina Library, Gauhati) is yet another book on the Assamese language that gives a definition of fricatives, their articulation process, the source of words containing fricatives etc. Modern laboratory equipments are not used in the analysis of the speech sounds.

Suniti Kumar Chatterji's The Origin and Development of Bengali Language (1975 edition, published by Rupa & Co. Calcutta), first published in 1926, is the earliest and full length consideration of the growth of Bengali Language and a

description of the then language. Volume 1, chapter V deals with sibilant fricatives. He holds the view that Bengali has only one sibilant phoneme which is / ʃ /, and / s / is only a subsidiary form of / ʃ / occuring in certain phonetic environment. The sound change from / ʃ / to / x / in East Bengali and Assamese is also part of this chapter. According to him, "Bengali has one sibilant phoneme, the palato-alveolar / ʃ / and the dental or alveolar [s] is only a subsidiary form of it —— / ʃ / normally becoming [s] when occuring before / t, d, n, r, l /. In East and North Bengali, of course, [cʃh] is reduced to [s]. The pure palatal sibilant is preserved in Bengali only among the Magadhan speeches .... In early Assamese, intervocal / ʃ / became / ɦ / and in recent Assamese single / ʃ / initial or intervocal is pronounced as the gluttural spirant / x / .... It is only in West Bengali that the original Magadhi value is kept intact. In this point, more than in anything else, Bengali has remained faithful to the Magadhi character .... In fact [s] rather than / ʃ / is till found among certain communities in Western Radha and elsewhere, although it is regarded as very vulgar in Standard Colloquial speech." The voiced and voiceless varities of / h /, their distribution, the dropping of / h / in medial position, occuring alone or in clusters are also dealt with here. Chatterji has also traced the source of / ɦ / and / h / in this work. Another attempt he has made in this book is that he has made a frequency count to see the percentage of occurrence of all the consonants and finds

that / ʃ / has 3.64 % and [s] has only 0.35 % of occurrence.

In Sukumar Sen's Bhashar Itibritta (1994 edition, published by Anand Publisher pvt. Ltd., Calcutta) chapter two has a part on sound changes. He has laid down two principles of sound change. The first is , sound change takes place in a particular language under certain conditions. In other conditions the change is not possible. The second is, sounds inside a word undergo changes according to definite rules. This book too clearly points out how sibilants are either modified or dropped in Bengali.

A Bengali Phonetic Reader by Suniti Kumar Chatterji (1986 edition, published by Rupa & Co. Calcutta) describes the Bengali phonemes and deals with the sound attributes such as length, stress and intonation. Transcription of Bengali texts and finally a short list of vocabulary in transcription are given at the end. This book, originally published in 1928 in London, records the pronunciation of Bengali words of that time. In the section, 'Details Regarding the Bengali Sounds and their Formation', Chatterji has contradicted what he had said earlier in the O. D. B. L. There he treats / s / as a subsidiary form of / ʃ / and not as a separate phoneme. But in this book he writes under section / s /, "occurs only before / t , t^h , n , l , r / ; some might regard it as a subsidiary member of the / ʃ / phoneme, but since it occurs in foreign names , and since , at least in the speech of some , it would seem to distinguish words , its

recognition as a separate phoneme in Standard Colloquial Bengali is justifiable."

In Bengali and Other Related Dialects of South Assam by S. S. Tunga (1995 edition, Mittal Publications, New Delhi) the author devotes chapter IV of this book to sound system where he draws lines of differentiation between Standard Bengali and Cachar Bengali with special reference to sound change in /k/, /tʃ/ and /p/ which are turned fricatives in Cachar Bengali. It is because of factors such as these that Cachar Bengali becomes even unintelligible to the speakers of Standard Bengali.

A Comparative Grammar of East Bengali Dialects by Gopal Haldar (first edition 1986 ; published by Puthipatra , Calcutta) is yet another book on East (Cachar) Bengali. After outlining the linguistic area, groups and varieties of East Bengali dialects in the 'Introduction', he devotes Part I of the book to Phonetics. Under the section, consonants , their distribution and modification , he discusses the fricatives. He traces the sound change of /ʃ/, the common variety of Eastern Prakrit , first to /h/ in Eastern dialects and from this to /x/ in Assamese. He asserts that this change was well established in East Bengali by the time of Sri Chaitanya Deva (1485 - 1533). According to him /ʃ/ is extremely rare in initial position and quite common in medial position.

Mike Davenport and S. J. Hannah's Introducing Phonetics and Phonology (1998, Arnold Publishers) has specified the distribution of all the fricatives and explained the variation in fricatives. Some of the sound changes in fricatives in English are dealt with here. The change of / v / to / f / when followed by a voiceless consonant, the elision of / θ / and / ð / when followed by / s / and / z /, the dropping of / h / in unstressed pronouns and auxiliaries etc. are discussed in this book.

In Phonology in the Twentieth Century (1985 , The University of Chicago Press , Chicago and London) R. Anderson has traced the history of twentieth century phonology from Saussure upto the 1980s. In chapter twelve , the author considers the decline of American Structuralism and the ascendancy of generative phonology. The confrontation between the structuralists and the proponents of generative phonology like Chomsky and Halle and the final replacement of structuralism by generative model are considered at length. Chapter thirteen takes up the developments in this field after The Sound Pattern of English (1968). He says that this very year marked the beginning of reactions against the generative model. For instance Kiparsky's paper in that year asked the question, 'How Abstract is Phonology ?' This was in response to the body of analyses represented by SPE and other generative works of the 1960s. His concluding remark is , "neither a theory of rules nor a theory of

representations constitute a theory of phonology by itself."

An Outline of English Phonetics by Daniel Jones (1992 Indian edition , published by Kalyani Publishers , Ludhiana) is an introductory book to the learners of phonetics. Jones has used photographs showing the lip formation and strictures involved in the articulation of all the speech sounds. These are supplemented by diagrams wherever necessary. This book is of much use to the second and foreign language learners of English as the photographs showing the position of speech organs at the time of articulation tells him or her the accurate formation needed for acquiring the correct speech sounds of English. In describing each speech sound , Jones has pointed out the errors committed by foreign learners of English and has suggested appropriate remedial measures. For instance in the section dealing with the voiceless labio-dental fricative , / f / , he writes , "The Japanese generally replace / f / by a breathed bilabial fricative ɸ ..... The error may be remedied by holding the upper lip out of the way , and practising the sound with the lower lip firmly pressed against the upper teeth."

In chapter VII of English Phonetics and Phonology : An Introduction by Philip Carr (1999 , Blackwell Publishers , Oxford) the author explains the syllable structure, the knowledge of which is essential in drawing the syllable boundaries. While deciding whether a consonant sequence is a cluster or not it is of immense help. If two

or more consonants fall within the same syllable only the sequence becomes a cluster. He writes, "The two main constituents within a syllable are the onset and the rhyme. In the word 'bile', for instance, the first segment /b/ constitutes the onset of the syllable and the last two segments /ai/ and /l/ taken together, constitute the rhyme." He has given a number of reasons for justifying this kind of division. "The rhyme may be further subdivided into constituents nucleus and coda. Thus in the word 'bile' the diphthong /ai/ constitutes the nucleus, and the consonant /l/ constitutes the coda." Secondly he has enumerated and explained the universal principles of syllabification such as the sonority scale principle and the maximal onset principle. Applied to a syllable structure sonority scale implies that the most sonorous element in a syllable will be located within the nucleus, and that the further one gets away from the nucleus, the less sonorous are the segments. Maximal onset principle means that where the language specific phonotatics will allow for two or more syllabification across a syllable boundary, it is the syllabification which maximizes the material in the following onset which is preferred.

Universals of Human Language Ed. by Joseph H. Greenberg Vol. II (Phonology) (1978 , Stanford University Press, Stanford) has one essay by the editor himself entitled 'Some Generalizations Concerning Initial and Final Consonant Sequences' which has brought out many

generalizations regarding the possible consonant sequences. One such generalization is : 'Every initial or final sequence of length m contains at least one continuous sub sequence of length m - 1. Forty such generalizations are given in this essay. Distinctive features of the various elements of the consonant sequences too are given here.

In A Course in Phonology by Iggy Roca and Wyn Johnson (1999, Blackwell Publishers , Oxford) , the authors have devoted the first chapter of their work to 'The Production of Obstruents' where they discuss all the fricatives of English. The strictures formed in the production of various fricatives are shown with the help of diagrams. Chapter nine and ten are devoted to syllable and syllable complexity. Most of the things discussed here like onset , rhyme , nucleus , coda , sonority scale , maximal onset principle etc are presented likewise in Philip Carr's English Phonetics and Phonology (1999).

The Sound Pattern of English by Noam Chomsky and Morris Halle (1968 , Harper & Row Publishers , New York) was an interim report on work in progress and also the most conclusive response to the structuralist criticism. In chapter seven of this book , 'The Phonetic Framework' , the authors consider the distinctive features in detail. They consider these features "to be the minimal elements of which phonetic , lexical , and phonological

transcriptions are composed , by combination and concatenation." They say that the symbols used for transcription are nothing more than convenient ad hoc abbreviations for feature bundles. All the features of a speech sound taken together is called a 'feature complex' or a 'unit'. The classificatory and phonetic functions of the distinctive features are clearly distinguished. In their classificatory function all features are strictly binary. But "as phonetic parameters , the distinctive features provide a representation of an utterance which can be interpreted as a set of instructions to the physical articulatory system , or as a refined level of perceptual representation." The theory of distinctive features is more accurate and scientific than the traditional three-term label description of speech sounds.

In Malayalam Verbal Forms by Prabodh Chandran Nair (1972 , Dravidian Linguistics Association , Trivandrum) the author has devoted a considerable part of this book to the study of the phonology of Malayalam. A lot of scientific methods are used in describing the articulation of speech sounds. Written in the Firthian framework , this book is one of the first books of its kind.

The Phonetics and Phonology of Malayalam by Tara Warrier (1976 , unpublished M. Litt. dissertation , C. I. E. F. L. , Hyderabad) is a scientific approach to the study of speech sounds of Malayalam. X-Ray photographs of the various strictures involved in the production of speech sounds of Malayalam are used to scientifically

determine the place of articulation. One of the rare works of its kind , this dissertation is of immense help to the students of Malayalam phonology.

In 'Sanskrit Influence on Malayalam' by Kunjunni Raja (1992 , Indian Journal of Dravidian Linguistics , No. XXI vol. 2) the author has given enough and more examples of Sanskrit sibilants being either dropped in Malayalam or replaced by other speech sounds. This , he explains , was because of the fact that Malayalam didn't have sibilants , and the present day sibilants in the language were borrowed from Sanskrit.

In Dravidian studies : Selected Papers by Emeneau M. B. (1994 , Motilal Banarsidas Publishers Pvt. Ltd. , Delhi) the author observes that the frequency of occurrence of fricatives varies from language to language, but one thing is certain and that is the most frequently occurring and common fricative is / s /. He says that the most pertinent study on fricatives is done by Nartey (1979). His data is based on 319 languages and he makes some valuable statements regarding the fricatives. In chapter 21 , he deals with the Proto-Dravidian / tʃ / and its developments. He writes , "Proto-Dravidian initial / tʃ / is defined phonetically as a palatal affricate by comparative examination of the

phonetics of its continuants in the various languages. It is more complex than the other plosives , and is unstable and subject to simplification. This results in some languages in loss of the stop component , resulting in a sibilant , which is preferably the universally most favoured / s / but in some Tamil dialects it is / š /. In some central Dravidian languages and dialects there is progressive development from s — to h — to zero."

R. E. Asher and T. C. Kumari in their Malayalam (1997 , Routledge , London and New York) has devoted Chapter III to Phonology, They state here that "underlying fricatives occur only in loan words. Three of the segments that have entered the language through the influx of Sanskrit namely / š, ʃ , s / are not differentiated in all dialects." They have also indicated the position of occurrence of the fricatives in Malayalam. All of them occur only in initial and medial positions.

In Comparative Dravidian Linguistics : Current Perspectives by Bhadriraju Krishnamurti (2001 , Oxford University Press) the author takes up the study of 'Patterns of Sound Change in Dravidian' in chapter eighteen. He classifies the major sound changes in Dravidian Languages into Historical and Typological kinds. "The historical changes are classified into (a) those internal to Proto-Dravidian and (b) innovations confined to major branches , sub-branches , and individual languages." The different kinds of sound changes like the palatalization of velars , / tʃ / changing into / s / and this further changing into / h / and finally this being dropped etc. are discused here.

3. THE LANGUAGES AND THEIR PHONEMES

Any proper study of the fricatives or any class of speech sounds entails a brief sketch of the language and the description of the phonems by using a three-term label. Hence in the following pages the origin and development of these four languages and their phonemes are given.

3.1. Assamese

Assamese is the principal vernacular and official language of Assam, a north-eastern state of India, and it is spoken there as well as in some parts of Bangladesh. The anglicized derivation of / ɔxɔm / (Assam), Assamese refers to both the language and its people. The native people call it / ɔxɔmiə / . It is a descendant of the Magadhan group of the Indo-Aryan family of languages and shows affinity with modern Hindi, Bengali and Oriya. The script of Assamese is developed from Brahmi through Devanagari and is similar to that of Bengali except the symbols for / r / and / w / .

3.1.1. Origin and Development

Though it is an established fact that Assamese is a descendant of Indo-Aryan language, the exact nature of the origin and development in the early stages are not very clear. It is supposed that

Assamese developed from Magadhi Prakrit of Eastern group of Sanskrit languages. According to Chatterji (1926 : 140) the Magadhi Prakrit gave rise to four Apabhramsa dialects, viz., Rāḍha, Vaṅga, Varendra and Kamarūpa. Out of these four, the first three dialects developed into the various dialects of Bengali in South and South-East Bengal. The last one, Kamarupa dialect, spread to the east keeping north of the Ganges river and it is spoken in North-Bengal and the Brahmaputra valley of Assam. In the early days the languages of these two areas constituted a single dialect group. From history books we learn that the kings of Koch Bihar in North Bengal patronised Assamese language and literature during the time of Maharaja Naranarayana and his brother Chilaraya in the sixteenth century and the seventeenth century. It was during the last century that the language of North Bengal was influenced to a great extent by the neighbouring Bengali language. Of course the political amalgamation of the area with West Bengal also played a crucial role in this.

If we look at the literary works we can say that the earliest literary work which may be claimed distinctly Assamese commences from the late thirteenth century, though there are some linguists who trace the beginning from an earlier period. Golok Chandra Goswami (1982 : 3) for instance, mentions the remark of Hiuen Tsang, a great Chinese traveller of the seventh century about the language of Kamarupa when he visited this place in 643 AD during the reign of Kumara Bhaskara Varma. He recorded that the language of Kamarupa 'different

a little from that of Mid-India.'

According to Dr. Goswami the earliest specimen of Assamese is to be traced in the copper plate inscriptions of the fifth century (see Goswami 1966 : 3). These inscriptions of Assam Kings dating back from the fifth century onwards, though written in Sanskrit, give clear indications to certain phonological features of the language of the time which are carried over to the present language.

In the seventh century Kumara Bhaskara Varma patronised Sanskrit language. In all likelihood the kingdom of Bhaskara Varma which extended to a considerable part of Bengal was populated by Aryans who were better equipped than the aboriginals of the time in various respects. The Aryans spread their language among these people who had no written language. The native population (Austric and Tibeto Burman) adopted the Aryan language. As in all such circumstances, the language might have influenced each other. The native languages might have surely influenced the Aryan language which brought about the Kamarupa Apabhramša.

Golok Chandra Goswami makes the following reference to the earliest specimen of the language.

"It is available in the mystic dohas of the Buddhist Siddhā Chāryas better known as the Caryas. These dohas discovered and brought to India by M. M. Hari Prasad Sastri from Nepal.were written

by eighty four siddhas hailing from various parts of eastern India. A few of them are recognized to have come from Kamarupa by authorities like Dr. G. Tucci. According to Dr. P. C. Bagchi these dohas were composed in between the eighth and tenth centuries A. D. The language of the dohas is late Apabhramsa. Doha is the precursor of the Assamese Bar-Git, the song celestial composed by the early Vaishnavite poets of Assam." (Goswami 1966 : 3)

The earliest leterary work which is claimed distinctly Assamese is Prahrada Carita by Hema Saraswati. It was written in the latter half of the thirteenth century A. D. Since the fourteenth century upto the present time there has been a continuous stream of literature. This span of time has been divided into three distinctive periods by Banikanta Kakati (Goswami 1982 : 7). The early Assamese period from the fourteenth to the end of the sixteenth century is marked by the contribution of the great Vaishnavite reformer, Sri-Sankaradeva. He introduced the prose style of writing in his one-act plays. The middle Assamese period from the beginning of the seventeenth century upto the annexation of Assam under British rule is the period of secular prose. And the third period (modern) from the annexation to the present times is significant for both language and literature.

The Christian missionaries have played a vital role in the development of modern Assamese. It is they who hastened the process of modernisation of the use of Assamese. In this connection

Goswami observes :

"The modern Assamese period begins with the translation and publication of the Bible in 1813 A. D. It was the American Baptist Missionaries who laid the foundation of modern Assamese literary idiom. The present day standard leterary language, based on the eastern dialect of Sibsagar did not evolve from the early Assamese literary standard ..... a new literary language and idiom originated in the middle of the nineteenth century when the missionaries established the first printing press in 1836, printed the second Assamese Grammar in 1848, the Assamese dictionary in 1867. They also started publishing the first Assamese journal 'The Arunodaya' in 1846, wrote volumes of Christian literature and thus created a tempo of producing a new literature in Assam" (Goswami 1982 : 8 - 9).

There was a period prior to 1873 when Assamese was not studied in educational institutions or used in offices. It is said that this was owing to the conspiracy of some native officials brought from Bengal by the British saying Assamese is a local variant of Bengali. It was again owing to the untiring efforts of the missionaries and the Assamese elite that Assamese was reintroduced in 1873.

People from other states of India or even from foreign countries face a number of problems while doing research in this language. The reason for this is that compared to many other Indian

languages, less linguistic research is done in Assamese. Thus it has many potential areas of research. Secondly, as Banikanta Kakati (1941 : X) points out Assamese has been very little studied abroad. He writes : "It (Assamese) has not been mentioned in the existing comparative grammars of the New Indo-Aryan languages." In a work on pure linguistics, it was for the first time noticed in Dr. S. K. Chatterji's The Origin and Development of the Bengali Language (1926). Assamese forms have also been similarly treated in Grierson's Modern Indo-Aryan Vernaculars (Supplement Indian Antiquary 1931 - 1933). The first grammatical notice of Assamese was taken by Rev. N. Brown in his Grammatical Notes on Assamese Language 1848. These notes were primarily meant for the American Baptist missionaries and were accordingly short.

It was many years later in 1894 that Prof. Nicholl summarised the main features of spoken Assamese in his work, 'Manual of the Bengali Language Including Assamese Grammar.' Two of the native grammarians, Hem Chandra Barua and Satyanath Bara brought out two grammar books in their own way which are considered elementary. Mr. Kaliram Medhi's Asamiya Vyakarana Aru Bhasatatva was published in 1936. Besides these, three comprehensive dictionaries have been published. The first was the Assamese-English Dictionary of M. Bronson, 1867 ; the second was that of Hem Chandra Barua's Hem-Kosa 1900, an Assamese to Assamese and English dictionary. And the third, Chandra Kanta Abhidhana was

published under the auspices of the Asam Sahitya Sabha in 1932.

Besides the works that are already mentioned in this section there are a few more on Assamese language available in English. The prominent among these are A Study of Phonology and Vocabulary of the Assamese Language by D. Bharati (1959), "Linguistic Studies in Assamese" in the Journal of the Post Graduate Students, Gauhati University (1953 : 1 - 8) "Assamese Verb Morphology : Derivation" in the Journal of the Gauhati University (1959 : 49 - 67); "Dr. Banikanta Kakati and Assamese Linguistics" in the Journal of the Assam Research Society (1966), "Classifiers and Quantifiers in Assamese" in Studies in Indian Linguistics. (Prof. M. B. Emeneau sastipurti volume, Poona (1966); "Assamese, the Lingua Franca in Eastern India" in the Souvenir of the Indian Economic Conference 53rd session, Gauhati (1970); "Eastern and Central Assamese Dialects" in the Assam Academy Review (1971) all by Golok Chandra Goswami ; 'An Introduction to Assamese' by U. Goswami, 'A Controlled Historical Reconstruction of Oriya, Assamese, Bengali and Hindi' by D. P. Pattanayak (1966) and Assamese Grammar by W. Robinson (1839).

3.1.2. The Phonemes.

Unlike English the Assamese plosives /p/, /t/ and /k/ have their aspirates as separate phonemes. In English these are allophones of these phonemes. As regards vowels it may be noted that there is no contrast of long and short vowels though there are separate

symbols for the long and short vowels in the alphabet.

3.1.2.1. Consonants

/ p /	voiceless	bilabial		plosive
/ b /	voiced	bilabial		plosive
/ t /	voiceless	alveolar		plosive
/ d /	voiced	alveolar		plosive
/ k /	voiceless	velar		plosive
/ g /	voiced	velar		plosive
/ p^h /	voiceless	bilabial	aspirate	plosive
/ b^h /	voiced	bilabial	aspirate	plosive
/ t^h /	voiceless	alveolar	aspirate	plosive
/ d^h /	voiced	alveolar	aspirate	plosive
/ k^h /	voiceless	velar	aspirate	plosive
/ g^h /	voiced	velar	aspirate	plosive
/ m /	voiced		bilabial	nasal
/ n /	voiced		alveolar	nasal
/ ŋ /	voiced		velar	nasal
/ l /	voiced		alveolar	lateral
/ r /	voiced		alveolar	rolled
/ s /	voiceless		alveolar	fricative
/ z /	voiced		alveolar	fricative
/ x /	voiceless		velar	fricative
/ ɦ /	voiced		glottal	fricative
/ w /	voiced		bilabial	semi-vowel
/ j /	voiced		palatal	semi-vowel

The consonants are presented in a tabular form.

	Bilabial		Alveolar		Palatal		Velar		Glottal	
	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.
Plosives										
Unaspirated	p	b	t	d			k	g		
Aspirated	p^h	b^h	t^h	d^h			k^h	g^h		
Fricatives			s	z			x			ɦ
Nasals		m		n				ŋ		
Lateral				l						
Trill				r						
Semi-vowel		w				j				

3.1.2.2. Vowels.

As stated earlier the distinction between long and short vowels / i: / and / i /, and / u: / and / u / is not strictly maintained in Assamese. Kakati (1972 : 63 - 67) writes :

"There is no distinction of length in the sounds of / i /, / i: / ; / u /, / u: / in Assamese. They may be used indiscriminately in Assamese words without alteration of sound or sense. And in final positions, especially in affixes, / i /, / i: / are so used. But in tatsama words (Sanskrit words) and in tadbhava words (words derived from Sanskrit language) distinction is made in the use of / i /, / i: / ; / u /,

/ u: / in imitation of Sanskrit spelling. There are, however, long and short sounds of the pure vowels / i /, / u /. But the long or short quality depends on the length of the word in Assamese or in the position of the vowel within the word."

The long vowel is heard particularly at the end of the word where some vowel sounds are dropped ; as,

/ kini: /	having bought	/ kiniā /
/ ni: /	having taken	/ nia /

Similarly the long vowel / u: / occurs in word final positions ; as,

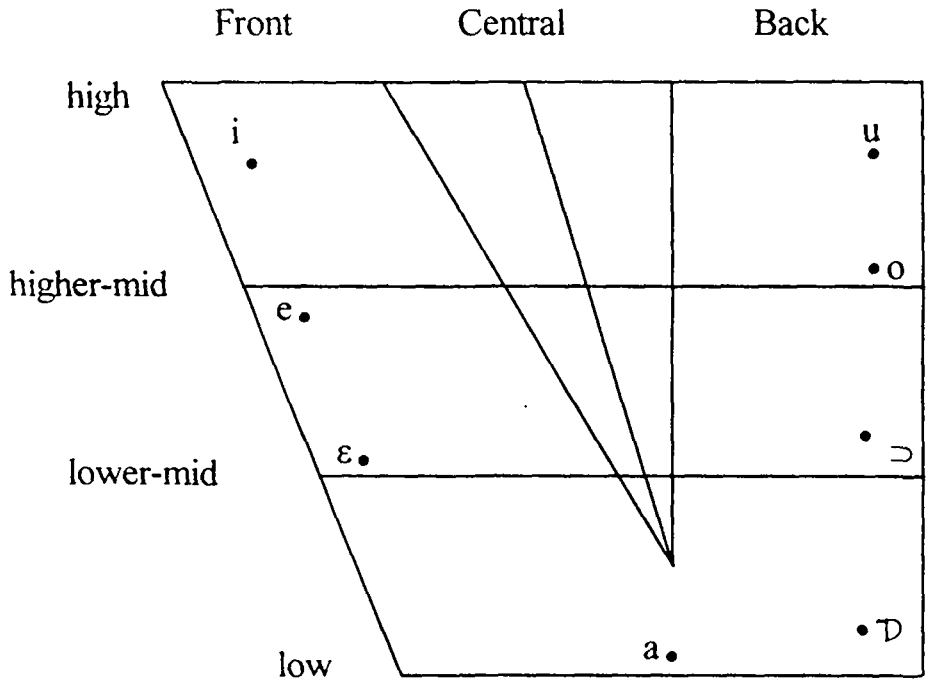
/ kharu: /	a bracelet
/ garu: /	a pillow

/ i /	High	front	unrounded	vowel
/ e /	Higher-mid	front	unrounded	vowel
/ ɛ /	Lower-mid	front	unrounded	vowel
/ a /	Low	central	unrounded	vowel
/ ɒ /	Low	back	rounded	vowel
/ ɔ /	Lower-mid	back	rounded	vowel
/ o /	Higher-mid	back	rounded	vowel
/ u /	High	back	rounded	vowel

The eight vowels are shown in the following tabular form.

	Front	Central	Back
High	i		u
Higher-mid	e		o
Lower-mid	ɛ		ɔ
Low		a	ɒ

The vowels are placed in the following vowel chart.

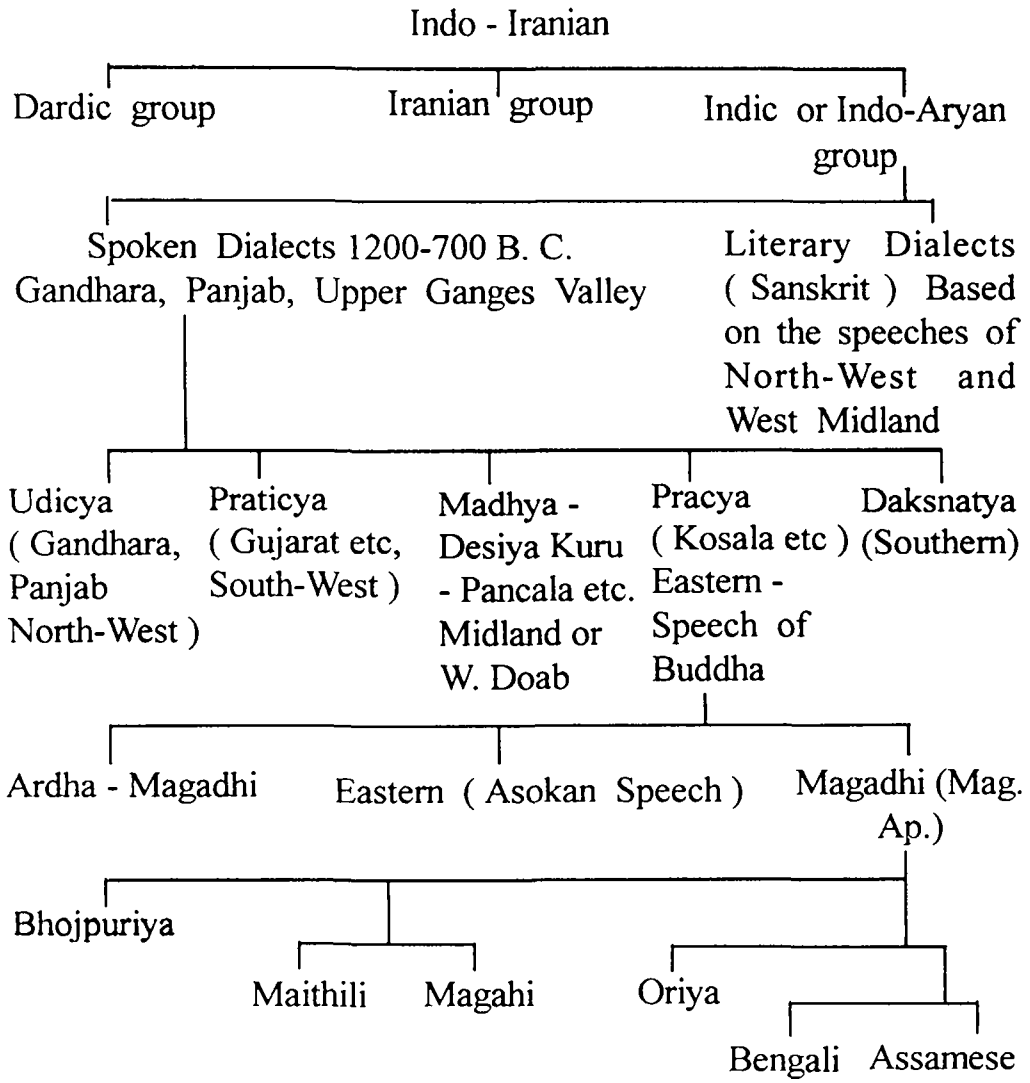


3.2. Bengali

Bengali is one of the Indo-Aryan languages spoken in W. Bengal state of India, some parts of Assam, Orissa, Bihar and in Bangladesh. In terms of the number of speakers it ranks eighth in the world. The Bengali linguistic area is surrounded by a large number of languages. These include Oriya, Hindi and Assamese which are sister

languages of Bengali ; Santali, a dialect of Kol (Munda) group of Austric family of languages and Mo and Mundari (Kol family), Malto and Kurukh, two dravidian languages in the West, Tibeto-Burman languages in the North and East such as Rong, Bhutanese or Lho-ke, Danjing-ka or Sikimese, Bodo, Kachari Garo, Dimasa, Mrung, Maithei and dialects of Kuki-Cin. Another neighbouring language is Khasi belonging to Mon-Khmer group of the Austro - Asiatic language.

Descent of the Bengali Language



(courtesy : S. K. Chatterji)

3.2.1. Origin and Development

Before the Aryans entered Bengal there were people who spoke other languages. Suniti Kumar Chatterji talks about the presence of the Kol and Dravidian speakers in the western fringes of the Bengali area. With the establishment of the Gupta power in Bengal in the fourth century, Bengal became finally and completely linked to Northern or Aryan India. The Guptas being zealous brahmins, a large number of brahmin settlements took place in their time.

From the remark of Fa Hien , who visited Bengal in the beginning of the fifth century, we learn that this area was flourishing in Aryan learning and culture. Similarly from the evidence of Hiuen Tsang, it can be concluded that by the seventh century A. D. , the Aryan language had been generally adopted by the people all over Bengal , and it had penetrated as far east as western Assam.

Since the beginning of Pala dynasty in 740 A. D. composition in the vernacular of the land as well as in the literary Apabhramsa of the west started. With the ousting of Palas and the taking over of power by the Senas around 1100 , the people of Bengal had probably formed their seperate individuality, with the dialects they spoke developing a common character in contra distinction to those of Mithila and Magadha.

The oldest specimens of Bengali prior to 1300 A. D. are the following.

1. A number of place names in the inscriptions and in old books beginning from the first half of the fifth century A. D.

2. A glossary of over 300 words scattered in a Sanskrit commentary in the 'Amara-Kosa' by a Bengali Pandit, Vandya-ghatiya Sarvananda, written about 1159 A. D. The vernacular words preserved in it belong to the old Bengali period and they embody valuable material for the study of Bengali Phonology.

3. 47 songs called 'Carya-padas or 'Caryas' composed by teachers. The language of the Caryas is the genuine vernacular of Bengal (See Chatterji 1926 : 115).

Coming to Middle Bengali period, we see many landmark works. The most important one is Sri Krsna Kirttana of Candi-dasa. Other works of this period include the Padas of Candi-dasa, the Ramayana of Krtti-vasa, the Padma-Purana of Vijaya-gupta, the Sri-Krsna-Vijaya of Maladhara Vasa, the Mahabharatas of Sanjaya, Kavindra Paramesvara and Srikarana Nandi, The Dharma Mangala of Manika Ganguli etc.

The modern Bengali period from 1800 onwards saw the development of a standard language for prose. It was partly necessitated by the advent of Western learning. Meanwhile Calcutta became the intellectual centre of the Bengali people. Through literature

and actual contact in life the Calcutta dialect of Bengali gained prominence over other dialects. The colloquial of Calcutta made its first appearence in the Hutom Pecar Naksa (1862) (Sketches of the Hooting Owl) of Kali-Prasanna Sinha. This language reached higher planes of perfection in the hands of Rabindra Nath Tagore.

Some of the developments that took place in Modern Bengali are the following.

a) Euphonic combination of two adjacent vowels became a common feature and then the latter vowel sound changed. Thus dekh + ia became dekhya. The final 'ia' was changed into 'e', the word to dekhe. Likewise pa + ia was changed into paya and then to peye (having received).

b) Vowel harmony was extensively used from the nineteenth century onwards. Thus 'jalua' was changed into 'jolo' (watery).

c) The verb stem 'kar' (to do) was added with Sanskrit nouns to form compound verb forms. In this way 'sraban kar' (to hear), 'dan kar' (to give) etc. entered the modern literary Bengali.

d) The connective 'ebam' (and) which had its origin in Sanskrit was replaced by the Persian connective 'wa' which changed to 'o' in Bengali in literary and spoken varieties of Bengali. This connective

was used to link two words or two simple sentences, as in 'nara o nari' (man and woman).

e) New experiments were made in the field of Bengali prose. New ideas and techniques of the western world influenced the growth and shaping of the Modern Bengali prose (See Atindra Mojumder 1973 : 23 -24).

Two factors that influenced the Bengali language during this period were the influence of western literature and the replacement of Persian by English as the court language in Bengal. Hundreds of English words and many words coming from European languages through English were used in colloquial and written Bengali. English was also used as the medium of instruction in schools and colleges. All these factors influenced the Bengali language to a great extent (See Atindra Mojumder 1973 : 23).

3.2.2. The Phonemes

Different linguists have different ways of classifying speech sounds. According to some there are two sibilant fricatives in Bengali while for others there is only one. Thus / ʃ / and / s / are treated as two separate phonemes by some , while others treat these as one phoneme / ʃ /, and / s / is treated as an allophone of / ʃ /. As linguists have not given any minimal pair to justify that these two are separate

phonemes, I have considered these two as one phoneme / ʃ /.

3.2.2.1. Consonants

/ p /	voiceless	bi-labial		plosive
/ b /	voiced	bi-labial		plosive
/ t /	voiceless	dental		plosive
/ d /	voiced	dental		plosive
/ ṭ /	voiceless	retroflex		plosive
/ ḍ /	voiced	retroflex		plosive
/ k /	voiceless	velar		plosive
/ g /	voiced	velar		plosive
/pʰ /	voiceless	bi-labial	aspirate	plosive
/ bʰ /	voiced	bi-labial	aspirate	plosive
/ tʰ /	voiceless	dental	aspirate	plosive
/ dʰ /	voiced	dental	aspirate	plosive
/ ṭʰ /	voiceless	retroflex	aspirate	plosive
/ ḍʰ /	voiced	retroflex	aspirate	plosive
/ kʰ /	voiceless	velar	aspirate	plosive
/ gʰ /	voiced	velar	aspirate	plosive
/ tʃ /	voiceless	palato-alveolar		affricate
/ dʒ /	voiced	palato-alveolar		affricate
/ m /	voiced	bi-labial		nasal
/ n /	voiced	alveolar		nasal
/ ŋ /	voiced	velar		nasal
/ l /	voiced	alveolar		lareral

/ ɽ /	voiced	retroflex	flap
/ r /	voiced	alveolar	flap
/ *ʃ* /	voiced	palato-alveolar	fricative
/ h /	voiceless	glottal	fricative
/ *ɦ* /	voiced	glottal	fricative
/ j /	voiced	palatal	semi-vowel
/ w /	voiced	bi-labial	semi-vowel

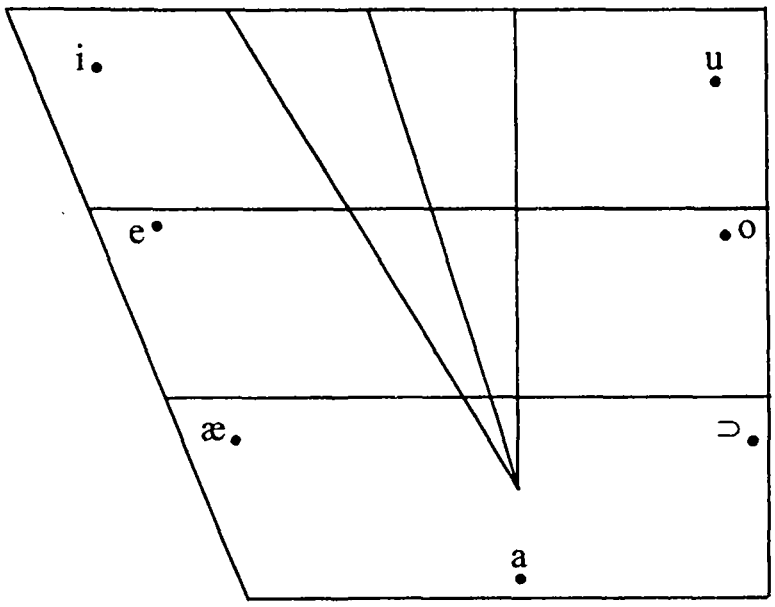
These can be shown in the following consonant chart.

	Glottal	Velar	Retroflex	Palatal	Palato - alveolar	Alveolar	Dental	Bi-labial
Plosive (Unaspirated) (Aspirated)		k g k^h g^h	ʈ ɖ $ʈ^h$ $ɖ^h$				t d t^h d^h	p b p^h b^h
Affricate					$tʃ$ $dʒ$			
Nasal		ŋ				n		m
Lateral						l		
Flap			ɽ			r		
Fricative	h *ɦ*				*ʃ*			
Semi-vowel				j				w

3.2.2.2. Vowels

/ i /	High	front	unrounded	vowel
/ e /	Higher-mid	front	unrounded	vowel
/ æ /	Lower-mid	front	unrounded	vowel
/ a /	Low	central	unrounded	vowel
/ ɔ /	Lower-mid	back	rounded	vowel
/ o /	Higher-mid	back	rounded	vowel
/ u /	High	back	rounded	vowel

These vowels can be represented in the vowel chart as given below.



3.3 English

English, which was introduced into the British islands in the fifth century by Germanic tribes, is today the national language of England, America, Australia, and the official language in a

number of Commonwealth countries. Though it does not have the largest number of speakers, it has the widest geographical spreading.

3.3.1. Origin and Development.

Since the origin and development of English is more obvious than the three other languages taken up for consideration here, only a very cursory survey is attempted here. Like Assamese (and unlike Malayalam) English is descended from the Indo-European language which was spoken about 3500-3000 B. C. by nomadic tribes which wandered in the lands around the Black Sea. In course of time it was split up into eight branches of which Primitive Germanic was one. This in turn was divided into Gothic, Scandinavian and West Germanic. From West Germanic Anglo-Saxon took its descent. Middle and Modern English are the later developments of old English (Anglo-Saxon) (Wood 1969 : 11)

The evolution of the language is continuous but there were major causes for rapid development in certain periods. The invasion of England by the Angles and Saxons of Germany, the Norman Conquest, the Renaissance and Reformation, the introduction of printing press and finally the influence of a large number of other languages on English have contributed to make the English we speak today.

3.3.2. The Phonemes.

The standard English has forty four phonemes —— twenty four consonants and twenty vowels. There are twelve pure vowels and eight diphthongs in the language. Unlike Assamese and Bengali and like Malayalam here length is phonemic. Words like 'fit' and 'feet' are different because of the difference in the vowel. The first one is short and the second one is long.

3.3.2.1. Consonants

/ p /	voiceless	bilabial	plosive
/ b /	voiced	bilabial	plosive
/ t /	voiceless	alveolar	plosive
/ d /	voiced	alveolar	plosive
/ k /	voiceless	velar	plosive
/ g /	voiced	velar	plosive
/ tʃ /	voiceless	palatal	affricate
/ dʒ /	voiced	palatal	affricate
/ f /	voiceless	labio-dental	fricative
/ v /	voiced	labio-dental	fricative
/ θ /	voiceless	dental	fricative
/ ð /	voiced	dental	fricative
/ s /	voiceless	alveolar	fricative
/ z /	voiced	alveolar	fricative

/ ʃ /	voiceless	palato-alveolar	fricative
/ ʒ /	voiced	palato-alveolar	fricative
/ h /	voiceless	glottal	fricative
/ m /	voiced	bi-labial	nasal
/ n /	voiced	alveolar	nasal
/ ŋ /	voiced	velar	nasal
/ j /	voiced	palatal	semi vowel
/ r /	voiced	post-alveolar	frictionless continuant
/ l /	voiced	alveolar	lateral
/ w /	voiced	labio-velar	semi vowel

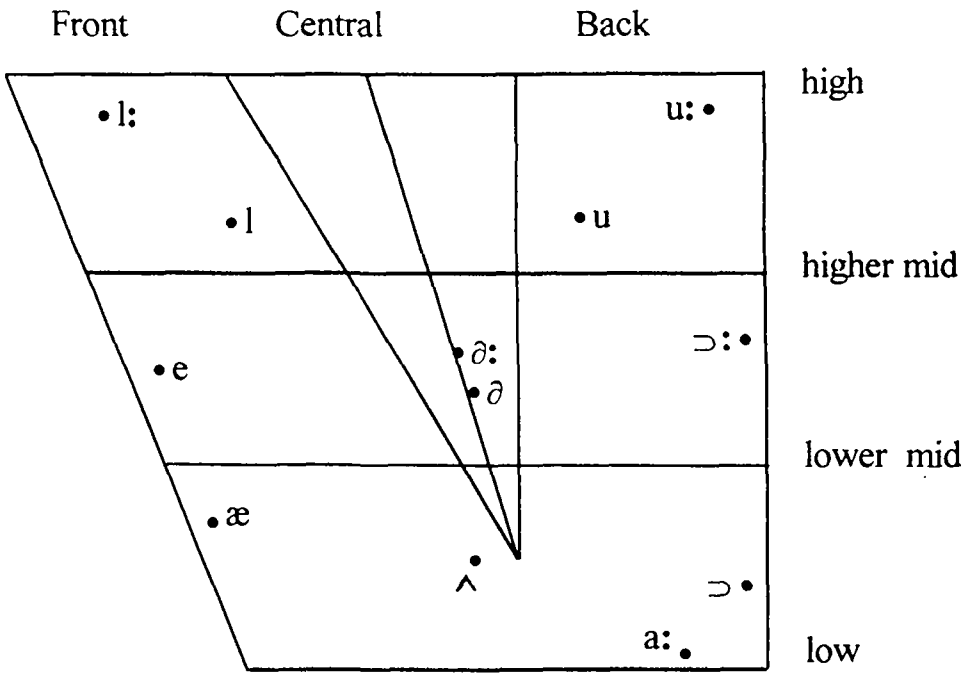
These phonemes can be shown in the following tabular form on the next page.

Place →	Bilabial		Labio-dental		Dental		Alveolar		Post-alveolar		Palato-alveolar		Palatal		Velar		Glottal	
Vd-/Vl. → Manner ↓	Vl	Vd	Vl	Vd	Vl	Vd	Vl	Vd	Vl	Vd	Vl	Vd	Vl	Vd	Vl	Vd	Vl	Vd
Plosives	p	b					t	d							k	g		
Affricates											tʃ	dʒ						
Fricatives			f	v	θ	ð	s	z			ʃ	ʒ					h	
Nasals		m						n								ŋ		
Lateral								l										
Frictionless Continuant										r								
Semi vowels		(w)												j		w		

3.3.2.2. Vowels

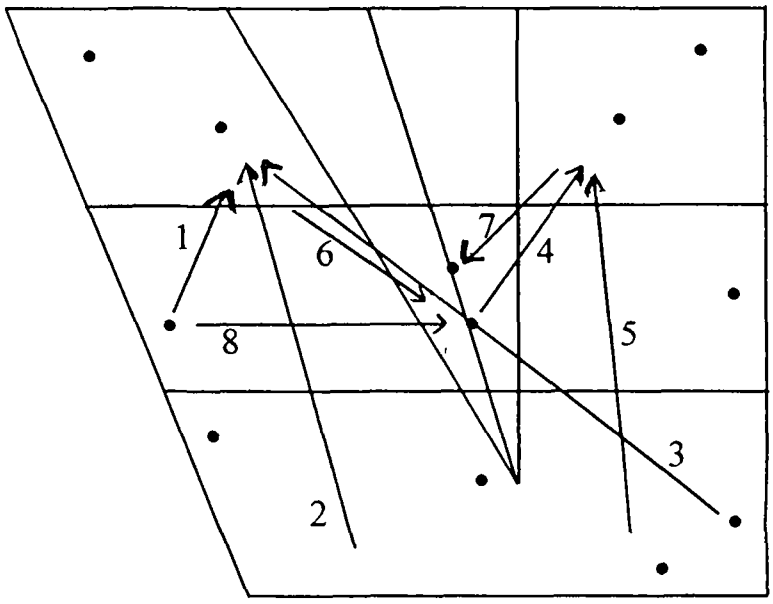
/ i /	Front	unrounded vowel between high and higher-mid points.
/ i: /	Front	high unrounded vowel.
/ e /	Front	unrounded vowel between higher mid and lower-mid points.
/ æ /	Front	unrounded vowel just below lower-mid point.
/ ʌ /	Central	unrounded vowel between low and lower-mid points.
/ *a*: /	Back	open unrounded vowel.
/ ɔ /	Back	open rounded vowel between low and lower-mid points.
/ ɔ : /	Back	rounded vowel between higher-mid and lower-mid points.
/ u /	Back	rounded vowel between high and higher-mid points.
/ u: /	Back	high rounded vowel
/ ə /	Central	unrounded vowel between higher-mid and lower-mid points.
/ ə: /	Central	unrounded vowel between higher-mid and lower-mid points, slightly above / ə /.

These vowels can be shown in the following vowel diagram.



Besides these twelve pure vowels there are eight diphthongs. These are given in the following vowel diagram. The diphthongs are :

1 / ei /, 2 / ai /, 3 / ɔi /, 4 / əu /, 5 / au /, 6 / iə /, 7 / uə /, and 8 / ɛə /



3.4. Malayalam

Malayalam is one of the dravidian languages and it is spoken in the state of Kerala and Lakshadeep islands. Malayalees, the speakers of this language constitute four percent of the population of India (29.01 million according to 1991 census). In terms of the number of speakers, it ranks eighth among the languages of India (Asher 1994 : 2350).

In many ways Malayalam stands opposed to Assamese and Bengali. The first thing that one notices while making a comparative study of these languages is the absence of long vowels in Assamese and Bengali and the presence of the same in Malayalam. There are five sets of long and short vowels along with /ə/ which has no long vowel counterpart.

Secondly one can notice that the three letters representing the sibilant fricatives in Assamese and Bengali have actually only one speech sound or phoneme whereas these have three separate phonemes in Malayalam at least in the speech of careful speakers.

3.4.1. Origin and Development.

The original home of Dravidian language was in the North-West of India. With the arrival of the Aryans the Dravidian

population moved away from their ancestral home to the central and later to the southern parts of India. Now excluding certain minor groups of Dravidian population in the North-West, Bihar, Orissa and Madhya Pradesh, the bulk of the population has settled down in South India. In the process of migration different sections of the Dravidian population branched off from the main stream and settled in different locations and the languages too developed in different directions, giving rise to the different Dravidian language groups of the present time (See Andronov 1980 : 17).

With Tamil, Kota, Kodagu and Kannada, Malayalam belongs to the southern group of Dravidian languages. Its affinity to Tamil is the most striking feature. Proto-Tamil Malayalam, the common stock of Tamil and Malayalam apparently developed into two different languages over a period of four or five centuries from the ninth century on, resulting in the emergence of Malayalam as as language distinct from Tamil. As a language of scholarship and administration Tamil greatly influenced the early development of Malayalam. Later the irresistible inroads the Aryans made into the cultural life of Kerala accelerated the assimilation of many Indo-Aryan features into Malayalam at different levels. Speaking on the Sanskrit influence on Malayalam Dr. Kunjunni Raja writes in 'Sanskrit Influence on Malayalam' (1992 : 50) :

"It accepted all the non-Dravidian phonemes of the Sanskrit

language and there was a successful attempt at mixing the local Malayalam language and Sanskrit in what is known as Manipravala style. The independence of Malayalam as a separate language starts from about the eighth or ninth century A. D."

Malayalam, according to Kunjunni Raja, might have got separated from Tamil at some time, but its development as a separate language is mainly owing to the impact of Sanskrit. Tamil had confined itself to the Dravidian phonetic pattern, and could not accommodate Sanskrit loan words containing non-Dravidian phonemes. For example, 'palam' , 'phalam' and 'balam' , three distinct words in Sanskrit, would all be represented as 'palam' in Tamil. This limitation is partly responsible for Sanskrit loan words being less in Tamil than in Malayalam. Malayalam borrowed freely from Sanskrit and assimilated the rich treasures of Sanskrit language.

In the study of the phonology of Malayalam, the contribution of Kerala Panini is worth mentioning. In the chapter on 'Alphabet' (Reddy and Nair 1972 : 25) he describes the method by which the speech sounds are produced and he classifies them according to the manner of articulation. The method is very similar to that of Sanskrit grammarians. G. K. Panikkar in Phonetics and Phonemics as dealt by Kerala Panini writes that like Allen's Phonetics in Ancient India this work is also valuable in that it evaluates the speech sounds of Malayalam applying the ancient Indian system, and thus makes a

scientific study for the first time. He admits that tongue is the chief articulator and states that different qualities of sounds are due to the following six processes :

1. Emission (Anupradaanam)
2. Articulation (Karana Vibhranam)
3. Sound Combination (Samsargam)
4. Path Difference (Marga Bheedam)
5. Difference in point of Articulation (Sthana Bheedam)
6. Variation in Quantity (Parimanam)

Similarly he classified speech sounds on the basis of the emission that takes place during the articulation of each sound. These are :

1. Non-contact (Aspṛṣṭam)
2. Slight Contact (iisat spṛṣṭam)
3. Half Contact (Neema spṛṣṭam)
4. Contact (Spṛṣṭam)

There are various phonetic and phonological studies of Malayalam. On the one hand we have traditional analysis by grammarians brought up on the Sanskrit tradition set up by Panini. Rajaraja Varma's Kerala Paniniyam (1895) is a typical example of this. With the advent of Structural Linguistics, we have linguistic study of Malayalam on structural framework. Balakrishnan's Bhasha Vijnanam (1962) is a case in point. Similarly there are

doctoral dissertations based on structural framework. Velayudhan's work The Phonetics and Phonology of Malayalam may be mentioned as an example of this. In the same year came out Prabodh Chandran Nair's work Malayalam Verbal Forms within the Firthian framework of prosodic analysis (see Paulose 1997 : 27-28).

3.4.2. The Phonemes.

As in the case of Bengali, Malayalam too has some problem with regard to the number of consonant phonemes. / t / is not considered as a separate phoneme by some linguists. However since there are many minimal pairs distinguishing / t / and / t̪/, I have considered / t / as a separate phoneme.

3.4.2.1. Consonants.

/ p /	voiceless	bilabial	plosive
/ b /	voiced	bilabial	plosive
/ t̪ /	voiceless	dental	plosive
/ d̪ /	voiced	dental	plosive
/ ṭ /	voiceless	alveo-palatal (retroflex)	plosive
/ ḍ /	voiced	alveo-palatal (retroflex)	plosive
/ tʃ /	voiceless	palatal	affricate
/ dʒ /	voiced	palatal	affricate
/ k /	voiceless	velar	plosive
/ g /	voiced	velar	plosive
/ m /	voiced	bi-labial	nasal

/ n̲ /	voiced	dental	nasal
/ n /	voiced	alveolar	nasal
/ ṇ /	voiced	alveo-palatal (retroflex)	nasal
/ n̄ /	voiced	palatal	nasal
/ ɳ /	voiced	velar	nasal
/ l /	voiced	alveolar	lateral
/ ḷ /	voiced	alveo-palatal (retroflex)	lateral
/ r /	voiced	denti-alveolar	flap
/ R /	voiced	alveolar	flap
/ s /	voiceless	denti-alveolar	fricative
/ ʃ /	voiceless	alveo-palatal (retroflex)	fricative
/ š /	voiceless	palatal	fricative
/ h /	voiceless	velar	fricative
/ ʋ /	voiced	labio-dental	continuant
/ y /	voiced	alveo-palatal	continuant
/ j /	voiced	palatal	continuant

It may be noted that the symbols used here and the descriptions given are more or less the same as given by Prabodh Chandran Nair in Malayalam Verbal Forms. To this list I would like to add :

/ t /	voiceless	alveolar	plosive

This is done because there are minimal pairs involving / t̲ /, / ṭ / and / t / as given below :

/ pat̲i / hood of a snake

/ paṭi / dog

/ pati / touched

The argument that / t / is a geminate of / r / is

understandable to a certain extent. In causative verbal forms like :

/ k*a*j*a*ruk*a* / to climb.

/ k*a*j*a*tuk*a* / to make / cause someone to climb.

this is the case. But the distinctions do exist in many minimal pairs of nouns, as ;

/ p*a*:ṭ*a* / tin

/ p*a*:t*a* / cockroach

/ k*a*ṭ*a* / a piece of wood or a lump of mud

/ k*a*t*a* / sheaf

But / t / has no voiced counterpart.

The consonants are placed in the following chart.

	Bi-labial	Labio-Dental	Dental	Denti-alveolar	Alveolar	Retroflex	Palatal	Velar
Plosive	p b		t̲ d̲		t	ṭ ḍ	tʃ dʒ	k g
Nasal	m		n̲		n	ṇ	n̄	ŋ
Lateral					l	ḷ		
Flap				r	R			
Fricative				s		ʃ	š	h
Continuant		ʋ				y	j	

3.4.2.2. Vowels

There are eleven vowels in Malayalam. These are :

/ i / high front unrounded vowel

/ i: / high front unrounded vowel higher, more front and tense than / i /

/ e / mid front unrounded vowel

/ e: / mid front unrounded vowel slightly higher and more tense than / e /

/ *a* / low back unrounded vowel

/ *a*: / low back unrounded vowel, more back than / *a* /

/ ⊃ / mid back rounded vowel

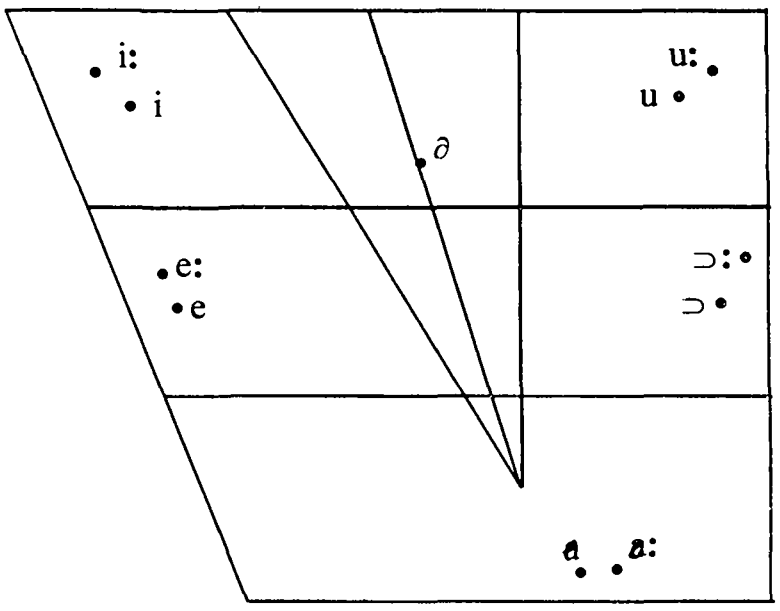
/ ⊃: / mid back rounded vowel, slightly higher and more back than / ⊃ /

/ u / high back rounded vowel

/ u: / high back rounded vowel, higher and more back than / u /

/ ∂ / high mid central vowel

The vowels are shown in the following vowel chart :



4. SOUND CHANGE IN FRICATIVES

One of the most noticeable phenomena in the growth of language is sound change. While changes regarding spelling, vocabulary and grammar are recorded after certain gaps of time change in pronunciation is a gradual but regular feature of all living languages. In this chapter sound changes that have taken place on fricatives in Assamese, Bengali, English and Malayalam are considered.

It has been a long standing question whether aound change can be observed while it is actually occuring. In modern linguistics the answer to this question has usually been a resounding negative. According to two of the founders of the modern discipline, Saussure (1959) and Bloomfield (1933), most linguists have maintained that change itself cannot be observed; all that one can possibly hope to observe are the consequences of change.

According to Hockett (1965) sound change is "a slow and imperceptible wandering about of local maxima in the multidimensional continuum of the phonological space." (See Wang 1977). In much simpler terms, "a sound change", according to Hockett (1958 : 439), "is a gradual change in habits of articulation and hearing, taking place constantly but so slowly that no single individual would ever be aware

that he might be passing on a manner of pronunciation different from that which he acquired as a child."

Linguists have tried to ascertain the causes of these changes. Ferdinand de Saussure in his paper entitled 'Phonetic Changes' brings out seven basic causes for these phonetic changes. These are :-

1. racial pre-disposition,
2. conditions of soil and climate,
3. law of least effort,
4. Phonetic education in childhood,
5. general state of the nation at a particular moment,
6. political instability, and
7. fashion. (see Baldi and Werth 1978 : 97)

Sociolinguists have other reasons to put forward for sound change. William Labov, for instance, lays much emphasis on immigration and considers it as a major cause of any linguistic change. In his paper 'On the use of the Present to Explain the Past' he writes :

A linguistic change begins as a local pattern characteristic of a particular social group, often the result of migration from another region. It becomes generalized throughout the group, and becomes associated with the social values attributed to that group. It spreads to those neighbouring populations which take the first group as a

reference group in one way or another. The opposition of the two linguistic forms, continues and often comes to symbolize an opposition of social values. These values may rise to the level of social consciousness and become stereotypes, subject to irregular social correction, or they may remain below that level as unconscious markers. Finally, one of the other of the two forms wins out. (see Baldi and Werth 1978 : 275 - 312).

Phonetic changes were studied in isolation in ancient days without taking into account the underlying system that undergoes the changes. Roman Jacobson in his paper, 'Principles of Historical Phonology' writes :

"Every phonological fact is treated as a part of the whole which is related to other parts of higher levels" (see Baldi and Werth 1978 : 103 - 119).

Thus the first principle of historical phonology will be : 'every modification must be treated as a function of the system of which it is a part. A phonological fact can be understood only by elucidating its role within the system of the language' (Baldi and Werth 1978 : 103). Jacobson cites the example of the old Polabian language where the phoneme / x / was represented before certain vowels as a voiceless velar spirant / x / and before other

vowels as a voiceless palatal spirant / x̄ /.

There have been two controversial views as to the way sound change takes place. According to the first view a sound change is not regular, that is, it can resist a sound change if the unchanged form can express an important meaning. Bloomfield illustrates this with examples from Greek in his book Language (Bloomfield 1933 : 362 - 363). In ancient Greek, Primitive Indo-European / s / between vowels had been lost by sound change. Thus Primitive Indo-European / gewso / 'I taste' appears in Greek as / gewo / 'I give a taste' ; Primitive Indo-European / genesos / 'of the skin' (Sanskrit / ɟanasah /) appears as Greek / geneos / later / genows /. But there is a considerable residue of forms in which an old intervocalic / s / seems to be preserved in ancient Greek. The principal type of this residue consists of the aorist tense (that is, past punctual) verb forms in which the suffix / -s- / of this tense occurs after the final vowel of a root or verb stem. 'Thus, the Greek root / plew- / 'sail' (present tense / plewo: / 'I sail' paralleled by Sanskrit / plavate / 'he sails') has the aorist form / eplewsa / 'I sailed' .... and the Greek root / ste- / 'stand' present tense / histemi / 'I caused to stand'. In place of this sibilant we have a voiceless velar fricative / x / in old Bulgarian / staxu / 'I stood up'. Bloomfield gives us further examples of retaining / s / amidst weakening and loss of / s /. Indo-European aorist type / ebhuism / old Bulgarian / byxu / 'I became', is

apparently represented by Greek / ephu:sa / 'I caused to grow' (see Paulose 1997).

It is evident from the above that when the intervocalic / s / was weakened and finally lost, it resisted the change if it expressed an important meaning. A sound change can thus be checked if it threatens to remove some semantically important features (see Bloomfield 1933 : 362 - 363).

The second and more accepted view regarding sound change that sound change is is unaffected by semantic features and concerns merely the habits of articulating speech sounds. According to this view the sound change that led to the loss of the intervocalic / s / destroyed every intervocalic / s /. The supporters of this view claim that forms like Greek / este:sa / cannot be continuants of forms that existed before that sound change. They were created after the sound change was past, as new combinations of morphemes in a complex form by a process which we call 'analogic new combinations' or 'analogic change' (see Bloomfield 1935 : 362 - 363). Similarly the intervocalic / s / was weakened to / h / and then lost. We can see the development of Indo-European / sweso:r / 'sister' Sanskrit / svasa: / giving first presumably / swehor / and then to / siur / in old Irish.

Gleason says :

"What is shifting is not the pronunciation of a specific

sound in a specific place, say a certain word. If it were, we might expect the same sound to change in a different way in some other place. Instead the shift affects the statistical norm based on all occurances of the given phoneme in a given environment - that is, on all occurances of a certain allophone. In turn this norm controls the pronunciation of this allophone wherever it occurs. Phonetic change, therefore affects allophones as wholes. Within the understanding that the effect is statistical, phonetic change affects any given allophone consistently. This is commonly expressed by saying that PHONETIC CHANGE IS REGULAR. This means that any phonetic change will affect all instances of the sound concerned in the positions in which it is operative" (See Gleason 1968 : 395).

William s – y Wang in his book The Lexicon in Phonological Change has considered at length the views of modern linguists who support the view that Phonetic Change is regular. He writes :

"It is instructive to take a cursory look at why sound change is thought to operate uniformally without exception. The classical doctrine as formulated in Ostaff and Brugmann's (1878) "Glaubensbekenntnis" of the Neogrammarian movement claims that "All sound changes, as mechanical processes, take place according to laws that admit no exceptions". Sapir(1921 : 187) accepted the traditional view that "sound changes work

mechanically", although he rejected the physiological explanation of sound change and regarded sound change as a strictly psychological process. We find a vigorous restatement of the Neogrammarian position in Hockett (1965) "According to the "physicalist" view of sound change, it is the mechanical, blind, imperceplible, and inexorable nature of phonetic law that accounts for its absolute regularity" (See Wang 1977 : 198).

Moving away from the extreme physicalist approach, some linguists like to see in the principle of identity the theoretical basis of the regularity hypothesis. When the physicalist school conceives of sound change "in the concrete terms of performance deviation of allophones, proponents of the principle of identity interpret sound change as directly and per se affecting the abstract unit phoneme, and only indirectly altering linguistic forms in so far as there are concrete occurrences of the identical phoneme". (see Wang 1977 : 198).

The best example of the principle of identity as the basis of the regularity hypothesis is found in Fourquet (1964 : 639). This is further endorsed by Bloomfield when he wrote : "Phonetic change affects the phonemes and alters linguistic forms only by altering their phonemic shapes" (see Bloomfield 1933 : 392).

Postal taking this issue to a higher level of abstraction argues that "the regularity of phonological change is a direct

consequence of sound change conceived as an addition, modification, or deletion of a general rule in the phonological component of the grammar." He writes :

"The regularity of sound change is due to exactly the same causes as the regularity of the linguistic phenomenon of distribution (phonetic or otherwise) generally. Such phenomena are regular, that is capable of general formulation across lexicon, formulation other than listing of all cases, just because they are the result of general rule, i.e. formal statements which apply to whole classes of (sequences of) lexical items in ways determined by their structure" (See Postal 1968 : 277).

Having presented the two controversial views regarding the nature of sound change I would like to state that the most accepted view that 'phonetic change is regular' is not fool proof. Let us consider the case of / h / dropping as is found in many languages across the world (including English). If sound change is regular then all instances of / h / will be dropped. Consider the words 'hit' and 'it'. In the case of / h / dropping according to the principle of regularity both words will be 'it' whereby there is no distinction. I strongly believe that something of / h / may be dropped but a trace will still be left inorder to differentiate 'hit' from 'it'. The trace may not be perceived by our normal ears but could be accounted for in a spectrogram or any such voice prints taken in a phonetics laboratory.

There are instances in English to prove the fact that a phonetic change is not regular. It can be explained by taking the words with / l / and / r /. When these sounds are in the onset position in a syllable they are pronounced as in play and pray (/ plei /, / prei /). But when they are in coda position these are not pronounced in most cases as in park and calm (/ pa:k /, / ka:m /). There are hundreds of such words in English where these sounds are dropped in coda position. The rule of their change can be stated as :

$$\left\{\begin{matrix} l \\ r \end{matrix}\right\} \rightarrow \emptyset \; / \; V \_\_ C$$

We can also see words like gold and cold where / l / is in a coda position but they are not dropped because the dropping will pose another problem. It is difficult to distinguish goad from gold if / l / of gold is not pronounced. Both will have the same pronunciation / gəud /. Similarly if we drop / l / of cold it becomes / kəud / which is same as the English word code / kəud /.

Because of these evidences in the English language it is not cent percent correct to say that phonetic change is regular. in case of words like 'park' and 'palm' the dropping does not pose such problem as there are no other words having the same pronunciation as / pa:k / and / pa:m /. Hence the view held by some of the modern linguists that Phonetic change is regular is to be accepted with certain reservations.

One of the causes of sound change given by Ferdinand De Saussure — the law of least effort (the difficult is replaced by easy one) seems to have taken place to a great extent in fricatives. From the data collected from many languages of the world this becomes clear. The whole line of change extending to affricates on one side and null on the other side seems to be something like this. The affricate / tʃ / is replaced by the sibilant fricative / s /. It is in turn replaced by the voiceless glottal / velar fricative [h / x]. In the next stage this is replaced by the null or zero element ⌀ . These changes can be shown as below.

$$/ tʃ / \rightarrow / s / \rightarrow \left\{ \begin{matrix} h \\ x \end{matrix} \right\} \rightarrow ⌀ \quad (\text{zero})$$

None has definite clues as to how this development took place exactly. However the available studies on this and the observation of the present day development in languages help us reconstruct the past development. The three changes shown above can be seen separately as follows :

1. / tʃ / → / s /

Though / tʃ / is a single phoneme, it is a combination of two components - / t /, a stop and / s /, a fricative. The orthographic symbol / ts / in some books in Phonetics clearly suggests this fact. Moreover the manner of articulation also makes this clear. There is a complete closure of the oral passage (as in the case of a stop) and then there is delayed release or continued flow of air as in a fricative.

It is because of these factors that /tʃ/ is not included in either stops or fricatives but in a separate class called affricate.

Once we admit the fact that /tʃ/ is a combination of a stop and a fricative, the process of change from /tʃ/ to /s/ can easily be understood. The stop element was dropped and the fricative element is retained. This can be written as

/tʃ/ (/t/ + /s/) → ⓘ + /s/ (/s/).

It may be noted that in some languages the stop element is retained and the fricative element is dropped. In that case we can have /t/ in place of /tʃ/.

2. /s/ → $\begin{Bmatrix} h \\ x \end{Bmatrix}$

/s/ is a voiceless alveolar fricative. Unlike /tʃ/ it is not a combination of two sounds but it has, along with other sibilant fricatives the inherent tendency of aspiration (see Trump 1986 : xlii). Here aspiration can be taken to mean unimpeded breath. From this I would like to reconstruct the possible development of /h/ out of /s/. /s/ with aspiration can be written as [Sh]. But as time went on the aspirated element became more prominent than before. Thus a stage might have been reached when both elements were equally prominent. This stage can be shown by the symbol [sh], not /ʃ/. The development continued and we reach the next stage. When the element of aspiration became more prominent than /s/. This stage can be

represented by the symbol [sH]. Gradually the / s / was lost giving us only / h /. Alternatively we can say that the impeded breath in / s / is removed or the impediment is discontinued resulting in the unimpeded breath, though at glottal level some flapping of the vocal cords may give us a fricativized release (See Paulose 1997).

Saussure's law of least effort might have been at work, for / h / or / x / is easier to produce than / s /. The energy spent on producing a sibilant fricative is much more than that spent on a non-sibilant fricative. This is proved by the fact that when the spectrograms of these sounds are taken there are darker formants in the spectrograms of sibilant fricatives and very light formants for the non-sibilant fricatibes. The spectrograms marked PVD 1, PVD 2 and PVD 3 have the words / m*a*:s∂m /, ʋi*ʃ*∂m and n*a*:š ∂m respectively, all with sibilant fricatives. See the dark formants representing these sounds and then compare these with the spectrograms marked PVD 4, PVD 8, PVD 12, PVD 16, PVD 20, PVD 21 and PVD 22 which are the voice prints of / guha /, / maha /, / xap^{h}ɔr /, / him /, / xɔba / , / ɔha / and / ah /. The formants are hardly visible. (The dark areas represent the vowels). Spectrograms are given on pages from 165 to 188.

3. $\begin{Bmatrix} h \\ x \end{Bmatrix} \rightarrow \emptyset$ (zero)

I would like to name the voiceless glottal fricative as the vanishing fricative as this change has been attested in a number of

languages including English. Wyld (1968 : 211), for instance, talks about the loss of initial aspirate :

"In considering the process, a distinction must be made between words of pure English origin and those from French. Even in respect of genuine English words, a Norman French speaking scribe often omits initial h- in the M. E. period. This spelling 'alf a pound' Norf, Guilds (1389) appears to be a genuine early example of the loss in a stressed syllable ...Cooper does not mention the dropping of h- among his 'barbarisms' ....". He also mentions the loss of / h / before / t / preceded by front vowel. The original sound of 'h' in night etc. was [h^{-}] and the loss of / h / before / t / when preceded by a back vowel. (g)ht becomes -ft. Marston (1604) rhymes 'after' with daughter (Wild 1968 : 217).

One of the reasons for this is the fact that the omission of / h / does not distort the message much. In other words it is not semantically a significant factor. This can be understood from the following two sentences. In one / h / is omitted while in the other another consonant is omitted. The first blank can easily be filled in by anybody with a moderate knowledge of English but the second cannot be so.

— alf a pound is needed.

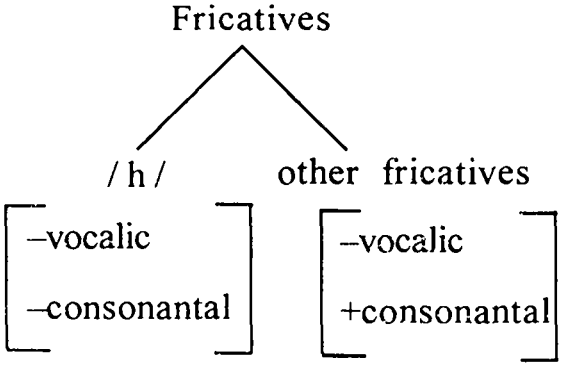
— ar is coming.

A second reason for the dropping of / h / is that though it is a consonant, its articulation stricture is neither complete like that of a stop, nor that of an affricate (complete closure and slow release) nor as close as that of the remaining fricatives. In other words / h /, like the semivowels, comes very close to the vowels. So its dropping is taking place faster than any other consonant.

Thirdly, as mentioned earlier, the energy spent on / h / is much less in comparison to that spent on the sibilant fricatives. This is evident from the spectrograms taken in the phonetics laboratory. As long as the omission of / h / does not pose any semantic problem it is likely to be dropped, that is / h / in hit will not easily be dropped because the remaining part of the word will not be distinguished fromm the ordinary 'it'.

Fourthly / h / is the oddman of the fricative category as it is the only fricative that shares the distinctive feature of –consonantal.

This can be shown as below :



Before considering these changes in the four languages under consideration, it is essential to see how these changes have taken place in other languages across the world.

The words for numerals from one to ten in some European languages may be taken as an example. Among these numerals 'six' and 'seven' begin with a sibilant fricative in English (six, seven), Gothic (saihs, sibun), German (sechs, sieben) Dutch (zes, zeven) Danish (sex, syv) Latin (sex, septem), but those sibilants are replaced by / h / in Greek (hex, hepta) (see Wood 1969 : 14). From these examples we can reconstruct the first sound of six and seven as a sibilant in Proto-Indo-European language and that the Greek case is an evidence of the substitution of a glottal fricative for an alveolar fricative. (/ s / → / h /).

Similar changes are found in a number of other languages. In the Apabhramša dialects such changes are attested. Thus we have 'eha' from 'eʃah' in the three Apabhramsa dialects, 'daha' from 'dašan' in western and southern Apabhramsa, 'pāhana' from 'paʃana' in Western Apabhramša (see Tagare 1987 : 66).

The term 'Apabhramša' originally meant a corrupt or deteriorated form and was applied to usages not sanctioned by the school of Panini. Bharata's Natyasastra (300 AD) makes the first reference to Apabhramša as a distinct dialect from Sanskrit and Deši.

Linguistically Ap. is the name of a stage in the development of the Indo-Aryan branch of the Indo-Iranian group of the Indo-European family of languages. This stage is supposed to have intervened between secondary Middle Indo - Aryan and New Indo - Aryan (to use Grierson's terminology), and Indo-Aryan speeches are assumed to have gone through this during 500 - 1200 A. D. The term Ap. is used here as the name of a literary dialect in which poetic works were composed between 500-1200 AD, and which was regarded as Ap. by the authors themselves and by the Prakrit grammarians (see Tagare 1987 : 4)

Grierson in his Pišaca languages of North - Western India cites a number of languages where the sibilants are regularly substituted by / h / or / x / (see Grierson 1969 : 21-22). In one dialect of Pašai, it is regularly changed to / x / and this change is also observed in Kashmiri, in which š, the suffix of the second person singular has become / kh / . In the Eastern dialect every / š / becomes / x / (see Grierson 1969 : 128).

Similary Indo - Aryan sibilants have been found to be replaced by / h / in many forms of New Indo-Aryan like Gujarati of Surat, some forms of East Bengali and Assamese. These developments, according to Chatterji, are recent, and do not appear to be inheritances from Middle Indo-Aryan ; otherwise they would have been written as -h- for / š /, / ʃ / and / s / in early orthography

of these languages. However in Middle Indo-Aryan we find from the Apabhramša period a tendency to pronounce intervocatic –s– or –ss– as / h / in certain areas. These areas are identified as Udicya or North-Western tracts – the present day areas of Hindi and Panjabi and the Rajasthani and Western Hindi areas also appear to have been influenced by it judging from the evidence of a few words. It would appear that this change characterized the Panjab - in this matter the Panjabi speech would appear to have developed a characteristic which is noticed in Iranian (change of I Ir. s– –s– to h– –h–). Thus Salatura, the village which was the home of Panini became Halaura, now Lahaur, Snusa > nhuha > Panjabi nuh ; vimsa (ti) > Panjabi with ; vasanta > vahanda, as noted by Al-Biruni. The change of sibilant to -h- in numerals is easily noticeable and it appears that this change is influenced from the Panjab side from the Middle Indo - Aryan times through business men. Thus we see dasa being changed into daha, raha (egaraha, baraha, teraha, choudhaha etc) (see Chatterji 1983 : 75). He also gives us examples of this kind from literary words in Hindi and Rajasthani which also show similar substitution (Kehari < Kesarin ; dihada, diahada < divasa - ta). Chatterji is of the opinion that in Western Panjabi (Lahndi), in Rajasthani and Gujarathi, their source dialects in Middle Indo-Aryan would appear to have preserved the sibilant in the -sy- future (Karisyati-Karesi (Lahndi), Karasi (Rajasthani), Karase (Gujrati) but interestingly enough in Brajbhasa, and in the Awadhi and Bihari and Bengali we have -h- karsyati = karihai (Brajbhasa), karihai (Awadhi), karihi. kari

(Bhojpuri), karisyatha, karihaha, kariha, kario, koro (Bengali) (see Chatterji 1983 : 75).

The sound change from /s/ → /h/ and /h/ → ∅ have been attested in Gondi, a Dravidian language spoken by 2.2 million people in the mountains and forests of four adjacent states of central India. /s/ → /h/ is noticed in the North, West and North - West, while /h/ → ∅ is found in the south and south-east (See Krishnamurti 2001).

Besides the sound changes mentioned so far (/tʃ/ → /s/ → $\begin{Bmatrix} h \\ x \end{Bmatrix}$ → ∅) there are other directions in which the sibilants moved away from their original sound pattern. In some cases one sibilant was substituted by another sibilant and in some other cases a stop has taken its place.

In some languages owing to assimilation sibilants are altogether lost. Thus the first element of compound ʃk is a sibilant, but this conjunct consonant is assimilated in Sindhi to /k/. Thus the Sanskrit word /niʃkərmə/ becomes nikami, Sanskrit /gɔʃt/ becomes /gɔtu/. In compound words /ʃp/ is simply assimilated to /p/ as /niputrɔ/ (without a son) is from Sanskrit /niʃputra/. The compound letter kʃ is assimilated in Sindhi to kh as 'akhe' is from Sanskrit /akʃi/ (eye), /khiru/ (milk) is from /kʃi:r/ etc. (see Trump 1986).

4.1. Sound Change in Assamese

Among Indian languages Assamese could be taken as a fine example to illustrate the changes of /tʃ/ → /s/ and /s/ → /x/. The loss of the stop element in the affricate is one of the most unique features of Assamese language. In place of the Sanskrit voiceless affricate, we have a fricative in Assamese. Thus the following words in Assamese have a fricative in the initial position whereas their equivalents in Sanskrit have a /tʃ/.

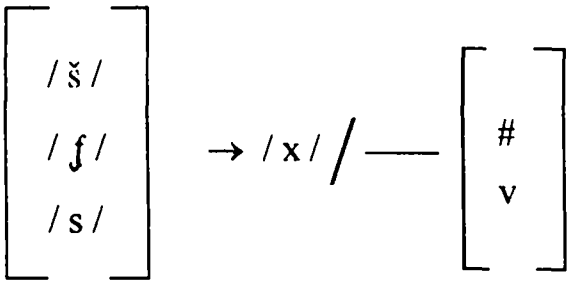
Assamese	Sanskrit	Meaning
/sɔkrɔ/	/tʃakra/	wheel
/sɔrɔn/	/tʃaran/	feet

In terms of distinctive features this change can be shown as the following.

/tʃ/	/s/
+consonantal	+consonantal
+delayed release	–delayed release
–continuant	+continuant
–anterior	+anterior

The second change /s/ → /x/ has also taken place in Assamese. Here it is to be noted that the /s/ developed out of the

Sanskrit / tʃ / did not further change into / x / but remained / s /. The Sanskrit sibilants / š /, / ʃ / and / s / became / x / in Assamese. But this change is dependent on certain phonetic environment, that is, these sibilants are not substituted en-gross with / x /. The substitution is based on the following rule :



To illustrate this some words in Malayalam and their equivalents in Assamese are given below. These words have their origin in Sanskrit. See how sibilants are retained in Malayalam while these are substituted with / x / in Assamese.

Malayalam	Assamese	Meaning
/ *a*:k*a*:šəm /	/ akax /	sky
/ šušruʃə /	/ xusruxa /	service
/ s*a*:gərəm /	/ xag⊃r /	ocean
/ š⊃:kəm /	/ xok /	sorrow
/ s*a*k*a*l*a* /	/ x⊃k⊃l /	all
/ *a*:s*a*:m /	/ ⊃x⊃m /	Assam
/ s*a*b*a* /	/ x⊃ba /	meeting

Exceptions to this rule are not altogether absent. Some of the exceptions are given below.

1. Words of numerical system seem to differ. Words like / bis / (twenty), / tris / (thirty) etc ending in a sibilant in other languages descended from Sanskrit, retain the sibilant in Assamese, though the sibilants are in word final positions. However, 'one hundred' in Assamese is / ek xɔ / → / exɔ / and not / ek sɔ / as in Hindi. Here the velarization may be due to the / k / of /ek/ .

One reason for this exception could be the fact that the words for numerical system tend to behave in a different way for the easy transaction of business. The most intelligible and common word forms are used by all the people though some sound change has taken place on some speech sounds in other words.

2. Another exception to the rule is with regard to / kʃ /. Everyone will agree it is a combination of the stop / k / and the fricative / ʃ /. In Assamese a change has taken place in it. The sibilant is altogether lost leaving behind a trace of aspiration. The sibilants have the inherent quality of aspiration. This is passed on to / k /. Thus we get :

/ šikʃa / →	/ xikʰa /	(education)
/ parikʃa / →	/ pɔrikʰa /	(examination)
/ pakʃi / →	/ pɔkʰi /	(bird)

It is not hard to find an explanation for this change. As per the rule stated earlier about the / x / substitution, what can take place is this:

If we split /kʃ/ into its components we get /k/ and /ʃ/. After applying the /x/ substitution rule the word /šikʃa/ will be /xikxa/. This combination is unusual in the language or not permitted, that is /k/ is not immediately followed by /x/ in the same word. Even in the adjacent words this is sometimes odd if these two sounds are in nearby positions (at the end of the first word and at the beginning of the second word). In /exɔ/ when two words /ek/ and /xɔ/ are produced together /k/ is omitted.

Phonetically too this looks quite odd, because both /k/ and /x/ are velar and also voiceless sounds, the only difference being the former is a stop and the latter a fricative. To produce /k/ and then /x/ at the same place of articulation without the intrusion of a vowel is difficult, and this explains the reason for the rejection of /xikxa/ and the adoption of /xik^{h}a/ where the aspiration is retained on /k/.

The combination as mentioned above i.e. a plosive followed by a homorganic fricative is very rare in English too. Let's consider the three voiceless plosives of English and see if they are followed by the homorganic fricatives.

/p/	followed by /f/	(labials)
/t/	followed by /s/	(alveolars)
/k/	followed by /x/	(velars)

The first combination is not found in English. The second is

found but extremely rare excluding when the plural morpheme is added to nouns ending in / t / as in cats, pots etc. The Advanced Learner's Dictionary of Current English has just one word where 'ts' combination is in the initial position. The word 'tsetse' is a noun, a fly in tropical Africa. The word 'Tsar' is pronounced / *za:* / and hence it doesn't concern us here. But one may note that / s / behaves in an unusual manner as can be seen in the chapter, 'Consonant Clusters Involving Fricatives.' The third combination is not found in English as / x / is not a phoneme in Standard English.

A third exception to the rule of / x / substitution is in words like /nɔksa /. Here too the explanation given for / kʃ / is applicable. The substitution of / s / with / x / will result in the combination of / k / being followed by / x / which is not found in Assamese.

/ s / in Assamese has different allophonic variations some of which are phonetically determined while others are dependent on the source of the sound. Golok Chandra Goswami in his Introduction to Assamese Phonology has given all the allophonic variations of the sibilant fricatives (five in the case of / s / and six in the case of / z /) with examples (See Goswami 1966). But certain factors, may be because they were not relevant for the purpose, were not included which I would like to highlight in this study. These factors are :

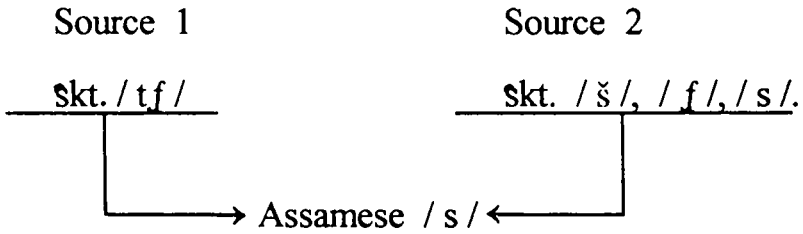
1. The two sources of / s /

2. Whether the two / s /$_S$ coming from two sources can be distinguished or not.

3. The / s /$_S$ derived from different Sanskrit sibilants can be distinguished or not.

1. The two sources of / s /

The Assamese / s / comes from two separate sources. These are : (a) The Sanskrit / tʃ / after the loss of the stop element becomes the fricative / s /. (b) The Sanskrit sibilants / š /, / ʃ / and / s / retain their sibilant quality when these are followed by consonants (else where these become / x /)



2. The distinction between the two / s /$_S$ coming from two different sources.

The / s / that comes from the Skt. sibilants have their sibilant realisation only when they are followed by consonant, whereas the / s / that comes from / tʃ / can be followed by a vowel. In other words if / s / is followed by a vowel this / s / has its source in Sanskrit / tʃ /.

Secondly the / s / that comes from skt. / tʃ / has a slight affricate realisation (See Goswami 1982 : 62 - 72). He also says that the phonetic range of / s / extends from alveolar to palato-alveolar region on the point of articulation and classifies the words accordingly. The classification in this study varies from his. The two groups of words given below have the phoneme / s / in them. How these two groups are shown to be different by Goswami and me are given below.

Group (a)

[s̄] in	/ sin /	sign, signal
[s̄] ɛk	/ sɛk /	stain
bi[s̄]	/ bis /	fan, to fan

Group (b)

[s̄] ri	/ sri /	beauty
[s̄]reni	/ sreni /	class
a[s̄]rɒ m	/ asrɒ m /	hermitage

The / s / in (a) and (b) as given above are, according to Goswami :

"alveolar voiceless spirant, fortis and half long; a split spirant in production of which the front of the tongue becomes flat and the blade rests against the roof

of the alveolar region on both sides, keeping a slit for the air to come out."

The difference between the two / s /$_S$ in these two groups is / s / in (a) "occurs utterance initially before and utterance finally after vowels /i·e ɛ a ɔ / ; and / s / in (b) initially and medially (Goswami 1982 : 62) before / r / in clusters."

I differentiate these two / s /$_S$ differently. The / s / in (a) is derived from the Sanskrit affricate / tʃ / and the / s / in (b) comes from the Sanskrit sibilants. The alphabet of Assamese has two separate symbols for these two / s /$_S$.

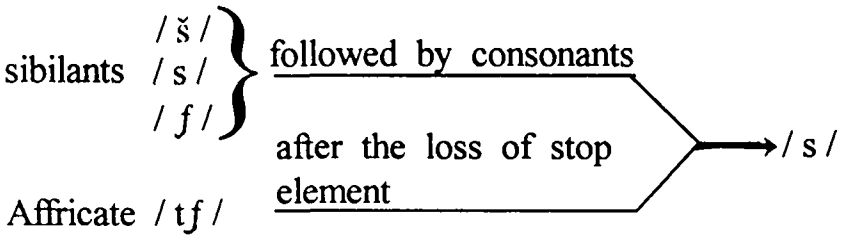
In the spectrographic analysis these two / s /$_S$ have yielded different results. The / s / that comes from / tʃ / has lower frequency than the / s / that is derived from the Sanskrit sibilant / s / or the ordinary / s /. The ordinary / s / (as in PVD 1) has the frequency from 4000 — 8000 Hz. But the / s / in the Assamese word / sɔki / has the frequency from a lower range of 3000 — 7000 Hz (see spectrogram PVD 19).

That the two / s /$_S$ can be distinguished can be shown with the help of some simple experiments. A non-native speaker of Assamese may be allowed to read the phonemic transcription

of the words given in (a) above. His reading will surely evoke laughter among the Assamese speakers. Thus the / s / of / sor / (thief) and the / s / of / sreni / (class) are pronounced differently by the native speakers of Assamese.

3. The distinction between / s /$_S$ derived from Skt. sibilants.

Now the question whether there is any distinction in the quality of sounds that have derived from the three sibilants of Sanskrit can be considered at length. Linguists have treated all these three as well as the / s / that comes from / tʃ / as one phoneme / s /. This can be shown as below :



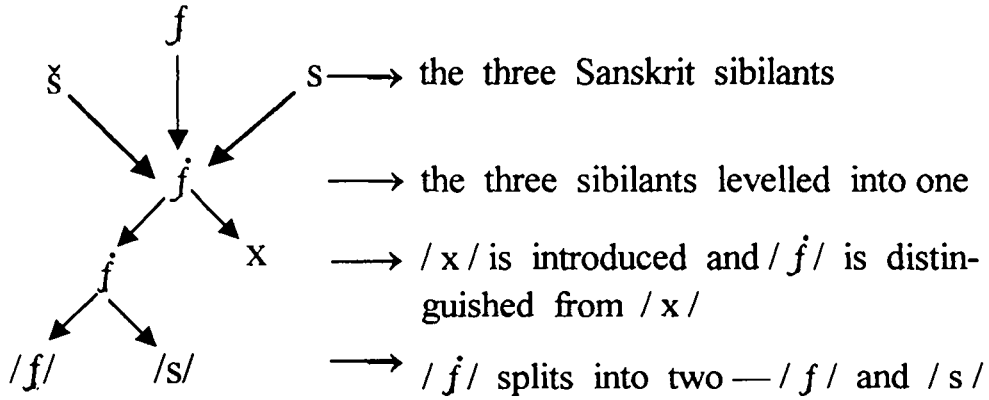
The three sibilants do not seem to have three distinct sounds in Assamese as they have in Malayalam, though these are borrowed into Malayalam from Sanskrit. In Assamese a two-way distinction could still be made.

The three sibilants of Sanskrit might have maintained a threefold sound system but soon they got levelled into one sound for which I use the symbol / ʃ́ / as used by S. K. Chatterji.

Owing to the contact of various other languages the following changes might have taken place.

1. Levelling down the three sibilants into one sound / ʃ̇ /
2. The introduction of the voiceless velar fricative / x /
3. / ʃ̇ / gradually acquiring allophonic distinctions to have / ʃ / and / s /.

Whether these changes took place simultaneously or one after the other is not clear. In all probability the sound change might have taken place like this.



Thus the allophonic variations of / s / as / ʃ / and / s / can be distinguished. The phonetic environment determines their occurrence. The ordinary / s / occurs before consonants that are labial or alveo-dental ; and / ʃ / occurs before consonants that are palato-alveolar and velar. This can be illustrated with the help of words such as / sneh / and / pɔriʃkar /. In the first word / s / is followed by / n /, an alveolar sound and therefore it is

/ s /. The / s / in the second word is followed by / k / which is a velar sound, and therefore it is / ʃ /.

Spectrographic studies done on these two words (see Paulose 1997) showed / s / has the formants at higher frequencies than those for / s / in / pɔriskar /.

4.2. Sound Change in Bengali

The line of change in fricatives as given at the beginning of this chapter is partially attested in Bengali. The changes from / s / → / ɦ / and / h / → ∅ have been found here. The following examples could be used to illustrate this.

/ goʃala / > / gohala / > / gohali / > / goāl / cowshed

/ naʃti / > / natthi / > / nahi / > / nai / is not

Besides this there are many instances of independent / h / dropping in Bengali. / h / is dropped from OIA conjuncts / –hm– /, / –hl– /, / –hn– / and / –hr– / ; and the second member is usually doubled. This is clear from the following words.

/ brahman /	>	/ bramm ɔ n /
/ ahladh /	>	/ allad^{h} /
/ tʃihna /	>	/ tʃinn ɔ /
/ hrid ɔ i /	>	/ rid ɔ i /

(see Mojumder 1973 : 128).

Sanskrit medial single consonant / h / is dropped in some words while it was retained in others.

/ kɔthajɔti / > / kɔhei / > / kɔhe / > / kɔi /

/ bɔhɔti / > / bɔhɔi / > / bɔhe / > / bɔi /

/ radhika / > / rahiha / > / rahi / > / rai / (see Sen 1994:182)

OIA / dh / / / h / is frequently dropped in Bengali as can be seen from the following examples.

/ dadhi / > / dahi / > / dɔi /

/ vadhu / > / bahu / > / bɔu /

/ madhu / > / mahu / > / mɔu /

/ h / is also dropped in numerals from eleven to eighteen as can be seen below :

/ egaraha / > / egarɔ /

/ baraha / > / barɔ /

/ teraha / > / terɔ /

/ tʃaudhaha / > / tʃaudhɔ / (see Chatterji 1926 : 552)

Chatterji says :

" / ɦ / cannot occur in Bengali as a final sound in a *syllable ; it must have either a vowel to prop itself up, or it must*

be dropped, and occasionally it is changed to a semivowel [ĕ] or to [i] when it terminates a syllable."

eg. sadhu > sahu > sah > sa .....

"The loss of intervocal / ɦ / and diaspiration of aspirated stops characterize late MB and NB. This has been noted in connection with NB diphthongs. In interjections, however, intervocal / ɦ / is retained eg. / aɦa /, / ɦiɦi / / oɦo /, / uɦu / " (see Chatterji 1926 : 557.)

The voiceless / h / is however found in syllable final position in Bengali. In such cases it is written with the visarga. It also occurs after voiceless stop or affricate / k^h /, / tʃ /, / th /, etc. forming an aspirate. The voiceless / h / like the / h / in 'hat' or 'happy' is also found in a few exclamatory words and is optionally changed to voiceless velar, palatal or bilabial spirant according to the nature of the preceding vowel (See Chatterji 1926 : 558).

Another line of development or sound change in fricatives in Bengali is from / ph / bh / → / h / → ∅. This is evident from the following instances.

/ sephalika /	/ sihali /	/ siuli /
/ prabhati /	/ pɔhei /	
/ asmabhih /	/ amhahi /	/ ami /
/ jumsabhih /	/ tumhahi /	/ tumi /

The reason for such changes can be easily explained. The stop element in /ph/ / /bh/ is lost while the aspiration became more prominent. As most intervocal /h/ was dropped, here too /h/ is dropped.

Linguists, including Chatterji have entered /s/ as a separate phoneme in Bengali, though they have not given any minimal pair to show this. Though there is distinction between /ʃ/ ans /s/ among the Bengali speakers, no known minimal pairs exist in the language to show these two are separate phonemes. Chatterji, however admits that there is only one sibilant phoneme in Bengali. He says, "Bengali has one sibilant phoneme, the palato-alveolar /ʃ/ and the dental or alveolar /s/ is only a subsidiary form of it — /ʃ/ normally becoming [s] when occuring before /t/, /d/, /n/, /r/, /l/." (See Chatterji 1926 : 546). Thus this sound change is environmentally determined. This change can be shown by the following rule :

$$/ʃ/ \rightarrow /s/ / \text{—} \begin{bmatrix} t \\ d \\ n \\ r \\ l \end{bmatrix}$$

In East Bengali /ʃ/ is turned to /h/ as it has happened in Assamese where the sibilant is replaced by /x/, the voiceless velar fricative (See Haldar 1986 : 27-28).

The / ʃ / and / s / in Bengali are therefore to be treated as allophones of / ʃ /. Speaking about the differences of these two Kostic and Das say :

"The difference between Bengali fricative / s / and Bengali fricative / ʃ / is the lowering of friction by at least 500 Cps so that the main fricative concentrations of acoustic energy is situated between 500 Cps and 3500 Cps instead of 2000 Cps to 4000 Cps as was characteristic for the / s / fricative. In the upper region the concentration is the same for / s / and for / ʃ /, that is, up to about 5000 Cps" (See Kostic and Das 1972 : 134 - 135).

The present rescarcher's spectrographic analysis of these two sounds [s] and [ʃ] as in the words / ʃnan / and / bhaʃkɔr / has yielded similar results. Spectrograms marked PVD 6 has the voice print of the word / bhaʃkɔr / and PVD 7 has the voice print of the word / ʃnan /.

In Eastern Bengali dialects, particularly in Cachar Bengali, plosives and affricates of standard Bengali have changed into fricatives. Thus / k / becomes / x /, / tʃ / becomes / s / and / p / becomes ϕ. These are considered below.

Cachar Bengali is unique for the quality and structure of the consonants. The consonants of this dialect are complex sounds and

acoustically very different from those of Standard Bengali. Describing the complexity of these sounds S. S. Tunga writes :

"In reality they (Cachar Bengali consonants) are mostly complex sounds the nature and character of which are difficult to know for the non-native speakers. This is perhaps one of the reasons why Cachar Bengali as also Syllhet Bengali is unintelligible to the outside world ..... Grierson writes that it is not even intelligible to Central and Northern Bengali areas ; a similar view was expressed by Beames a full one hundred years ago who says that Syllhet Bengali is as much unintelligible to a Marathi or a Sindhi as to a resident of Murshidabad .... This is because of, among other things, the nature of consonants. Accordingly, in Cachar Bengali a / k / is not a / k / ; it is either a / x / or a / kh / ; a / kh / likewise is not a /kh / but a / k / or / x /. And more important it does not properly distinguish between / k / and a / kh / but jumbles the plosives together with a severe friction at the glottis to produce a sound which is half / k / and half / k^h / yet tinged with glottal closure resembling German / x / or Arabic / ċ / " (See Tunga 1995 : 121).

The stops and affricate / k /, / p / and / tʃ / in standard Bengali are changed into / x /, ϕ and / s / respectively. These are considered separately below.

/ k / → / x /.

/ k / is normally spirantalized so as to make it a fricative. It remains this sound almost everywhere. The friction that is produced while articulating this sound turns it into a voiceless aspirated glutteral fricative which may be written as / x /. The following words in Cachar Bengali and their equivalents in Standard Bengali show this sound change :

Cachar Bengali	Standard Bengali	Meaning
/ xɔia /	/ kɔia /	saying
/ xɔitam /	/ kɔhitam /	used to say (I)
/ xɔrtɔ /	/ kɔrto /	used to do (he)
/ xɔrtam /	/ kɔrtam /	used to do (I)
/ baxɔl /	/ bakɔl /	skin
/ hɔxɔl /	/ ʃɔkɔl /	all, everybody

The word / xaɸɔr / was spectrographically analysed. This is / kapɔr / in Standard Bengali. The initial sound has shown formants as in a fricative (See the spectrogram marked PVD 12). The stop / k / would not show any formants in a spectrogram.

/ tʃ / → / s /

/ tʃ / is / s / in Eastern Bengali. It is realised either as / s / a fricative or / tʃ / an affricate and in some cases the same word has both these realisations.

Tunga writes :

"Whether fricatives or affricate these sounds are in reality compound sounds, not like simple plosives / c /, / j / and / jh /. The compound is formed with an alveolar plosive built on a dorsal plosive, and when the friction is rampant in one or the other or both the result is a strong fricative sound / sh /, / z / and / zh /. And when the friction is less rampant and both the plosives do not lose their separate identity yet is united by the affricate sound the result is the affricates which can be represented by the / ts /, / tsh /, / dz / and / dzh / respectively" (See Tunga 1995 : 130).

Grierson mentions that in Rajputana, Gujarat and Maharashtra the palatal sounds are now articulated as dental sounds resembling the Cachar sounds.

"B. K. Chattopadhyay is however of the opinion that the dental characteristic of the palatal (i.e. dorso-alveolar) plosives are due to the Perso-Arabic influences. In North Western India, Sind and Kashmir in particular, there is a predominance of Muslim population whose forefathers came from Arabia and Persia, and hence the palatal series are dentalized here. Dentalization is a speciality of Arabic and Persian. In West Bengal the series remain as clear plosive

sounds because Muslim population is very meagre here" (see Tunga 1995 : 131).

Whatever be the reason, one thing is clear, that is, the palatal affricates in Standard Bengali have been changed into perhaps affricates first and then into fricatives later. Both affricate and fricative realisations are heard in the words given below.

Cachar Bengali	Standard Bengali	Meaning
/ (t) sukɛ̃ /	/ tʃokhe /	in the eye
/ (t) sul /	/ tʃul /	hair
/ (t)sair /	/ tʃar /	four
/ (t)sakɔr /	/ tʃakɔr /	servant
/ (t)sa(t)sa /	/ tʃatʃa /	uncle
/ ba(t)sa /	/ batʃa /	to live

It is to be noted that this secondary / s / (that is the one developed out of the Standard Bengali affricate / tʃ /) never changes into / h /. It is the primary / s / (the sibilant ʃ in standard Bengali) that changes into / h / in East Bengali.

Some primary / ʃ / becomes / tsh / in Cachar Bengali as in :

/ atshale /	for	/ asale /	in truth
/ xallatsh /	for	/ gellas /	glass

/ dʒ / which is a palato-alveolar affriacte in Standard Bengali is a fricative in word final positions and in conjunct consonants in Cachar Bengali. This can be seen from the following words :

Cachar Bengali	Std. Bengali	Meaning
/ kuz /	/ khodʒ /	search
/ xaz /	/ kadʒ /	work
/ aiz /	/ adʒ /	today
/ izdzat /	/ idʒat /	prestige

/ p / → / ɸ /

"The / p / is bilabial plosive sound current in all important languages of the world. But Cachar Bengali and a number of other dialects have a unilabial sound which is aspirate and fricative producing a dry, hissing vibration" (see Tunga 1995 : 149). This sound is heard among people of Cachar, Sylhet, Comila, Noakhali and Chittagong. In all these places / p / is rare. Some of the most common words where this change has been noticed are given below :

Cachar Bengali	Standard Bengali	Meaning
/ ɸarə /	/ paera /	pegeon
/ ɸan /	/ pan /	betel leaf
/ ɸua /	/ pua /	son
/ uɸre /	/ upare /	above
/ xaɸɔr /	/ kapɔr /	cloth

One thing that is to be noted here is that the preference for ɸ is found more among the Muslim speakers. The other two sound changes (/ k / → / x / and / tʃ / → / s /) are also noticed more among the Muslim people.

Another common feature we notice with regard to sound change in fricatives is the exchange of the position of consonants in a consonant sequence involving fricatives. This has been found among these Cachar Bengali speakers as well as among Standard Bengali Speakers and even Assamese Speakers. This exchange of position of consonants is found in some local words but is mainly found in English words. Thus the word / rikʃa / is uttered as / riʃka /. This exchange is, one can say, based on sonority scale rule. But there are words like risk, ask etc where sonority scale is followed in English. These words are articulated as / rikʃ / and / akʃ / respectively by those spekers, violating the sonority scale

rule. No rule can be formulated as to under what phonetic environment such change is taking place as in the first word, they place the fricative first, and in the second and third they place the stop first. If we say in a consonant sequence at the final position or in the coda position in a syllable, fricative is placed at the end the words considered above, ask and risk, can be accounted for by that rule (/ rikʃa / has two syllables, and hence it may be treated separately). But we hear these speakers say 'post' as / pəust / and not as / pɔts / So this rule does not apply. So we can only say what causes this interchange of the two elements is not known. Had 'post' be a single case it would have been considered as an exception. But there are hundreds of words like 'host', lost, roast, boast and most which are pronounced without interchange of the fricative and the stop elements.

4.3. Sound Change in English

Most of the fricatives in English have shown sound changes. These changes are listed below.

The labio-dental voiced fricative / v / loses its voice and becomes / f / when followed by a voiceless consonant sound.

/ v / → / f /_____ [–voice cons.]

/ hæv tu / → / hæf tu /

/ mu:v slǝuli / → / mu:f slǝuli /

In fast speech / v / is completely lost in words like 'of' and 'have'. The phrases 'a piece of cake' and 'could have been' are spoken as / ǝ pi:s ǝ keik / and / kud ǝ bi:n / respectively. The preposition and the auxiliary in which / v / occurs are reduced to / ǝ /.

The dental fricatives / θ / and / ð / are dropped when they precede / s / or / z /.

$$\left\{ \begin{matrix} \theta \\ ð \end{matrix} \right\} \rightarrow \Phi / \text{——} \left\{ \begin{matrix} /s/ \\ /z/ \end{matrix} \right\}$$

clothes → / klǝuz /

months → / mʌns /

There are instances of / ð / changing into / d / in old English. Charles A Ferguson in his essay 'Phonological Processes' writes :

"English provides an interesting case of the process [ð → d] which apparently operated as a diachronic change very early in the history of the language and then again centuries later. The two occurrences of the change seem,

however, to be part of the same drift seen in Germanic languages. The first operation of [ð → d] occurred in Pre-Old English. During this period according to the consensus of Germanic specialists medial and final / ð / of Proto-Germanic became old English / d̲ / (beuðan > beodan). ..... The interdental spirant / ð / which came from earlier voiced allophones of / θ / and from the voicing of initial / θ / in pronominal and demonstrative forms (modern the , this , that , then , there etc.) remained stable in English for centuries, whereas in other Germanic languages except for Icelandic, the intervocal spirants became stops fairly early. The first sign of the second operation of [ð → d] in English is the middle English change / ð > d / –r as in the Modern English burden, afford ...." (See Greenberg 1978 : 421 - 422).

The entire process of this change might have taken place in either of these two ways.

a) θ > ð > d

b) θ > t > d

In the first case maintaining the feature of dentality voice changed and then maintaining voice the place of articulation changed. In the second case maintaining voicelessness the place of articulation changed and then maintaining place of articulation, voice is acquired on / t / to become / d /.

The voiceless alveolar fricative (/ s /) acquires voice when it is preceded by a voiced sound.

/ s / → / z / / . voice ——·

dogs → / dɔgz /

peas → / pi:z /

/ s / and / z / become palatalized when these are followed by palatal glide or palatal fricative / ʃ /

$$\begin{Bmatrix} s \\ z \end{Bmatrix} \rightarrow \begin{Bmatrix} ʃ \\ ʒ \end{Bmatrix} / \text{——} \begin{Bmatrix} j \\ ʃ \end{Bmatrix}$$

miss you → / miʃ ju: /

kiss Sheila → / kiʃ ʃeila /

It was yellow → / it wɔʒjelәu /

Words ending in / ʒ / also have / dʒ / pronunciations as in words garage and beige.

garage	/ gæra:ʒ /	/ gæridʒ /
beige	/ beiʒ /	/ beidʒ /

Out of the four sibilant fricatives in English the voiced ones / z / and / ʒ / were developed out of their voiceless

counterparts through sound change. Tracing the history of English back to its ancestors we find that there were only two sibilants / s / and / ʃ / F. T. Wood traces the history of these developments. "West Germanic, through which English is connected to its earlier ancestors is a purely theoretical language ... The most important modification that took place in this branch and not in other two, concerned the consonant sound / z /, which had developed in late Primitive Germanic from an / s /. When it occurred medially in a word it was now modified to an / r /, while at the end of a word the tendency was for it to disappear altogether. This explains why in modern English the plural of 'was' is 'were' , and that of 'is', 'are'. It also accounts for the consonantal difference in such closely related words as 'more' and 'most' and underlies the distinction between the comparative termination of adjectives in 'er' and superlative '–est' (See Wood 1969 : 19).

Likewise / ʒ / was added to the class of phonemes. Asher mentions the introduction of / ʒ / into English (Asher 1994 : 1125). He writes, "The major systemic change in the consonant system has been the addition of / ʒ / and / ŋ /. The Assibilation of poststress / z / created / ʒ / ." This also explains the reason why / ʒ / does not occur in word initial position, except in loan words.

/ h / is dropped by all spekers in unstressed pronouns and auxiliaries. Such as him, her, have etc. The sentence 'I could have

helped him' said normally doesn't have any instance of / h / in it (see Davenport and Hannahs 1998).

/ h / dropping as stated in the introductory part of this chapter is often found in English. Wild (1968 : 211) for instance talks about the loss of initial aspirate.

"In considering this process, a distinction must be made between words of pure English origin and those from French. Even in respect of genuine English words, a Norman, French speaking scribe often omits initial h- in the M. E. period. This spelling 'alf a pound' Norf, Guilds (1389) appears to be a genuine early example of the loss in a stressed syllable .... Cooper does not mention the dropping of h- among his barbarisms .... "

He also mentions the loss of / h / before / t / preceded by a front vowel. The original sound of 'h' in 'night' etc. was [ɲ] and the loss of / h / before / t / when preceded by a back vowel. (g)ht becomes –ft. Marston (1604) rhymes after — daughter (Wild 1968 : 217).

One of the reasons for the omission of / h / has already been given at the beginning of this chapter, that is, when any sound is not significant in communicating the message, we can afford

to ignore it. The omission of / h / doesn't distort the message as much as the omission of any other consonant.

The traces of / h / dropping in English could be considered with the different categories of words beginning with 'h' in the spelling as shown here.

1	2	3	4
house	honour	hotel	humour
horse	hour	historic	humorist
holiday	honest		

The words of the first category begin with an 'h' and the 'h' is pronounced. If an article is to precede these words it will be 'a'.

The words in the second category are written with an 'h' but this 'h' is not pronounced resulting in the use of 'an' before these words.

The words in the third category too begin with 'h' but these words can be preceded by either of the articles, 'a' or 'an', though the phonemic transcription in the dictionary clearly gives / h / at the beginning of these words (Advanced Learner's Dictionary of Current English by Hornby et. al. 1969 : 4698479).

One of the basic rules of English Grammar says that 'an' is used before a word beginning with a vowel sound. When all these factors are taken into account there seems to be a contradiction. How can 'hotel' / həutel / with a consonant beginning be preceded by 'an' as given in the dictionary or if 'an' is allowed why not the two pronunciations be given in the dictionary / həutel / and / əutel / ? The solution to this problem is a hint towards the change of / h / — Ø. The original pronunciation was (as I think) / həutel / which could be preceded only by 'a'. Gradually the / h / started disappearing at least in the speech of some people and thus reaching / əutel / which cannot be preceded by 'a'. So when the dictionary says 'hotel' can be preceded by both 'a' and 'an' , I don't think that it has contradicted the basic grammar rule. We cannot have / æn həutel / or / ə əutel /, but we can have / æn əutel / or / ə həutel /.

The words in the fourth category begin with the spelling 'h' but in the transcription 'h' is italicized, thus showing the loss of prominance (Hornby et al. 1969 : 482).

"In words where the 'h' precedes the glide / j / such words typically involve an orthographic 'hu' sequence such as 'human' or 'huge' the initial sound may well be the palatal fricative / ç / in many varieties. In North American Englishes there may be no / h / at all in these words, which thus begin with the glide / j / " (See Davenport and Hannahs 1998).

4.4. Sound Change in Malayalam

Some of the changes that have been considered with regard to Assamese have been attested in Dravidian languages. The major sound changes in Dravidian are classified into Historical and Typological (see Krishnamurti 2001). For instance historical changes such as /tʃ/ → /s/ → /h/ → ∅ have been found in some of the Dravidian languages like Gondi. The /tʃ/ which is a complex sound is split into the stop and the fricative and in many cases the stop is lost. M. B. Emeneau says, "In some central Dravidian languages and dialects there is progressive development from /s/ → /h/ → ∅ . Simplifications of /tʃ/ sporadically results in (1) in complete loss, or (2) in loss of the fricative component, which results in either t- or less frequently k- " (See Emeneau 1994 : 339).

The special features of Dravidian languages including sound patterns are extensively dealt by Emeneau (1970) and Zvelebil (1970). Emeneau's Sketch of Dravidian Comparative Phonology deals with correspondences of vowels and consonants of Dravidian languages, and reconstructs the proto-phonemes... Zvelebil's Comparative Dravidian Phonology (Moulton, The Hague-Paris 1970) is the first extensive synthesis of all published work in the subject till about 1968 (See Zvelebil 1990).

Malayalam which has been described as a Phonologist's

paradise (dedication in K. P. Mohanan 1986 b) presents sound changes quite different from the ones mentioned above. It is because of the great influence of Sanskrit on Malayalam. "Perhaps more than any other Dravidian language, Malayalam has been heavily influenced by Sanskrit. One effect of this has been a considerably increased number of distinctive segments as compared with the set found in Dravidian words" (see Asher & Kumari 1997).

One of the most striking features of Proto-Dravidian is the total absence of fricatives in it. Kamil V. Zvelebil in his Dravidian Linguistics writes, "Whenever sibilants do occur they are borrowed from Indo-Aryan which is rich in sibilants" (Zvelebil 1990 : 8). Under the influence of Sanskrit these sibilants entered Malayalam and today have become a part of Malayalam phonology.

When Aryans introduced Sanskrit words in Kerala the native people had problem in pronouncing the fricatives. The educated people slowly acquired these sounds and pronounced them correctly but as years went on and as more and more people were educated they began to produce the fricatives without much problem. But among the less educated some words with the substitution of local sounds still remain. This sound change is clearly shown by many linguists. For instance Dr. Kunjunni Raja in his Sanskrit Influence on Malayalam (1992 : 59 - 60) brings out the following changes.

/ s /

a) / s / is dropped in words in the beginning and middle, and in the beginning of conjunct consonants.

/ sahasra /	> / *a*h*a*jir*a* /	/ *a*:jir∂m /	thousand
/ sandhya /	> / *a*nṯi /		evening
/ sisa /	> / ij∂m		lead (metal)

b) / s / is changed to / ṯ /

/ sutʃi /	> / ṯuši /	needle
/ sri /	> / ṯiri / > / ṯiru /	beauty

c) / s / is changed to / tʃ /

/ samit /	> / tʃ*a*ma*ṭa* /
/ svati /	> / tʃoṯi /

/ š /

/ š / is changed to / tʃ /

/ šradham /	> / tʃ*a*tt∂m /
/ šunda /	> / tʃund*a* /

/ ʃ / is changed to / ṭ /

/ meʃa /	> / me*ṭa*m /
/ vrʃabha /	> / i*ṭa*v*a*m /

K. N. Ezhuthachan gives a number of such instances where Sanskrit sibilants are substituted by local sounds (see Ezhuthachan 1975 : 563).

L . F. Frohnmeyer in his Progressive Grammar of Malayalam Language has expressed the same views and illustrated them with examples. He writes, "as / s / is a foreign letter, uneducated people in Malabar generally replace it by / t̲ /. So your bandyman may ask for a / t̲u:ši / instead of a / su:dʒi / (needle). Similarly / tʃ / or / j / is used for / s / if it is not even dropped altogether. So / i:jəm / is in general use instead of / si:sm / " (see Frohnmeyer 1979 : 9).

These sound changes have occurred in Malayalam because of the total absence of fricatives in the original Dravidian language. "It has already been mentioned that Tamil is destitute of sibilants (Malayalam broke away from Tamil at about 1000 A.D.). The other Dravidian idioms freely use the sibilants and aspirates of Sanskrit, in writing and pronouncing Sanskrit derivations, and to some extent through the prevalence of Sanskrit influence in the pronunciation even of pure Dravidian words" (See Caldwell 1961).

Once these sounds were absorbed into Malayalam through the Sanskrit influence, they maintained separate identity,

that is the three sibilants have three separate phonetic quality in the conscious speech of people of Kerala. The research findings already available in the field and the spectrographic analysis done by the present researcher show that these three fricatives are quite different and therefore can easily be distinguished. The spectrograms marked PVD 1 has / s / , PVD 2 has / ʃ / and PVD 3 has / š /. The formants for / s / range from 4000 Hz to 8000 Hz, while the same for / ʃ / range from 2500 Hz to 8000 Hz and those for / š / start from 3500 Hz to 8000 Hz.

5. CONSONANT CLUSTERS INVOLVING FRICATIVES

It is essential to see the environment of occurrence of fricatives. Sometimes a fricative is preceded and followed by a vowel. Sometimes it is either preceded or followed by another fricative or other consonants. In some cases we can see it is both preceded and followed by other fricatives or other consonants. The last two cases can be described as consonant sequences. A variety of consonant sequence is named consonant cluster.

The occurrence of two or more consonants either before or after a vowel in a syllable is called a consonant cluster. The word sequence is, therefore, not synonymous with cluster. Every cluster is a sequence but every sequence is not a cluster. The requirement of a sequence is the contiguous occurrence of two or more consonants. But in a cluster this sequence must occur within the same syllable.

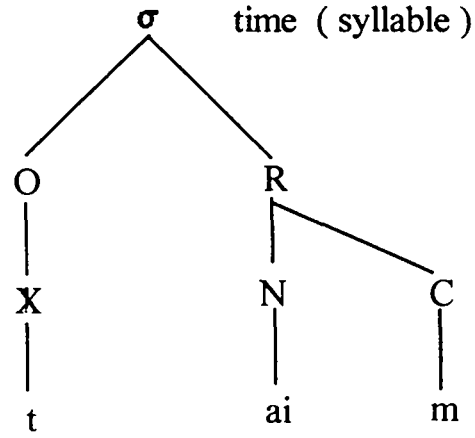
Inorder to understand this, the notion of syllable structure is to be explained. The unavoidable and most significant part of a syllable is the vowel in it. It is called nucleus. Every syllable has a vowel in it (Syllabic consonants like /l/ and /n/ in words like bottle and cotton have the force of a vowel). A syllable can be constituted of the nucleus alone as in 'eye' (/ai/). In most cases, however, the vowel is either preceded or followed by consonants. In some cases there are consonants on either sides. These are marginal elements in

a syllable. To show the structure of the syllable we can break the syllable into 'onset' and 'rhyme'. The part of the syllable that comes before the nucleus is called onset. The vowel and the consonants (if there be any) that follow the vowel taken together is called rhyme. The consonant or consonants after the vowel can be called coda.

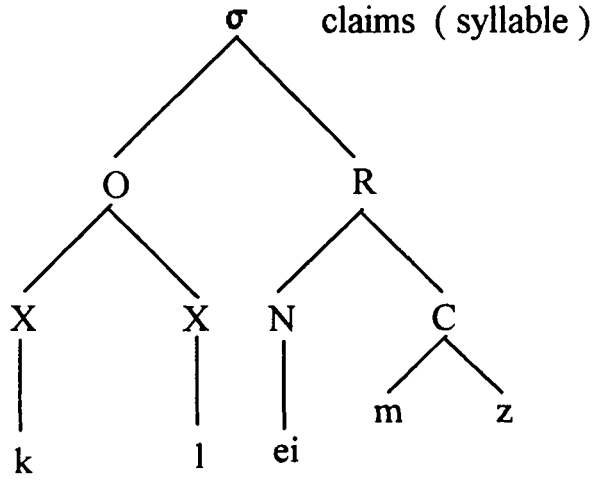
There is sufficient justification for the division of the syllable into onset and rhyme. Firstly there is evidence from the phenomenon known as rhyming in which it is the vowel in the syllable and any material which follows it which determine whether two words rhyme, quite independently of content of the onset as in the words 'bile' and 'pile'. Similarly alliteration depends on the identity of onsets, independently of the content of the rhyme as in the words 'light' and 'little'. Secondly in many languages (including English) the placement of word stress depends on the structure of the rhyme in the syllables which make up a word (see Carr 1999).

The consonant or consonant cluster occupies the slots of onset or coda in a syllable. As stated earlier, inorder that a sequence be a cluster, all the members of the sequence must fall within the same syllable, that is, they must be part of a single onset or a single coda. A cluster cannot spread into the coda of the first syllable and the onset of the second syllable. More on the syllable boundaries are considered later in this chapter.

Here the word 'time', which is a syllable, is analysed as explained above.



The syllable 'claims' having one consonant cluster each in onset and coda is analysed below.



As to how many segments can be there in the onset and in the coda there is no universal rule. It is language specific. For instance English permits upto three consonants in the onset and upto four in the coda. Assamese, Bengali and Malayalam admit upto three in the onset and a maximum of two in the coda. (Even this two is extremely rare).

The members of a consonant cluster occupy certain specified position within the syllable, that is, each element's proximity to the vowel is determined by the sonority scale of the consonants. The more sonorant the consonant the nearer it is to the vowel. The sonority scale is given below.

Sonority scale

low vowels

high vowels

approximants

nasals

voiced fricatives

voiceless fricatives

voiced stops

voiceless stops

As we proceed from the bottom to the top the sonority increases. The more sonorous a sound is, the more it resonates. Vowels have greater resonance than consonants.

When we apply this sonority scale rule to the structure of a syllable we find that the most sonorous element in the syllable is the vowel or the nucleus of the syllable. The further one gets away from the nucleus the less sonorous are the segments. Thus in the word blank / æ / is the nucleus which is the most sonorous here. To its left there are two consonants / b / and / l /. / l / is more sonorant than / b / and so it is placed nearer to / æ /. Similarly after / æ / there are two consonants / ŋ / and / k /. Here / ŋ / is more sonorous than / k /, so it is placed nearer to / æ /.

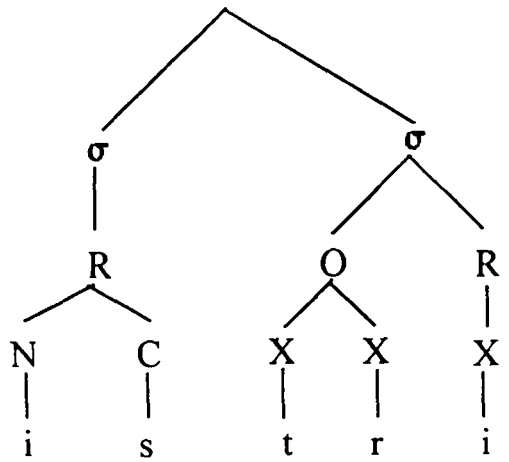
Sonority scale rule is an essential notion in the formation of cluster. It tells us that a word like 'blenk' is syllabically well formed but 'lbenk' is syllabically ill-formed because the latter violates the sonority scale rule.

This rule has a few exceptions. Some syllables beginning with / s / violates this rule. Words like stand, school, spin etc have the least sonorous plosives nearer to the nucleus. But / s / has been an exception here as well as in the formation of initial clusters in English. Only / s / can begin an initial cluster of three consonants.

In languages like Hindi, however, this violation is undone when the initial cluster having there consonants are preceded by / i / insertion, breaking the mono syllable into a dysyllabic word. When / s / becomes the coda of the first syllable / t / and / r / become the onset of the next syllable strictly following the sonority scale rule. This can be shown as below.

stri woman (syllable) (word)

istri / i / insertion (word)



When the onset or coda branches into two or more consonants we have consonant clusters. The initial (onset) and final (coda) consonant clusters of various types in these four languages are given below :

5.1. Clusters in English

Initial Clusters Involving Two Fricatives			
First Member	Second Member	Word	Descriptions of the Sounds
/ f /	/ l /	fly / flai /	voiceless labio-dental fricative + voiced alveolar lateral
/ f /	/ r /	fry / frai /	voiceless labio-dental fricative + voiced post-alveolar frictionless continuant.
/ f /	/ j /	few / fju: /	voiceless labio-dental fricative + voiced palatal semi-vowel.
/ v /	/ j /	view / vju: /	voiced labio-dental fricative + voiced palatal semi-vowel.
/ θ /	/ r /	throw / θrəu /	voiceless dental fricative + voiced post alveolar frictionless continuant.
/ s /	/ p /	spin / spin /	voiceless alveolar fricative + voiceless bilabial stop.
/ s /	/ t /	stop / stɔp /	voiceless alveolar fricative + voiceless alveolar stop.
/ s /	/ k /	school / sku:l /	voiceless alveolar fricative + voiceless velar stop.

(The table continues on the next page)

First Member	Second Member	Word	Descriptions of the Sounds
/ s /	/ m /	small / smɔ l /	voiceless alveolar fricative + voiced bilabial nasal.
/ s /	/ n /	snake / sneik /	voiceless alveolar fricative + voiced alveolar nasal.
/ s /	/ j /	sewer / sjuə /	voiceless alveolar fricative + voiced palatal semi-vowel.
/ ʃ /	/ r /	shrimp /ʃrimp/	voiceless palatal fricative + voiced post alveolar frictionless continuant.
/ h /	/ j /	hue / hju: /	voiceless glottal fricative + voiced platal semi-vowel.
/ θ /	/ w /	thwart / θwa:t /	voicelesss dental fricative + voiced labio-velar semi-vowel.
/ s /	/ l /	slow / slәu /	voiceless alveolar fricative + voiced alveolar lateral.
/ s /	/ w /	swan / swɔn /	voiceless alveolar fricative + voiced labio-velar semi-vowel.

It may be noted that the cluster formed by the reversing the order of the first and the second member of the above cluster do not occur at word initial position, that is to say, a fricative can be followed by some other consonant in an initial cluster in English, but a fricative cannot be preceded by any other consonant in an initial cluster. In other words, when an initial consonant cluster involving any fricative is formed, the first member is always that fricative. We can list the distinctive features of the first member in the consonant

cluster on the left hand side and that of the second member on the right hand side as shown below.

Distinctive Features of the Members of CC Initial Clusters.	
First Member	Second Member
	[+sonorant –syllabic +consonantal] nasals + liquids.
[–syllabic –sonorant +continuant]	[–syllabic –consonantal +sonorant] semi-vowels
	[–sonorant –syllabic +consonantal –continuant] stops.

When there are three members in an initial consonant cluster, it is / s /, the voiceless alveolar fricative that comes as the first member. This is followed by a stop in the second place and the third member is one of the liquids or semi-vowels. This can be shown as below.

Initial Clusters Involving Three Fricatives			
First Member	Second Member	Third Member	Word
/ s /	/ p /	/ r /	spray
/ s /	/ p /	/ l /	splash
/ s /	/ p /	/ j /	spew
/ s /	/ t /	/ r /	strong
/ s /	/ t /	/ j /	stupid
/ s /	/ k /	/ r /	screw
/ s /	/ k /	/ w /	square
/ s /	/ k /	/ j /	skew
/ s /	/ k /	/ l /	sclerosis

Distinctive Features of the Three Members of the Clusters.		
First Member / s /	Second Member / p /, / t /, / k /	Third Member / j /, / r /, / l /, / w /
[–sonorant +consonantal +continuant +strident –syllabic +coronal +anterior]	[–sonorant +consonantal –continuant –syllabic]	[–syllabic –consonantal / j, w / +sonorant] [–syllabic +consonantal / r, l / +sonorant]

In consonant clusters at the word final position having two consonants involving fricatives, the fricative can be either the first member or the second member. In some cases, both the members can be fricatives in English. These are shown below.

CC Final cluster with Fricative as the first member.			
First Member	Second Member	Word	Description of the Sound.
/ f /	t	lift	fricative + stop
/ f /	l	rifle	fricative + lateral
/ v /	d	loved	fricative + stop
/ ð /	d	breathed	fricative + stop
/ s /	p	clasp	fricative + stop
/ s /	t	post	fricative + stop
/ s /	k	ask	fricative + stop
/ s /	l	bustle	fricative + lateral
/ s /	n	chasten	fricative + nasal
/ z /	n	brazen	fricative + nasal
/ z /	d	confused	fricative + stop
/ ʃ /	t	pushed	fricative + stop

The distinctive features of the members of the final CC cluster can be shown as follows.	
First Member (fricative)	Second Member (non-fricative)
[–sonorant +continuant	[+sonorant –syllabic +consonantal] nasals + liquids.
	[–sonorant –syllabic +consonantal –continuant] stops.

CC final cluster with fricatives as the second member			
First Member	Second Member		
Non-Fric.	Fricative	Word	Description of Sound.
/ l /	/ f /	self	lateral + fricative
/ l /	/ v /	solve	lateral + fricative
/ n /	/ θ /	month	nasal + fricative
/ p /	/ θ /	depth	stop + fricative
/ t /	/ θ /	eighth	stop + fricative
/ d /	/ θ /	width	stop + fricative
/ m /	/ θ /	warmth	nasal + fricative
/ ŋ /	/ θ /	length	nasal + fricative
/ l /	/ θ /	filth	lateral + fricative
/ p /	/ s /	caps	stop + fricative
/ t /	/ s /	cats	stop + fricative
/ k /	/ s /	box	stop + fricative
/ l /	/ s /	false	lateral + fricative
/ n /	/ s /	chance	nasal + fricative
/ b /	/ z /	cabs	stop + fricative
/ d /	/ z /	heads	stop + fricative
/ g /	/ z /	dogs	stop + fricative
/ m /	/ z /	names	nasal + fricative
/ n /	/ z /	fans	nasal + fricative
/ l /	/ z /	balls	lateral + fricative
/ ŋ /	/ z /	longs	nasal + fricative

Distinctive Features of CC final cluster members where first member is non-fricative and the second is fricative.	
First Member Non-fricative	Second Member Fricative
[+sonorant –syllabic (nasals + liquid) +consonantal] [–sonorant –syllabic +consonantal (stops) –cintinuant]	[–sonorant +continuant]

From the above two charts it is clear that in the CC final cluster, when the last member is a fricative, the first member is, if it is a non-fricative, it is either a stop or a lateral or a nasal. Affricates, frictionless continuant and semi-vowels do not fall into this slot. This shows there is restriction as to the combination of elements in the CC final cluster.

CC Final cluster with fricative as first and second members.			
First Member fricative	Second Member fricative	Word	Description of phonemes.
/ f /	/ θ /	fifth	fricative + fricative
/ f /	/ s /	laughs	fricative + fricative
/ v /	/ z /	lives	fricative + fricative
/ θ /	/ s /	fourths	fricative + fricative
/ ð /	/ z /	breathes	fricative + fricative

Distinctive features of CC final cluster members where both members are fricatives.	
First Member fricative	Second Member fricative
[–coronal –sonorant +strident [/ f /, / v /] +anterior +continuant]	[–sonorant +continuant +coronal [/ s /, / z /] +strident +anterior]
[–sonorant +continuant +coronal [/ θ /, / ð /] –strident +anterior]	[–sonorant +continuant –strident [/ θ /] +coronal +anterior]

In a CCC cluster at the word final position the fricative usually takes the final position, but it can also occur as the first or second member, and at times all three members can be fricatives as in the word 'fifths'. The fricatives' distribution in a CCC cluster at the final position is shown below. Fricative as the final member is shown in one chart and its occurrence elsewhere is shown in the following chart immediately after this chart.

CCC clusters in word final position with Fricative as final member.			
First & Second Members	Final Member	Word	Description of phonemes.
pt	s	adopts	stop + stop + fricative
pθ	s	depths	stop + fricative + fricative
kt	s	acts	stop + stop + fricative
ft	s	lifts	fricative + stop + fricative
fθ	s	fifths	fricative + fricative + fricative
sp	s	clasps	fricative + stop + fricative
st	s	beasts	fricative + stop + fricative
lt	s	belts	lateral + stop + fricative
sk	s	asks	fricative + stop + fricative
mp	s	lamps	nasal + stop + fricative
nt	s	ants	nasal + stop + fricative
nθ	s	tenths	nasal + fricative + fricative
ŋk	s	banks	nasal + stop + fricative
lp	s	helps	lateral + stop + fricative
tθ	s	eighths	stop + fricative + fricative
lk	s	milks	lateral + stop + fricative
ks	θ	sixth	stop + fricative + fricative
lf	θ	twelfth	lateral + fricative + fricative
nd	z	hands	nasal + stop + fricative
ln	z	kilns	lateral + nasal + fricative
lm	z	films	lateral + nasal + fricative
lb	z	bulbs	lateral + stop + fricative
ld	z	builds	lateral + stop + fricative
lv	z	solves	lateral + fricative + fricative

Fricative as non - final member in a CCC cluster.				
Fricative / other		Non-fric.		
First Member	Second Member	Third Member	Word	Description of phonemes
/ d /	/ s /	/ t /	midst	stop + fricative + stop
/ n /	/ s /	/ t /	against	nasal + fricative + stop
/ k /	/ s /	/ t /	fixed	stop + fricative + stop
/ s /	/ p /	/ t /	clasped	fricative + stop + stop
/ s /	/ k /	/ t /	asked	fricative + stop + stop
/ l /	/ v /	/ d /	solved	lateral + fricative + stop

This chart makes it clear that when the third member in a CCC final cluster in not a fricative, it is always a stop, and that too in most cases the voiceless alveolar stop.

Finally, there are CCCC clusters at word final positions in English. There are only a very few words where such sequences are found, but in every such cluster there is at least one fricative in it without having any rule to restrict its position within the cluster as can be seen in the following chart.

CCCC final Cluster Involving Fricatives.					
First Member	Second Member	Third Member	Fourth Member	Word	Description of Phonemes
k	s	t	s	texts	stop + fric. + stop + fric.
l	f	θ	s	twelfths	lateral + fric. + fric. + fric.
m	p	t	s	prompts	nasal + stop + stop + fric.
k	s	θ	s	sixths	stop + fric. + fric. + fric.
m	p	s	t	glimpsed	nasal + stop + fric. + stop

5.2. Clusters in Assamese

There has to be a word of caution in the use of the word 'cluster' as used by Indian linguists while analysing the Indian Languages. Whenever two or more consonants come contiguously this sequence is called a cluster by them which is not correct. The word sequence cannot be equated with cluster as both have separate meaning. In Linguistics the word cluster has a technical meaning. Only those consonant sequences that fall within the same syllable are called clusters. Any cluster is a sequence but any sequence is not necessarily a cluster. Thus the Assamese / Bengali word / kɔrta / (subject) according to Golok Chandra Goswami has a medial cluster, but it does not have a cluster as / r / will fall into the first syllable / kɔr / and / t / will be part of the second syllable / ta /. The problem arises with regard to syllable boundary. One has to decide where one syllable ends and the next one begins. Unless and until the problem of syllable boundary can be settled no proper consideration of cluster can be taken up.

This problem can be resolved when we decide where the syllable boundary is to be drawn. The two possible ways of dividing /kɔrta / are / kɔr / + / ta / and / kɔ / + / rta /. If we go by the first analysis there is no cluster as / r / and / t / fall in different syllables. If we go by the second, there is a cluster as / r / and / t / fall in the same syllable.

The second analysis has the following problems. Firstly, it violates the sonority scale rule. / t / which is less sonorous than / r / is placed next to / æ / the nucleus and / r / which is more sonorous than / t / is placed away from the nucleus. Secondly, / rt / is not a well-formed onset in Assamese or Bengali. No word in these languages begin with / rt /. Because of these two reasons we come to the conclusion that / r / must be the coda of the first syllable, and the first analysis is the correct one.

In words of more than one syllable syllabification becomes a problem. It can be resolved by the 'maximal onset principle'. In words like 'abreast' this problem can come. Here the question is where do we draw the boundary — before / b / or after / b /. We know that / b / may occur in coda position in English as in cub, cab etc. We also know that / br / is a well-formed onset as in bread, bring etc ; and we also know that / r / may alone occur in onset position as in ring, road etc. Furthermore, we know that / br / is not a well-formed coda in English. It voilates the sonority hierarchy. Thus / u:br /, / i:br / etc are ill-formed words in English. Basing on this discussion two possible ways have emerged — ab + reast and a + breast. In such cases the maximal onset principle is applied. It says that in such cases, where the language specific phonotatics will allow for two or more syllabifications across a syllable boundary, it is the syllabification which maximizes the material in the following onset which is preferred. In this case, a + breast is the right way of syllabification.

That means, there is a cluster in the second syllable. The other way of syllabification does not leave a cluster in any of the syllables.

There are valid reasons for accepting the maximal onset principle. Some of these are given below.

1. CV type syllables appear to be the syllable types that human children first utter when they begin to speak (ba-ma). In the development of child's syllable structure, syllables in the adult language with branching onsets will be uttered as CV structures. The syllables with coda consonants too are uttered likewise. The coda consonants will be absent at the first stage. This strongly suggests that onset consonants are in some way more basic than coda consonants.

2. In many cases of aphasia, where post-stroke patients have suffered damage to their speech, CV syllable structures appear to be the sort that first begin speech as patients recover their speech.

3. It may be noted that languages that have onset and coda consonants permit a wider range of consonants to occur in onset position than in coda slot.

4. Fourthly, it has been noticed that in the course of historical development there is the chance of loss of articulation of coda consonants. This is what has happened to /l/ and /r/ when they occur

in coda position. In words like calm, palm etc /l/ is not articulated because these are in coda position. These same sounds when they are in onset position as in play, pray etc they are articulated.

5. Fifthly, it may be said that there are no known languages which have VC-type syllables but lack CV type syllables, whereas the reverse is not the case. This is another strong indicator to the fact that CV syllables are more basic than VC or indeed any other syllable type.

The term 'cluster' has been used wrongly for two reasons. The first is that the spelling system of Indian languages misguide the people. For often the two elements of the sequence are joined together and written as one letter, or one element is used on top of the other element. Thus in /kɔstɔ/, the letters representing /s/ and /t/ are joined together. In /kɔrta/ the symbol for /r/ is used above /t/ making people believe these are clusters. The other possible reason could be the difficulty involved in drawing syllable boundaries. In some cases it leads to complicacies and at the same time it is not easily understood by the student of language.

Since in my analysis the word cluster has a different meaning, all the sequences given by Golok Chandra Goswami as clusters do not form clusters in this study. Only those sequences that fall within the same syllable are considered here.

CC Initial Clusters Involving Fricatives			
First Member	Second Member	Word	Meaning
/ s /	/ t /	/ stɔmbɔ /	pillar
/ s /	/ n /	/ snehɔ /	affection
/ s /	/ r /	/ srɔm /	labour
/ s /	/ l /	/ slok /	couplet
/ s /	/ p /	/ spɔndhɔn /	throbbing
/ s /	/kh /	/ skhɔlɔn /	fall
/ s /	/ m /	/ smɔrɔn /	memory
/ z /	/ j /	/ zjoti /	light
/ ɦ /	/ r /	/ ɦrɔdh /	lake

The distinctive features of both the members of the cluster can be shown as below.

First Member	Second Member
[–sonorant +continuant +strident +coronal [s, z] +anterior +consonantal]	[+sonorant –syllabic (nasals + +consonantal] liquids)
	[–syllabic –consonantal +sonorant] (semi-vowels)
[–sonorant +continuant –strident [h] –coronal –anterior –consonantal]	[–sonorant –syllabic +consonantal [stops] –continuant]

The rule given for CC initial clusters in English is applicable to Assamese as well, that is, in CC initial clusters involving fricatives, the first member is always a fricative.

Initial clusters having three consonants are possible in Assamese but these are rare. A few examples are given below.

CCC Initial Clusters Involving Fricatives				
First Member	Second Member	Third Member	Word	Meaning
/ s /	/ t /	/ r /	/ stri /	woman
/ s /	/ p /	/ r /	/ spriha /	desire
/ s /	/ m /	/ r /	/ smriti /	remembrance
/ s /	/ k /	/ r /	/ skru: /	screw

The distinctive features of the three members of the clusters are shown below.

First Member	Second Member	Third Member
[–sonorant +continuant +strident +coronal (s) +anterior –voice +consonantal]	[–sonorant –syllabic (stop) +consonantal –continuant] [+sonorant –syllabic (nasal) +consonantal –continuant]	[+sonorant –syllabic +consonantal (r) +anterior +coronal]

The structure of the cluster makes it clear that the first member is always / s /, the voiceless alveolar fricative. The third member is always / r /, the voiced post alveolar frictionless continuant. English allows more possible combinations here.

Hindi speakers insert / i / before / stri / and before many consonant clusters beginning with / s /. This results in turning the word into a disyllabic one — / istri / with / is / and / tri / as its two syllables. In this case the first syllable has no cluster and the second syllable has a cluster of two consonants only. This, however, does not happen in the speech of Bangali and Assamese speakers. This is clear from the spectrogram of / ʃnan / by native speaker of Bengali. There are no formants formed for the vowel / i / at the beginning. The occurrence of / i / insertion in a handful of Assamese and Bengali speakers cannot, however, be ruled out.

Compared to English we find that final clusters are extremely rare in Assamese and that too are consisting of only two consonants. Clusters with three and four consonants do not occur in word final position. Three possible clusters with fricatives are given by Goswami but examples are not given for every possible cluster. The clusters that are given with examples are / rs / and / rz /. These are given in the following chart.

CC Final Clusters			
First Member	Second Member	Word	Meaning
/r/	/s/	/ɔrs/	worship
/r/	/z/	/arz/	earn

The distinctive features of the two members of the cluster can be set as below.

First Member	Second Member
[+sonorant	[–sonorant
–syllabic	+continuant
+consonantal [/r/]	+strident [/s/, /z/]
+anterior	+coronal
+coronal]	+anterior
	+consonantal]

5.3. Clusters in Bengali

In cluster formation Assamese and Bengali behave almost the same way. In some cases we see that there are two consonants in writing and both were pronounced in the past but one is no more pronounced in the present day Bengali. The word /ʃami/, for instance provides /ʃ/ and /w/ in the writing system but /w/ is not pronounced. In the same way /j/ is also dropped from some words. The word /ʃæm/ is pronounced without /j/ but the writing provides for /j/ in the spelling. Because of these reasons these two words have

no clusters in them. Leaving out such cases, the possible clusters involving fricatives are given in the following charts.

CC Initial Clusters in Bengali			
First Member	Second Member	Word	Meaning
/ ʃ /	/ t /	/ ʃtɔmbɔ /	pillar
/ ʃ /	/ n /	/ ʃnehɔ /	affection
/ ʃ /	/ r /	/ ʃr͡ɔm/	labour
/ ʃ /	/ l /	/ ʃlok /	couplet
/ ʃ /	/ p /	/ ʃpɔndhɔn /	throbbing
/ ʃ /	/ kh /	/ ʃkhɔlɔn /	fall
/ ʃ /	/ ph /	/ ʃphɔtik /	crystal clear

The distinctive features of the two members can be shown as below.

First Member	Second Member
[–sonorant +continuant +strident +coronal (ʃ) – anterior –voice +consonantal]	[–sonorant –syllabic (stop) +consonantal –continuant] [+sonorant nasals + –syllabic liquids. +consonantal]

In all the four languages under consideration clusters involving fricatives in a CC initial cluster, the fricatives occupy the first position.

CCC Initial Clusters				
First Member	Second Member	Third Member	Word	Meaning
/ ʃ /	/ t /	/ r /	/ ʃtri /	woman
/ ʃ /	/ p /	/ r /	/ ʃpriha /	desire
/ ʃ /	/ m /	/ r /	/ ʃmriti /	memory

Like Assamese clusters we see that in a CCC initial cluster involving fricatives a sibilant fricative always occupies the first position and / r / occupies the final position. The distinctive features of the three members can be shown as below.

First Member	Second Member	Third Member
[–sonorant +continuant +strident +coronal (ʃ) –anterior –voice +consonantal]	[– sonorant – syllabic (stop) + consonantal – continuant] [+sonorant –syllabic (nasal) +consonantal –continuant]	[+sonorant –syllabic +consonantal (r) +anterior +coronal]

5.4. Clusters in Malayalam

In Malayalam too cluster formations are more or less on the same lines as those of Assamese and Bengali. Final clusters do not occur in Malayalam. In initial position clusters of two consonants and three consonants can occur as shown in the following charts.

CC Initial Clusters			
First Member	Second Member	Word	Meaning
/ s /	/ t /	/ st*a*mbəm /	pillar
/ s /	/ l /	/ slɔ:kəm /	couplet
/ s /	/ p /	/ sp*a*nd̲ənəm /	throbbing
/ s /	/ k /	/ sk*a*ndəm /	shoulder
/ s /	/ r /	/ sr*a*:vəm /	oozing, flow
/ s /	/ n /	/ sne:həm /	love
/ s /	/ m /	/ sm*a*:rəkəm /	memorial
/ h /	/ r /	/ hrədəjəm /	heart

First Member	Second Member
[–sonorant +continuant +strident +coronal (s) +anterior +consonantal]	[–sonorant –syllabic (stops) +consonantal –continuant]
[+continuant –sonorant –strident –coronal (h) –anterior –consonantal]	[+sonorant (nasals + –syllabic liquids.) +consonantal]

In careful speakers / sw / and / sj / are also heard in words like / swa:d / (taste) and / sjalən / (brother-in-law).

CCC Initial Clusters				
First Member	Second Member	Third Member	Word	Meaning
/ s /	/ t /	/ r /	/ stri /	woman
/ s /	/ m /	/ r /	/ smriti /	memory
/ s /	/ p /	/ r /	/ sprih*a* /	desire

The distinctive features are given below.

First Member	Second Member	Third Member
[–sonorant +continuant +strident +coronal (/ s /) +anterior +consonantal]	[–sonorant –syllabic (stops) +consonantal –continuant] [+sonorant –syllabic (nasal) +consonantal –continuant]	[+sonorant –syllabic +consonantal (/ r /) +anterior +coronal]

When the consonant letters / k / and / ʃ / are put together we get the conjunct letter / kʃ /. Almost everywhere when two consonants

are combined the product has the qualities of both the elements. The first is released without a vowel following it while the second is released with an accompanying vowel. Thus /pr/ has the sound of /p/ and /r/. /st/ has the sound of /s/ and /t/. But in the case of /kʃ/, out of the two elements — one a stop and the other a fricative, the fricative is lost in Assamese and Bengali. In Assamese this is to be seen in the light of the fricative changing the sibilant quality, that is, the alveolar sibilant is replaced by a velar non-sibilant sound /x/. Thus after substitution /k/+/ʃ/ becomes /k/+/x/. Now /kx/ combination is not found in Asaamese. It is also not found in Malayalam, English or Bengali. This type of combination, that is, first a voiceless stop and then a voiceless homorganic fricative, is either not found or is extremely rare. Of the three such combinations (/kx/, /ts/, /pf/), /kx/ combination is not found in English as /x/ is not a phoneme in standard English. /pf/ too is not permitted in English. /ts/ in initial position is found only in one word in the Advanced Learner's Dictionary of Current English. It occurs in the plurals of words ending in /t/ as in 'cats' and 'pots' etc. This explains why /kx/ does not occur in Assamese. In Malayalam this combination has resulted in the loss of the stop, retaining only the fricative. Thus the word /parikʃa/ (examination) is /pɔrikʰa/ in Assamese and Bengali and the same word is /pariʃʃa/ in Malayalam. In both cases, however, the loss of an element is partially compensated by some other features. In Assamese and Bengali when the fricative element is lost the stop element gets the

quality of aspiration of the sibilant fricative. In Malayalam where the stop is lost, the fricative is geminated or the / ʃ / is uttered with extra energy than what is used in the normal case of uttering / ʃ /. In fact before uttering / ʃ / the tip of the tongue is in place for uttering / t /, but / t / is not articulated, instead, / ʃ / is articulated with extra emphasis.

Another common feature we notice among the Bengali and Assamese speakers with regard to their articulation of consonant sequences involving fricatives is that they exchange the position of the two elements of the sequences. This is mainly found in English words where one element is a stop and the other a fricative. Thus the word / rikʃa / is uttered as / riʃka /, / ɑ:sk / as / aks /, / risk / as / riks / etc. No rule can be formulated as to under what phonetic environment such change is taking place as in the first word they place the fricative first and in the second and the third they place the stop first. If we say in a sequence at the final position, fricative is placed at the end, these words given above can be accounted for by that rule. But we hear these speakers say 'post' as / pəust / and not as / pɔts /. So this rule does not apply. In the case of / ɑ:sk / being changed to / aks / and / risk / being changed to / riks / the rule of sonority hierarchy is violated. Therefore what we can finally say is that what rules are in operation with regard to these changes are not known.

6. COMPARISON OF FRICATIVES

In this chapter a comparison of each fricative with the other fricatives of the same language on the one hand and fricatives of one language with the fricatives of the other three languages on the other hand are done. The main tools of comparison are direct observation of the articulatory strictures, auditory perception of these fricative sounds, x-ray photographs and palatography done by the earlier researchers and, the most important one of course, spectrography done by the present researcher at the C. I. E. F. L. Phonetics labaratory. These spectrograms consists of the fricatives in Assamese, Bengali (standard), East or Cachar Bengali dialect and Malayalam. Spectrograms of English fricatives are already done by earlier researchers and these are used here for the present study.

In making the comparison a four-way strategy is used with regard to fricatives within the same language. First the position of occurrence is given, that is, whether a particular fricative occurs in word initial, medial and final positions. The examples are given in each case. Secondly the results of the spectrographic analysis are given. Since features of articulatory strictures are provided separately, the place and manner of articulation are not given in this section. Thirdly the description of articulatory strictures is given. And finally the distinctive

features that are common to and different from each fricative are given. A comparison can easily be made on the basis of these four factors.

6.1. Spectrographic Analysis of Fricatives

A Spectrograph is a scientific equipment used to record the voice and produce a spectrogram or a visible voice print. We are therefore able to see the voice in terms of the energy spent on each segment of speech, the spread, duration, frequency etc. We can also understand whether a sound is voiced or voiceless, the place of articulation, the manner of articulation etc. from the spectrogram (see Clara N. Bush 1964). Therefore spectrogram is a very useful thing in the study of speech sounds in a most scientific manner.

The horizontal axis reflects time, and the vertical axis, frequency. The calibrating lines represent frequency divisions of 1000 Hz. The dark bars are formants. The vertical striations at the bottom show the sounds are voiced ones (see Baldwin & Frech 1990).

The stops exhibit a relative lack of spectrographic activity. But the fricatives are accompanied by aperiodic vibrations in the higher frequencies. These can be seen on a spectrogram as regular

striations, dark vertical line in the upper part of the spectrogram. The main resonant frequencies of fricatives rise as the size of the oral cavity decreases, that is, the further forward, in the mouth the obstruction is. Thus / h /s strongest resonances are around 1000 Hz, those of / ʃ / about 3000 Hz, those of / s / 4000 Hz, 5000 Hz for / θ / and between 4500 and 7000 Hz for / f / (see Davenport and Hannahs 1998).

It may be noted that with regard to the quality of spectrograms, that some noise patterns are visible on the spectrograms. This is due to the transfer of the matter from cassette to the machine and such noise patterns are available only on spectrograms marked PVD-6 to PVD-21.

6.1.1. Fricatives in Assamese

/ s /

The voiceless alveolar fricative occurs in word initial, medial and final positions ; as in :

/ sneh / (love)	/ ɔspɔstɔ / (unclear)	/ mas / (fish)
/ stɔmbɔ / (pillar)	/ ɔsthir / (restless)	/ pas / (pass)

The spectrogram of the word / sɔki / is available in the spectrogram marked PVD-19 on page 183. The frequency of this

sound is between 4000 to 7500 Hz. It implies that it is produced in the front part of the mouth. The approximate time duration for the production of / s / is 200 milliseconds. The absence of vertical striations below the formants shoow that / s / is a voiceless sound.

The articulation stricture for / s / is as follows :

The lips are spread slightly or are neutral. The angle of the jaws is very narrow. The tip of the tongue is placed against the lower teeth ridge and the blade of the tongue is placed against the upper teeth ridge. Just behind the centre of the tongue a groove is formed from back to front. The air from the lungs is allowed to pass through this groove and strikes against the alveolar ridge and then flows out through the narrow gap between the upper and lower teeth.

/ s /, along with / z /, / x /, is + consonantal while / ɦ / is –consonantal. / s / is +strident and / ɦ / is –strident. / s / shares the feature of the +coronal with / z / and is opposed to / x / and / ɦ / which are –coronal. Similarly / s /, along with / z /, is +anterior while / ɦ / and / x / are –anterior.

/ z /

The voiced alveolar fricative occurs in word initial, medial and word final positions ; as in,

/ zɔla / (burning)	/ vizɔi / (victory)	/ kaz / (work)
/ zjɔti / (light)	/ izət / (prestige)	/ biz / (seed)

The voice print of the word / zɔla / is given in spectrogram marked PVD-18 on page 182. The frequency of / z / is slightly lower than that of / s /. The duration and other features except voice are similar to those of / s /. / z / being a voiced sound vertical striations are visible at the bottom.

The articualtion stricture of / z / is as follows :

The lips are spread or are neutral. The angle of the jaws is very narrow. The tip of the tongue is placed against the lower teeth ridge and the front of the tongue is raised to the upper teeth ridge. Just behind the centre of the tongue a groove is formed from back to the front. The air from the lungs is allowed to pass through the narrow opening between the tongue and the alveolar ridge causing audible friction. The air first strikes against the alveolar ridge and then flows out between the upper and lower teeth.

/ z / shares the feature of + consonantal with / s / and / x / and it is opposed to / ɦ / as it is –consonantal. / z / is + voice sound while / s / and / x / are –voice sounds. / z / shares the feature of +strident with / s / while / x / and / ɦ / are –strident. Likewise / z /, along with / s / is +coronal and / x / and / ɦ / are –coronal. Finally / z / is +anterior and / x / and / ɦ / are –anterior.

/ x /

The voiceless velar fricative occurs in all positions ; as in,

/ xɔman / (equal) / ɔxɔm / (Assam) / akax / (sky)

/ xagɔr / (ocean) / ɔxanti / (unrest) / upɔdhex / (advice)

The voice print of the word / xɔba / is given in spectrogram marked PVD-20 on page 184. Though the acoustic activity is very weak, the formants are still visible. The strongest part of the formants is at about 3000 Hz. The duration of this fricative is about 130 milliseconds. The absence of any vertical striation at the bottom indicates that / x / is a voiceless sound.

During the articulation of / x / the tip and blade of the tongue lie low in the mouth. The back of the tongue is raised towards the soft palate to form a closure of close approximation. The air behind this is allowed to pass through this narrow opening causing audible friction. The sound of friction is not as perceptible as that produced in / s /.

/ x / shares the feature of + consonantal with / s / and / z / while / ɦ / is –consonantal./ x / is –strident as is / ɦ / but / s / and / z / are opposed to / x / with regard to this feature. / x / shares the feature of –coronal and –anterior with / ɦ / and these two are opposed to / s / and /z / which are +coronal and +anterior.

/ ɦ /

The voiced glottal fricative occurs in all positions ; as in

/ ɦat / (hand)	/ ɔɦa / (coming)	/ maɦ / (month)
/ ɦɔri / (Vishnu)	/ ɔɦi / (serpent)	/ kaɦ / (cough)

The voice print of / ɦ / in / ɔɦa / is given in spectrogram marked PVD-21 on page 185. The formants are found between 1000 to 4500 Hz. The duration is about 125 milliseconds. The energy spent on / ɦ / is just like the one on / x /. The friction caused is not much significant.

The articulation stricture for / ɦ / is as follows.

The tip and blade of the tongue are loosely lying on the gum of the lower teeth. The middle of the tongue is raised towards the hard palate. The sides of the tongue are resting on the hard palate, leaving a passage for the air stream to escape from laryngeal cavity to the front buccal cavity producing reduced friction.

/ ɦ / can be distinguished from / s / and / x / by the +voice feature. / ɦ / is –consonantal as against all other fricatives in Assamese which are +consonantal. / ɦ / , along with / x / , is –coronal and –anterior as against / s / and / z / which are +coronal and +anterior.

6.1.2. Fricatives in Bengali

/ ʃ /

The voiceless palatal fricative occurs in all positions ; as in

/ ʃɔkal / (morning) / ɔʃanti / (rest lessness) / beʃ / (very)

/ ʃɔman / (equal) / eʃɔ / (come) / ghaʃ / (grass)

The voice print of / ʃ / is available in the word / Bhaʃkɔr / in the spectrogram marked PVD-6 on page 170. The strongest part of the formants are located between 2000 to 4000 Hz. The duration taken for the articulation of / ʃ / is approximately 125 milliseconds. The energy spent on this is rather high as can be seen from the dark formants. There are no vertical striations below the formants , indicating / ʃ / is a voiceless sound.

The articulation stricture of / ʃ / can be described as follows. The lips are in neutral position and tend to take the position for the following vowel. The tip of the tongue is pressed on the innerside of the lower teeth. The blade of the tongue forms a groove from back to front so that the uppersides of the grooves are pressed on the alveolar surface allowing the air stream to rush through the groove. The air strikes against the upper teeth ridge and then leaves the front oral cavity.

/ ʃ / is +consonantal while / ɦ/ and / h / are –consonantal. / ʃ / is +strident and is opposed to / ɦ / and / h / which are –strident. While / ʃ / is coronal / ɦ/ and / h / are –coronal. / ʃ / is –anterior , so also are / ɦ / and / h /. The allophonic variant of / ʃ / , which is / s / , is a +anterior sound and is opposed to / ʃ / with regard to this feature.

/ ɦ /

The voiced glottal fricative occurs in word initial and word medial positions ; as in ,

/ ɦritɔ / (robbed)	/ suɦridh / (friend)
/ ɦatha / (recede)	/ mɔɦa / (great)

The voice print of the word / mɔɦa / is the spectrogram marked PVD-8 and is placed on page 172. The frequency of the formants is between 500 Hz to 3500 Hz. The duration is about 80 milliseconds. The vertical striations at the bottom of / ɦ / show that / ɦ / is a voiced sound.

The articulation stricture of / ɦ / can be described as given below. The lips are in neutral position. The angle of the jaws is narrow but wider than that of / ʃ /. The tip of the tongue is held against the front lower teeth ridge. The centre of the tongue is raised towards the hard palate, so that the sides of the middle part of the tongue are in contact with the hard palate. As there is no obstruction in the oral cavity, the air escapes from the back cavity producing audible friction at the glottis. The soft palate is raised to shut off the nasal passage of air.

/ ɦ / is –consonantal as against / ʃ / which is +consonantal. Both / ɦ / and / h / are –strident and are therefore opposed to / ʃ / which is +strident. Both / ɦ / and / h / are –coronal and –anterior while

/ ʃ / is +coronal but -anterior. / ɦ / is the only voiced fricative in Bengali.

/ h /

The voiceless glottal fricative occurs in all positions ; as in ,

/ hɔrin / (deer) / grɔhɔn / (acceptance) / ah /

The voice print of the word / ah / is given in the spectrogram marked PVD-22 on page 175. The formants of / h / are formed between 1000 to 4500 Hz. The duration taken is about 75 milliseconds. The absence of vertical striations below the formants of / h / shows it is a voiceless sound.

The articulation stricture of / h / can be described as given below. The angle of the jaws is similar to that for / ɦ /. The tip of the tongue is held against the front lower teeth ridge. The centre of the tongue is raised towards the hard palate. Both sides of the tongue are resting on the hard palate leaving a passage for the air to escape from the laryngeal cavity causing very mild friction.

/ h / is –consonantal and can thus be distinguished from / ʃ / which is +consonantal. Both / h / and / ɦ / are –strident sounds and are thus opposed to / ʃ / which is a +strident sound. Both / h / and / ɦ / are both –coronal and –anterior as against / ʃ / which is +coronal but -anterior. / h / is a –voice sound while its counterpart / ɦ / is a +voice sound.

6.1.3. Fricatives in English

/ f /

The voiceless labio-dental fricative occurs in all positions; as in,

/ faiv / / bʌfə / / laif /

/ fit / / ɔfn / / li:f /

The voice print of / f*a* / is given in spectrogram marked PVD-24 on page 186. There are very light formants between 1000 Hz to 7000 Hz. The time duration is approximately 200 milliseconds or .2 seconds. Below this there are no vertical striations indicating / f / is a voiceless sound.

The articulation stricture for / f / can be described as given below. The jaw angle is narrow. The upper teeth and the lower lip are placed very close to each other and the air inside the oral cavity is allowed to escape causing slight friction. The soft palate is raised so that the nasal passage is shut off. The vocal cords are wide apart and hence they do not vibrate.

/ f / can be distinguished from / v /, / ð /, / z /, and / ʒ / by the feature of voice. The latter sounds are +voice while / f / is –voice. All the fricatives except / h / are +consonantal while / h / is –consonantal. / f / can be distinguished from / θ /, / ð / and / h / as the former is strident while the latter sounds are –strident. While / f / is

–coronal, / θ /, / ð /, / s /, / z /, / ʃ / and / ʒ / are +coronal. / f / is +anterior while / ʃ / , / ʒ / and / h / are – anterior.

/ v /

The voiced labio dental fricative occurs in all positions ; as in

/ veri / / evri / / ∂b∧v /

/ væn / / i:v∂n / / liv /

The voice print of / v*a* / is available in the spectrogram marked PVD-28 on page 187. The frequency range is to be like that of / f*a* / but the formants are hardly visible. However its duration can be considered from the breadth of the vertical striations at bottom. It is about 150 milliseconds. The vertical striations below indiacte that / v / is a voiced sound.

The articulation stricture can be described as below. The jaw angle is very narrow. The upper teeth and the lower lip are brought very close to each other, and the air inside the oral cavity is allowed to escape causing slight friction. The soft palate is raised so that the nasal passage is shut off. The vocal cords are held loosely together and hence they vibrate resulting in 'voice'.

/ v / can be distinguished from such fricatives as / f /, / θ /, / s /, / ʃ / and / h / by the feature of +voice. The latter sounds are –voice. / v / is also distinguishable from / θ /, / ð / and / h / by the

feature of +strident as the latter sounds are –strident. While / v / is –coronal / θ /, / ð /, / s /, / z /, / ʃ / and / ʒ / are +coronal sounds. Similarly / v / is +anterior and is opposed to / ʃ /, / ʒ / and / h / which are –anterior.

/ θ /

The voiceless dental fricative occurs in all positions ; as in

/ θiŋk /	/ sʌmθiŋ /	/ bəuθ /
/ θɔ:t /	/ nʌθiŋ /	/ mɔθ /

The spectrogram of / θa / is marked PVD-26 on page 186. The frequency range is between 2500 to 7000 Hz. The duration is about 150 milliseconds. The formants are very light showing the energy spent on this fricative is much less in comparison with the energy spent on the sibilants. The absence of vertical striations below the formants for / θ / shows that it is a voiceless sound.

While articulating / θ / the tip and blade of the tongue are raised towards the upper teeth. The tip of the tongue is brought very close to the upper front teeth. The soft palate is raised to shut off the nasal passage of air. The air from the lungs escapes through the narrow gap between the tip of the tongue and the upper front teeth causing audible friction. The vocal cords are wide apart so that there is no vibration at the glottis.

/ θ / can be distinguished from / ð /, / z /, / ʒ / and / v / as the former is –voice and the latter group of sounds is +voice. / θ / is +consonantal while / h / is –consonantal. / θ / is –strident and therefore is opposed to sounds such as / f /, / v /, / s /, / z /, / ʃ / and / ʒ / as these sounds are +strident. / θ / is +coronal as against / f /, / v / and / h / which are –coronal. / θ / is +anterior and is opposed to / ʃ /, / ʒ / and / h / as these are –anterior.

/ ð /

The voiced dental fricative occurs in all positions ; as in

/ ðis /	/ wiðin /	/ bri:ð / (breathe)
/ ðæt /	/ weðə /	/ ri:ð / (wreathe)

The spectrogram of / ð*a* / is marked PVD-30 on page 187. The frequency range is like that of / θ / but the formants are extremely light that they are hardly visible. The vertical striations, however, are clear enough to indicate the voice feature of this fricative. the duration is about 200 milliseconds.

During the articulation of / ð / the tip and blade of the tongue are raised towards the upper front teeth. The tip of the tongue is brought very close to the upper front teeth to form a closure of close approximation. The soft palate is raised to shut off the nasal passage of air. The air from the lungs escapes through the narrow gap

between the tip of the tongue and the upper front teeth causing audible friction. the vocal cords are held together so that they vibrate and 'voice' is produced.

/ ð / can be distinguished from / f /, / θ /, / s /, / ʃ / and / h / by the feature of voice. / ð / is +voice whereas the rest are –voice sounds. It can again be distinguished from / h / as / θ / is +consonantal while / h / is –consonantal. / ð / is a –strident sound while / f /, / v /, / s /, / z /, / ʃ / and / ʒ / are +strident sounds. / ð / is a +coronal sound whereas / f / and / v / and / h / are –coronal. / ð / is +anterior whereas / ʃ /, / ʒ / and / h / are –anterior.

/ s /

The voiceless alveolar fricative occurs in all positions ; as in

/ set /	/ əsli:p /	/ les /
/ silk /	/ pensil /	/ kæts /

The spectrogram of / s*a* / is marked PVD-25 on page 186. The frequency range is from 3000 Hz upwards till 7000 Hz. The duration is about 200 milliseconds. At the bottom there is no vertical striation indicating / s / is a voiceless sound. The formants are thick enough to indicate the great amount of energy spent on this fricative.

During the articulation of / s / the tip and blade of the tongue are placed very close to the alveolar ridge so that the opening

between them is very narrow. The soft palate is raised as to shut off the nasal passage of air. The air that comes from the lungs escapes through the narrow opening between the tip and blade of the tongue, and the alveolar ridge causing audible friction. The vocal cords are kept wide apart so that there is no vibration at the glottis.

/ s / can be distinguished from / z /, / ð /, / ʒ / and / v / by the feature of voice. / s / is –voice while the other sounds here are +voice. / s / is +consonantal whereas / h / is –consonantal. / s /, along with / f /, / v /, / z /, / ʒ / and / ʃ /, is +strident and is opposed to the –strident sounds like / θ /, / ð / and / h /. / s / is +coronal but / f /, / v / and / h / are –coronal. / s / is +anterior as against / ʃ /, / ʒ / and / h / which are –anterior.

/ z /

The voiced alveolar fricative occurs in all positions ; as in

/ zu: /	/ igzækt /	/ fleimz /
/ zib /	/ igzɔ:lt /	/ dɔgz /

The spectrogram of / z*a* / is marked PVD-29 on page 187. The frequency range is between 3500 to 7000 Hz. The duration of it is about 200 milliseconds. The formants are quite dark to show that much energy is spent on this fricative. The voice of the sound is shown by the vertical striations below the dark formants for / z /.

During the articulation of /z/ the tip and blade of the tongue are raised towards the alveolar ridge. They are placed very close to the ridge that a very narrow gap is formed for the air to escape. The soft palate is raised to shut off the nasal passage of air. The air that comes from the lungs escapes through the narrow gap between the tip of the tongue and the alveolar ridge causing audible friction. The vocal cords are loosely held together causing vibration at the glottis.

/z/ shares the feature of +voice with /v/, /ð/ and /ʒ/, and these sounds are distinguished from the rest of the fricatives as they are –voice sounds. /z/ can be differentiated from /h/ as the former is +consonantal while the latter is –consonantal. /z/, along with /f/, /v/, /s/, /ʃ/ and /ʒ/ is +strident and the remaining fricatives are –strident. /z/ shares the feature of +coronal with /s/, /ʃ/, /ʒ/, /θ/ and /ð/ while the remaining fricatives are –coronal. /z/ is +anterior as against /ʃ/, /ʒ/ and /h/ which are –anterior.

/ʃ/

The voiceless palato-alveolar fricative occurs in all positions ; as in

/ʃeim/ /buʃiz/ /kæʃ/

/ʃu:/ /əʃeimd/ /læʃ/

The spectrogram of /ʃa/ is marked PVD-23 on page 186. The frequency range of the formants is between 2000 to

6000 Hz. The time duration is about 200 milliseconds. The formants are lighter than those of /s/. Below the formants there are no vertical striations indicating /ʃ/ is a voiceless sound.

During the articulation of /ʃ/ the tip of the tongue are brought very close to the alveolar ridge. Besides, the blade of the tongue is raised towards the palate. The soft palate is raised so that the nasal passage of air is shut off. The air from the lungs escapes through the narrow opening between the front of the tongue and the palato-alveolar region causing audible friction. The vocal cords are kept wide apart so that no vibration is caused at the glottis.

/ʃ/, along with /f/, /θ/, /s/ and /h/ is a voiceless sound; while the remaining fricatives are voiced sounds. While /ʃ/ is +consonantal /h/ is –consonantal. /ʃ/ shares the feature of +strident with /s/, /z/, /ʒ/, /f/ and /v/ while the remaining fricatives are –strident. /ʃ/ is +coronal and is opposed to /f/, /v/ and /h/ as these sounds are –coronal. /ʃ/ is –anterior whereas /f/, /v/, /θ/, /ð/, /s/ and /z/ are +anterior.

/ʒ/

The voiced palato-alveolar fricative occurs in word medial positions and in loan words it occurs in word initial and final positions; as in,

/ʒa: r/ /pleʒə/ /mira:ʒ/

/meʒə/ /gæra:ʒ/

The spectrogram of / ʒa / is marked PVD-27 on page 187. The frequency range of / ʒ / is from 2000 to 7000 Hz. The time duration is approximately 200 milliseconds. The formants are clearly visible in the dark formations indicating the energy spent on this fricative. At the bottom we can see the vertical striations indicating the voice feature of the speech sound.

The articulation stricture of / ʒ / can be described as follows. The tip and blade of the tongue are brought very close to the alveolar ridge. Besides, the front of the tongue is raised in the direction of the hard palate. The soft palate is raised to prevent the air from entering the nasal passage. The air from the lungs escapes through the narrow opening between the front of the tongue and the palato-alveolar region causing audible friction. The vocal cords are held loosely together causing vibration at the glottis.

/ ʒ /, along with / v /, / ð /, / z /, is a voiced sound, and all other fricatives are voiceless sounds. While / ʒ / is +consonantal / h / is –consonantal. It shares the feature of +strident with / s /, / z /, / ʃ /, / f / and / v / while other fricatives are –strident. / ʒ / is a +coronal sound while / f /, / v / and / h / are not. Finally / ʒ / is –anterior and is therefore opposed to / f /, / v /, / θ /, / ð /, / s / and / z / with regard to this feature.

/ h /

The voiceless glottal fricative occurs in word inital and word medial positions. It never occurs in final positions ; as in ,

/ hæv / / biheiv /

/ hɔt / / əhed /

The spectrogram of / hai / is marked PVD-31 on page 188. The formants of /h/ are hardly visible in the spectrogram. Its strongest part of the frequency is to be around 1000 Hz. The duration is however clear. It is about 200 milliseconds. There are no vertical striations below , showing this sound is a voiceless one.

During the articulation of / h / the tongue has nothing much to do. The air from the lungs escapes through the narrow glottis causing audible friction.

/ h / alone is –consonantal , while all other fricatives are +consonantal. / h / shares the feature of –voice with / f / , / θ / , / s / , / ʃ / while remaining fricatives are +voice sounds. / h / is –strident , –coronal and –anterior sound.

6.1.4. Fricatives in Malayalam

/ š /

The voiceless palatal fricative / š / occurs in word inital and word medial positions ; as in ,

/ šɑ:nt̲i / (peace) / ɑ:šɑ / (hope)

/ šɑmǝm / (relief) / kɑ:šǝ / (money)

The spectrogram of / n̲ ɑ:šǝm / is marked PVD-3 on page 167. The frequency range is from 3000 to 8000 Hz. The extremely dark formants indicate the concentration of energy spent on this fricative. The duration of / š / is about 125 milliseconds. Below the dark formants there are no vertical striations showing / š / is a voiceless sound.

During the articulation of / š / the mid part of the tongue is brought very close to the front of the palate, allowing the air to squeeze through between the tongue and the palate producing a hissing sound. The sides of the tongue are in firm contact with the teeth and gum so that no air escapes that way. The soft palate is raised and there is no vibration of the vocal cords.

/ š / shares the feature of –voice with all the fricatives in Malayalam. / š /, along with / ʃ / and / s /, is +strident while / h / is –strident. / š / is +consonantal while / h / is –consonantal. / š / is +coronal while / h / is –coronal. / š / is –anterior whereas / s / is +anterior.

/ ʃ /

The voiceless retroflex fricative occurs in word initial and word medial positions ; as in

/ʃafṭi /	(sixty)	/ʋiʃəm /	(poison)
/ʃaḍpadhəm /	(grass hopper)	/ kaʃa:jəm /	(a kind of medicine .)

The spectrogram of /ʋiʃəm / is marked PVD-2 on page 166. The frequency range of / ʃ / is from 2500 to 8000Hz. The duration of the sound is approximately 150 milliseconds. The energy spent on this is too much as can be seen from the dark formants. There are no vertical striations below this indicating / ʃ / is a voiceless sound.

During the articulation of / ʃ / the tip of the tongue curls back and reaches towards the hard palate leaving a space for the air to escape. The sides of the tongue are held firm against the teeth and gum so that there is no lateral escape of air. The soft palate is raised to shut off the nasal passage of air. The vocal cords are wide apart so that there is no vibration at the glottis.

/ ʃ / is a voiceless sound , as are all the fricatives in Malayalam. It shares the feature of +strident with / š / and / s / but is opposed to / h / which is –strident. It is +coronal while / h / is –coronal. It is –anterior while / s / is +anterior.

/ s /

The voiceless alveolar fricative occurs in word initial and word medial positions ; as in

/ sam∂m /	(equal)	/ ma:s∂m /	(month)
/sagar∂m /	(ocean)	/anusaranq /	(obedience)

The spectrogram of / ma:s∂m / is marked PVD-1 on page 165. The frequency range is between 4000 to 8000 Hz. The duration is about 150 milliseconds. The formants are dark enough to show much energy is spent on this fricative. The absence of vertical striations below the formants for / s / shows that / s / is a voiceless sound.

/ s /, along with / ʃ /, / š / and / h /, is a voiceless sound. / s / is +strident while / h / is –strident. / s / is +coronal and is opposed to / h / which is –coronal. / s / is +anterior while / ʃ /, / š / and / h / are –anterior.

/ h /

The voiceless glottal fricative occurs in word initial and word medial positions ; as in

/ him∂m /	(ice)	/ a:ha:r∂m /	(food)
/ haran∂m /	(division)	/ahant̲a /	(selfishness)

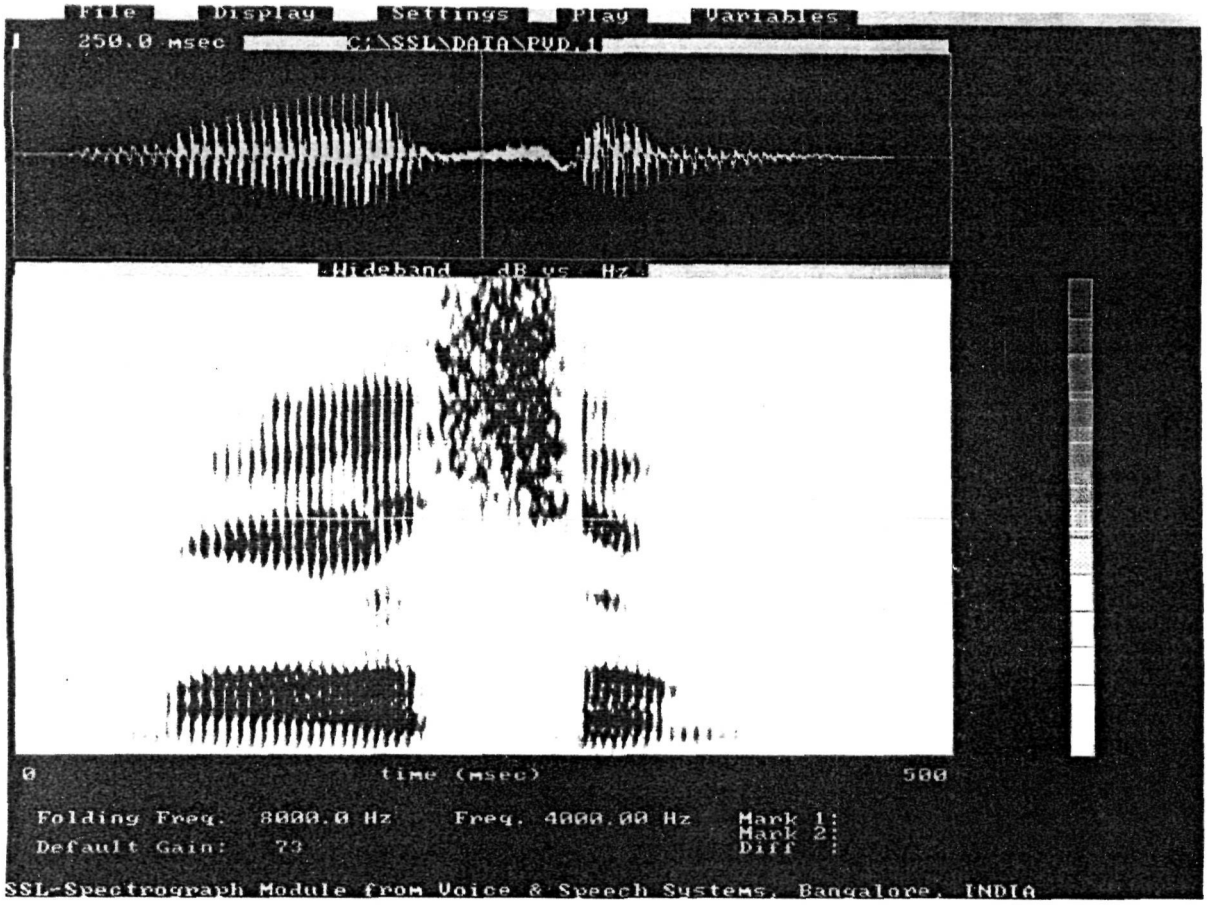
The spectrogram of / guha / is marked PVD-4 on page 168. The frequency is between 1000 to 4500 Hz. The time duration is about 100 milliseconds. There are no vertical striations below, indicating / h / is a voiceless sound.

The articulation stricture of / h / can be described as below. The tip and blade of the tongue lie low against the gum and lower teeth. The back of the tongue is raised towards the soft palate but the closure is not as narrow as that for other fricatives. The jaw angle is half open. The soft palate is raised to shut off the nasal passage of air. The vocal cords are wide apart so that there is no vibration at the glottis. The air from the lungs escapes through the narrow opening at the back of the mouth (or at the glottis as in some speakers) causing audible friction.

/ h / shares the feature of –voice with all other fricatives in Malayalam. It is –strident and –coronal. It is also –anterior as compared to / s / which is +coronal, +strident and +anterior and therefore / s / is opposed to / h / in many ways.

List of Spectrograms

PVD-1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Settings
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Variables
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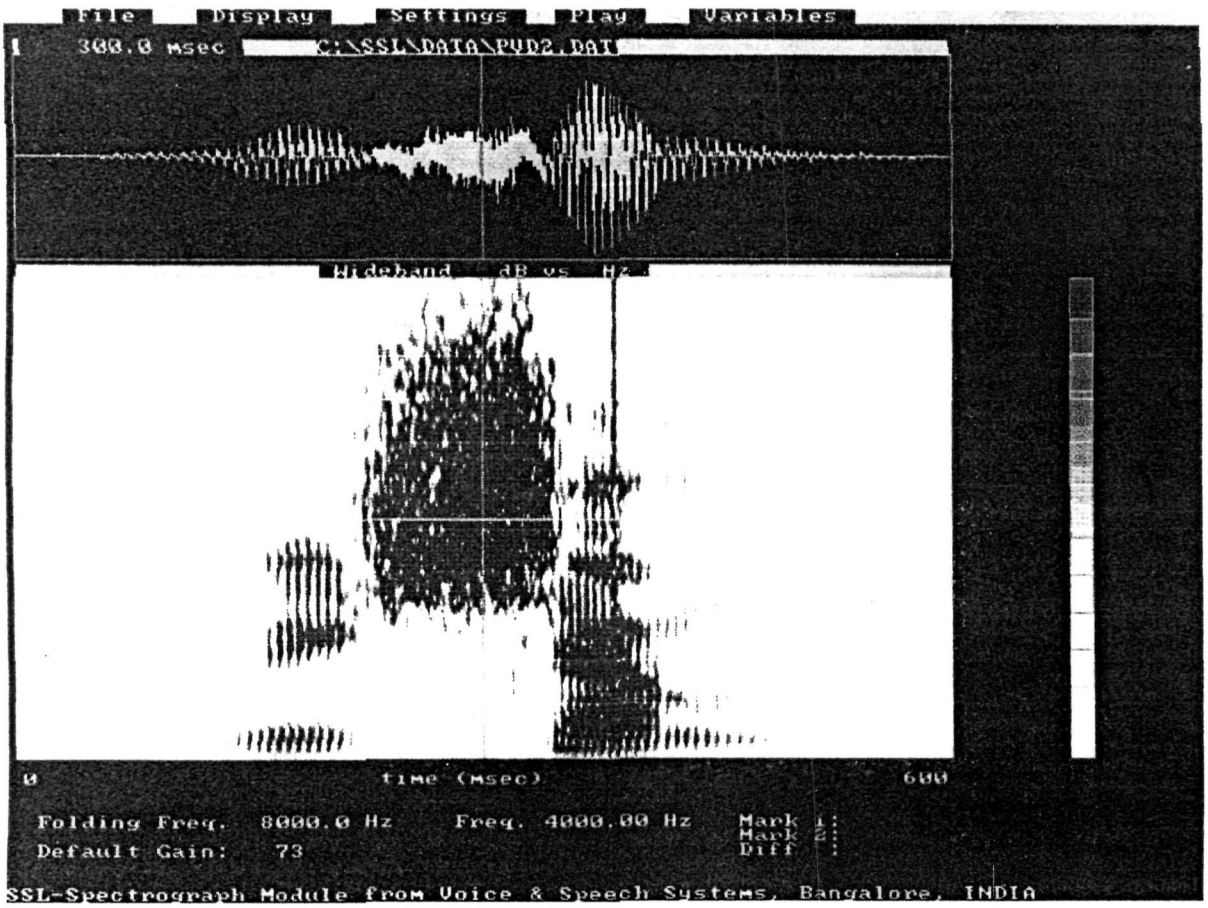
C:\SSL\DATA\PVD.1
Wideband
dB us
Hz
0
time (msec)
500
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-2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time (msec)
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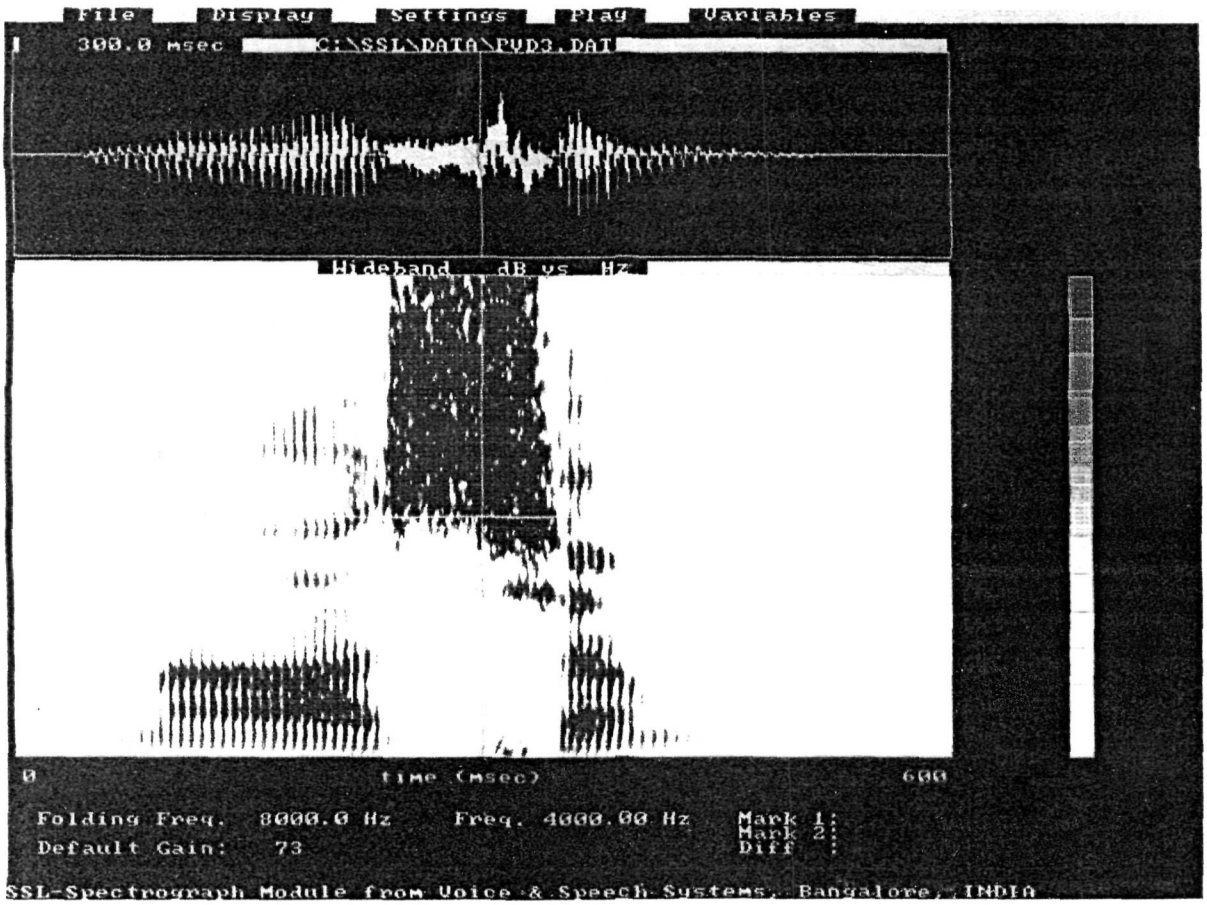
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-3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Play
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Wideband dB vs Hz
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time (msec)
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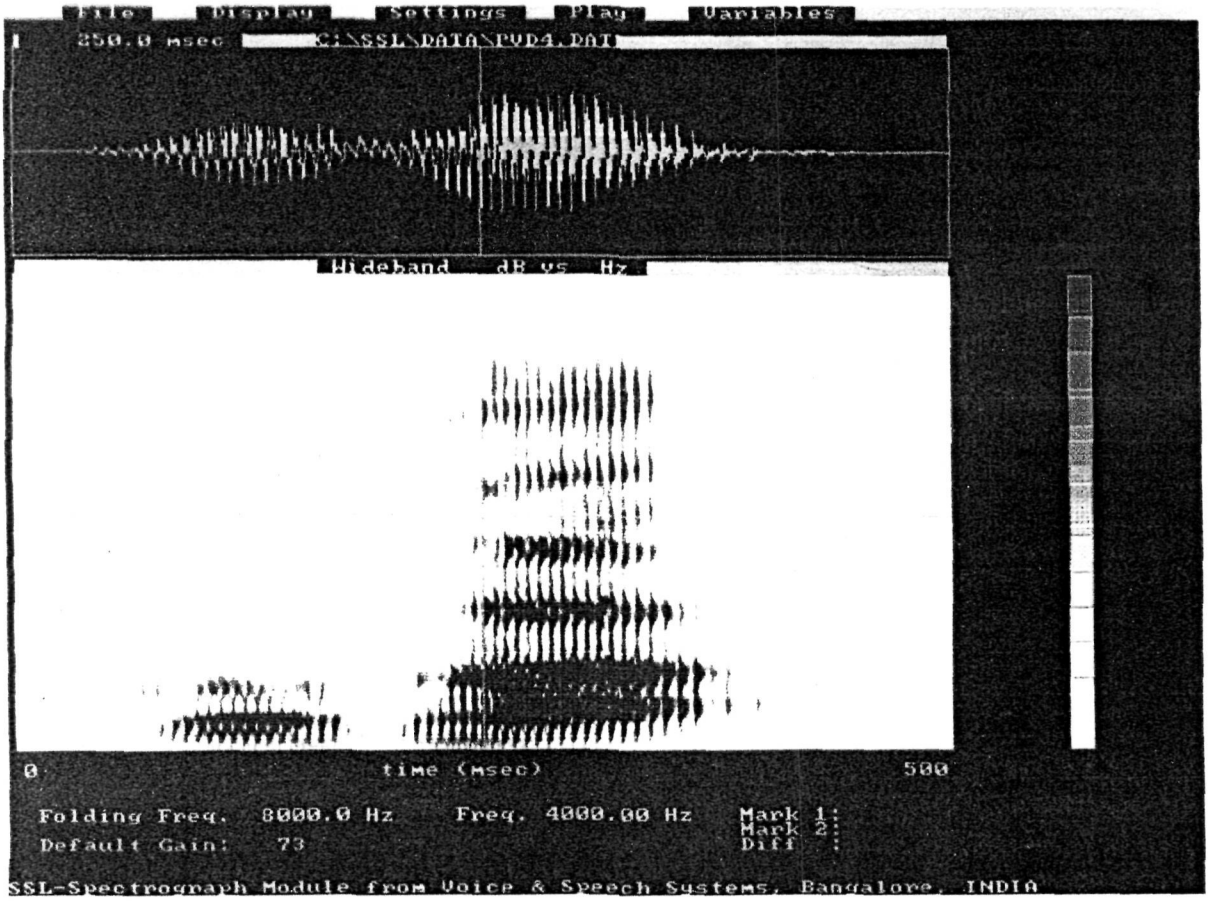
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-4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Play
Variables
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Wideband dB vs Hz
0
time (msec)
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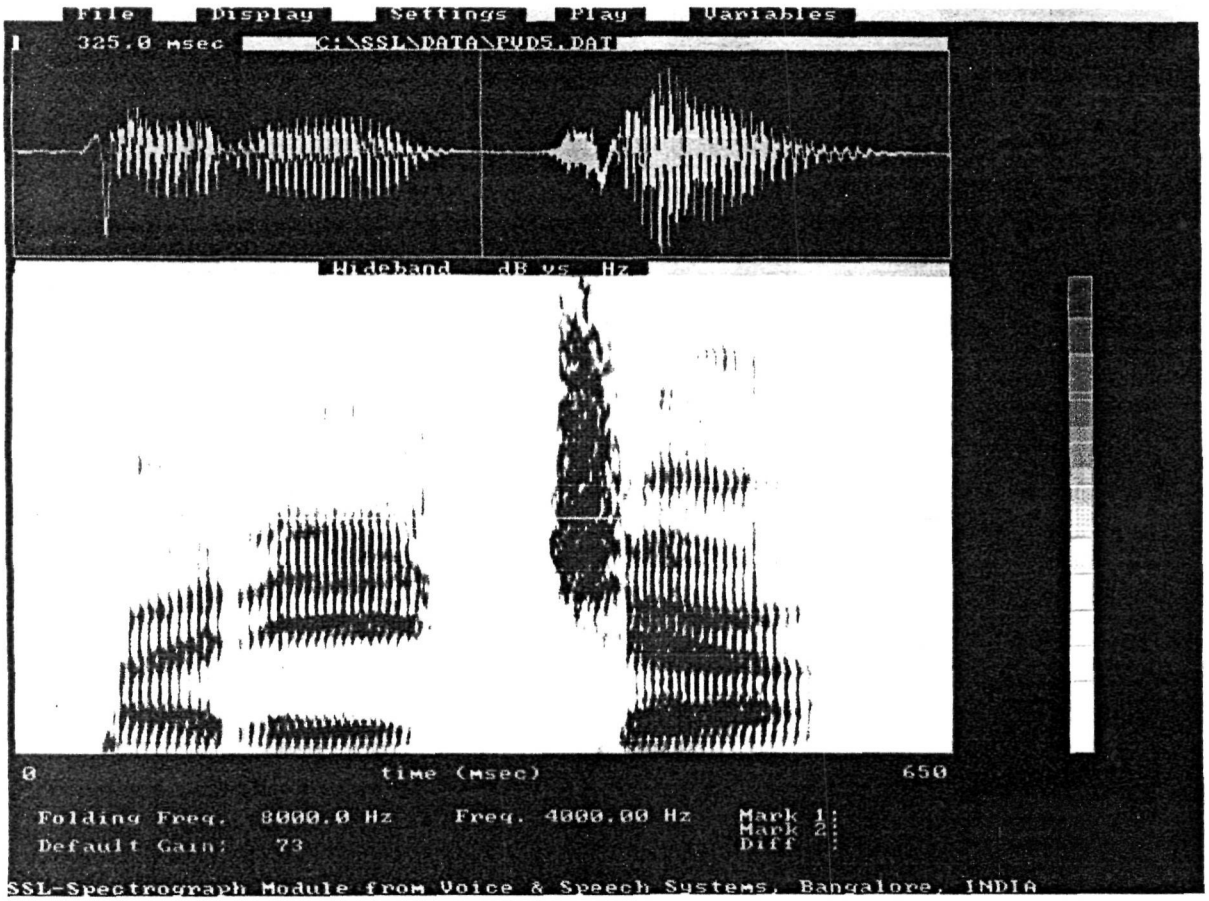
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-5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Settings
Play
Variables
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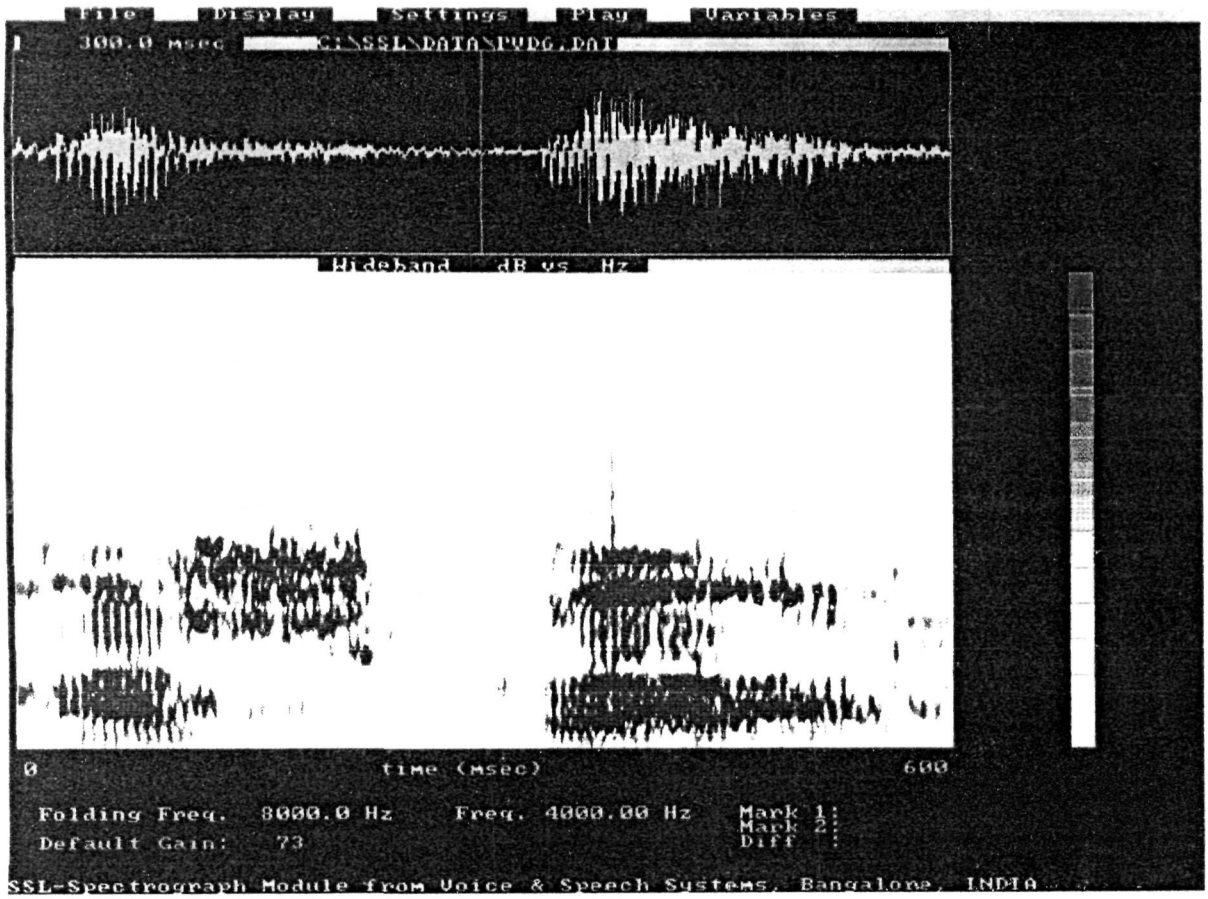
0
time (msec)
650
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-6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Wideband dB vs Hz
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time (msec)
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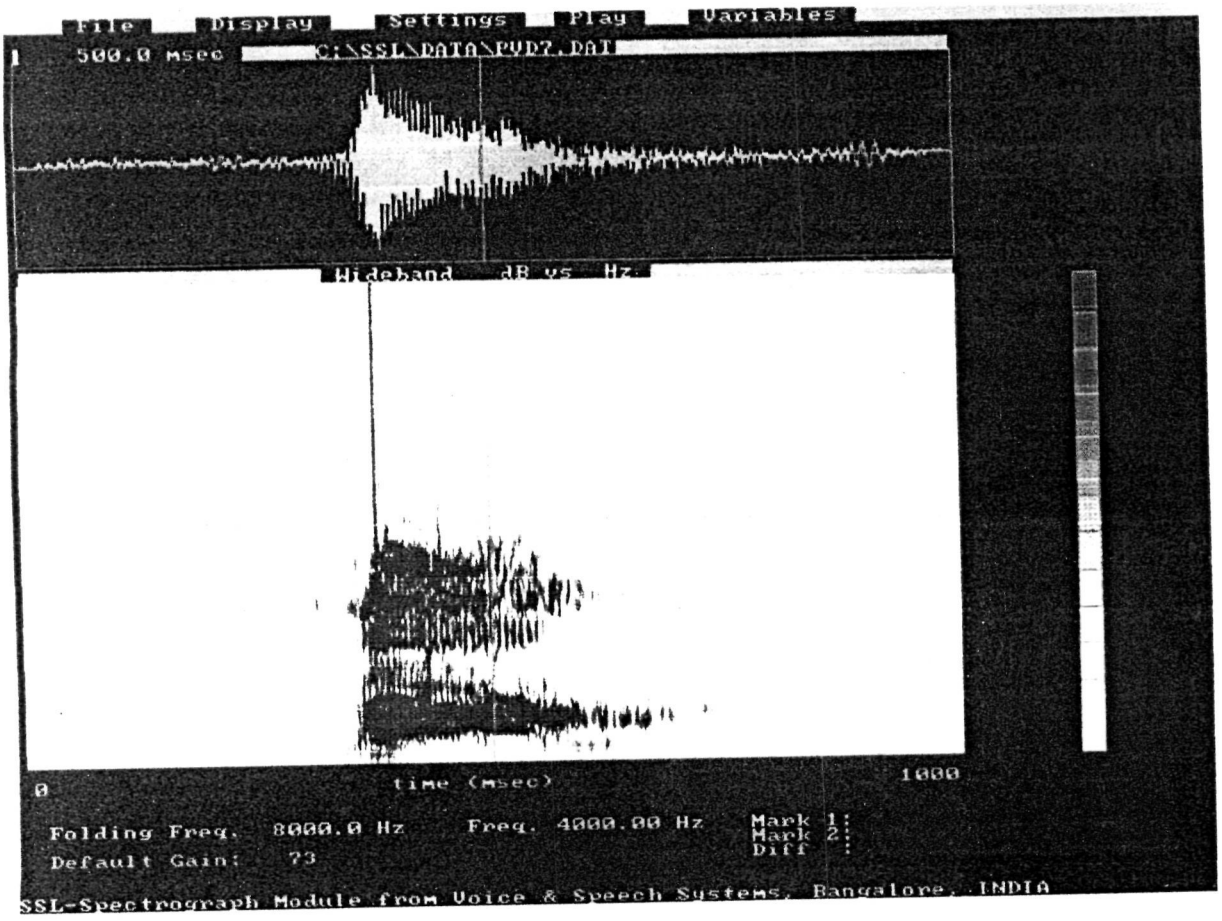
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-7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Settings
Play
Variables
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Wideband dB vs Hz
0
time (msec)
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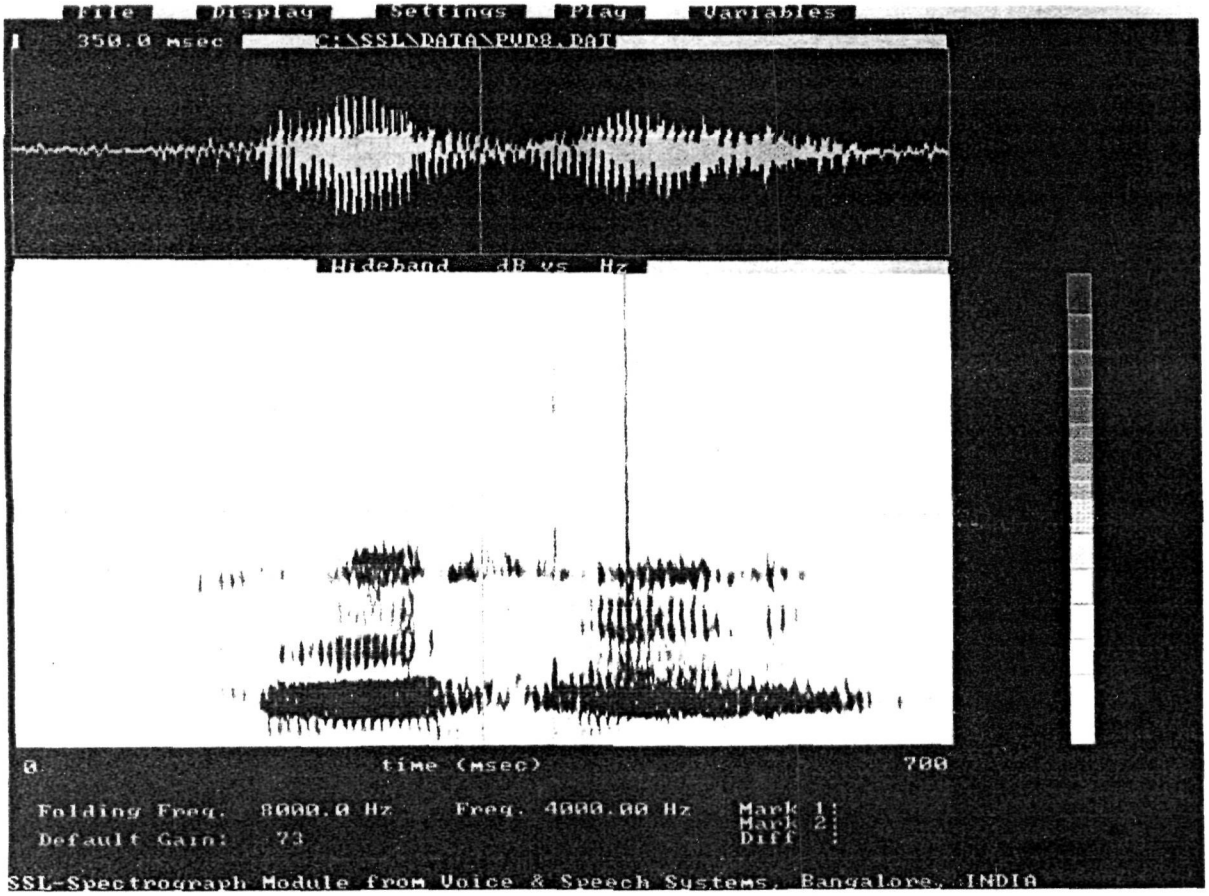
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-8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Play
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Wideband dB vs Hz
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time (msec)
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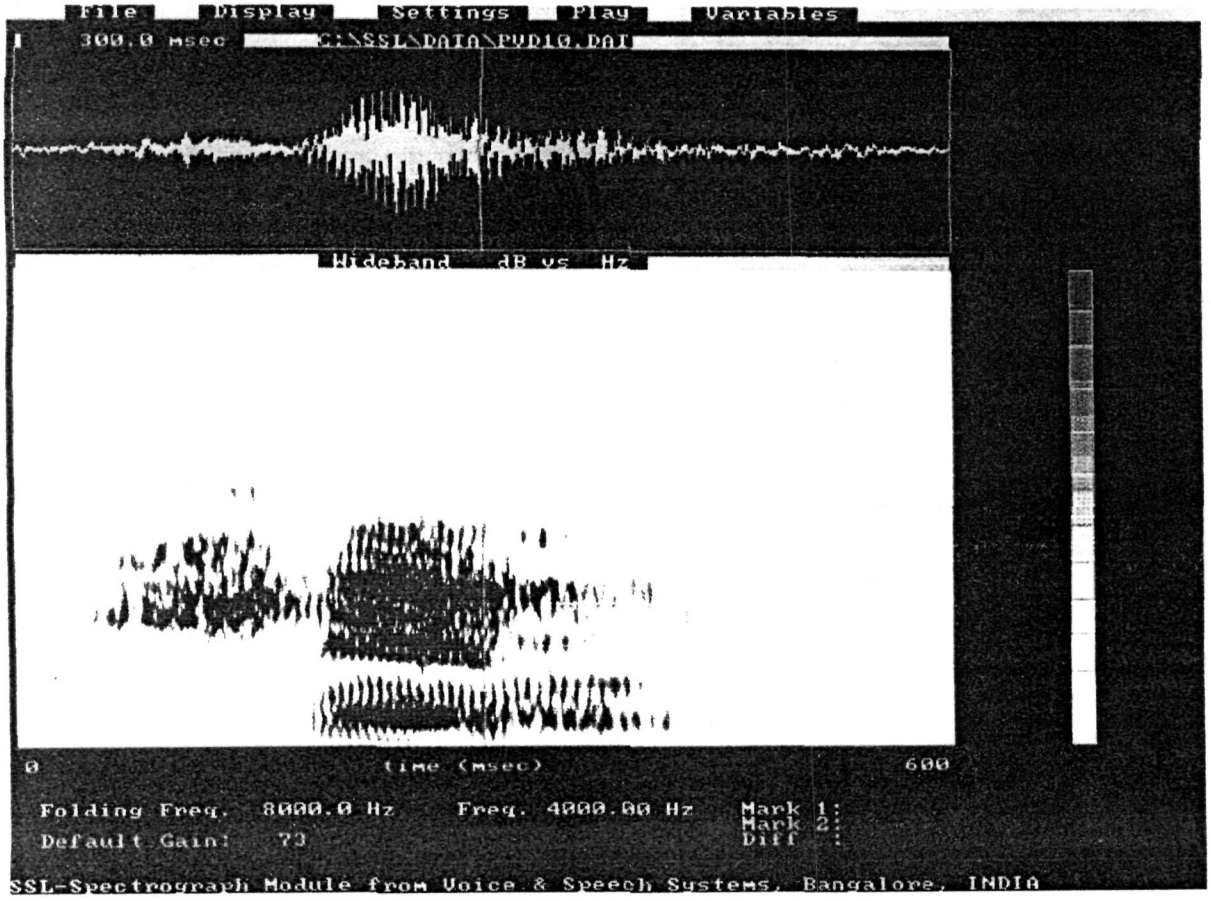
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PV D-10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Display
Settings
Play
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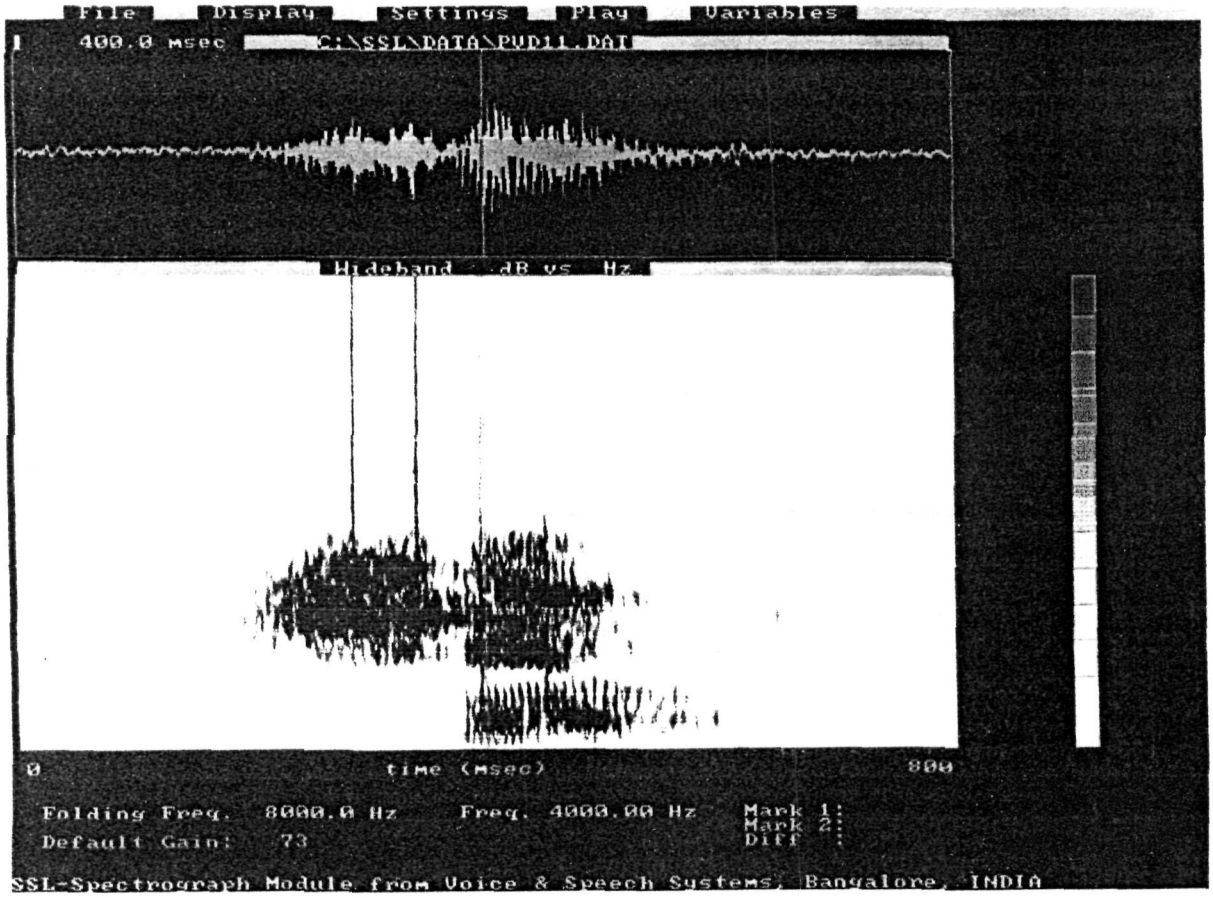
Wideband dB vs Hz
0
time (msec)
600
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-11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Wideband dB vs Hz
0
time (msec)
800
Folding Freq. 8000.0 Hz
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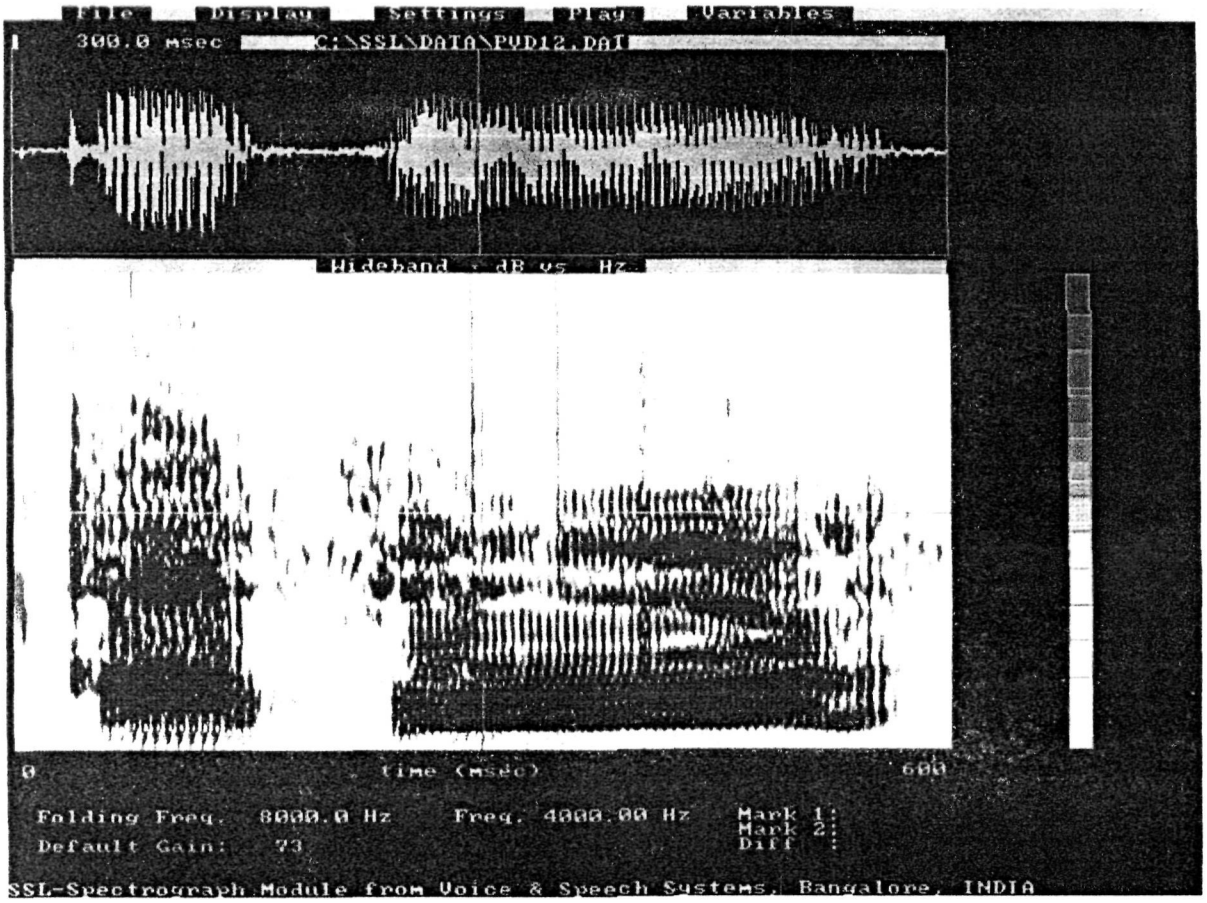
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-12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Settings
Play
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Wideband - dB vs Hz
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time (msec)
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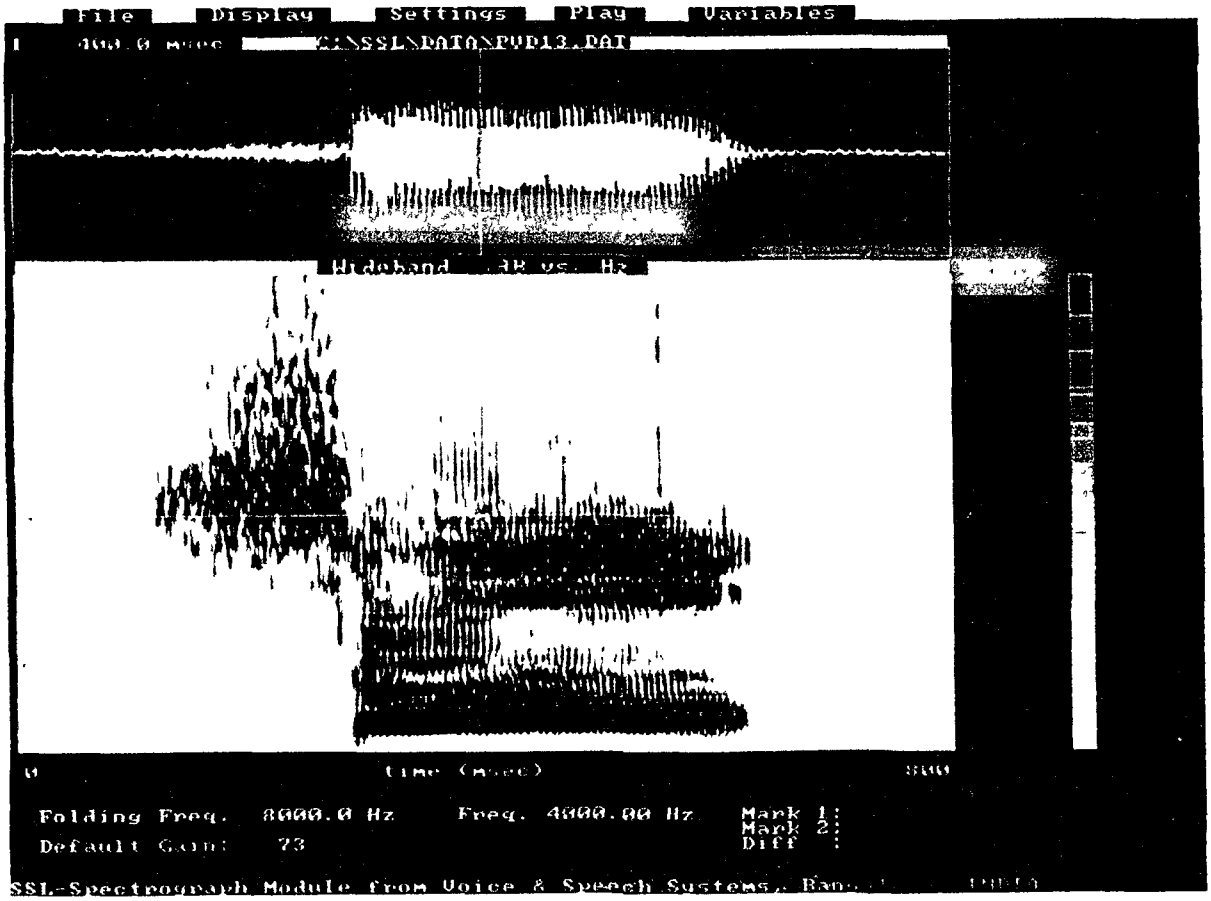
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-13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Wideband
time (msec)
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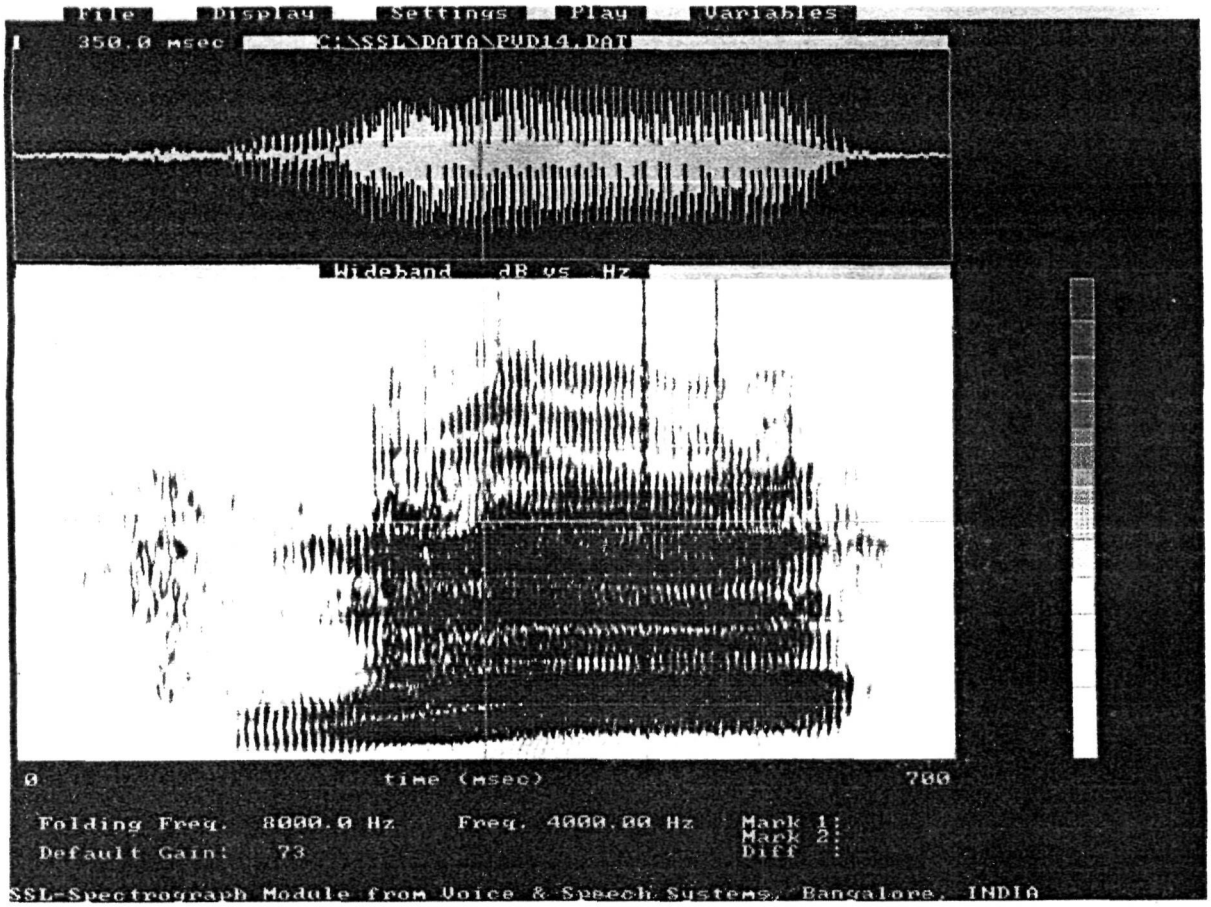
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems

PVD-14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Settings
Play
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Wideband dB gs Hz
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time (msec)
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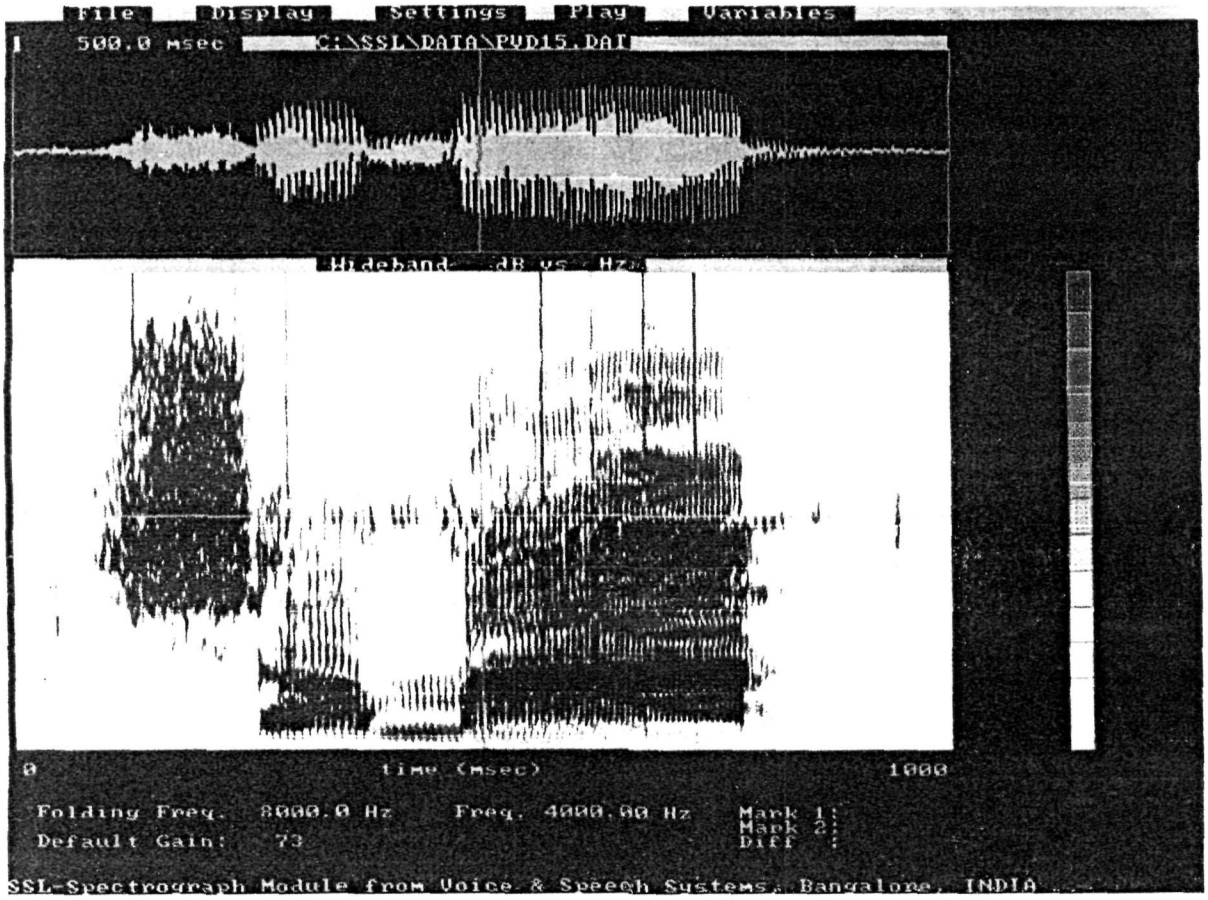
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-15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Settings
Play
Variables
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Wideband dB vs Hz
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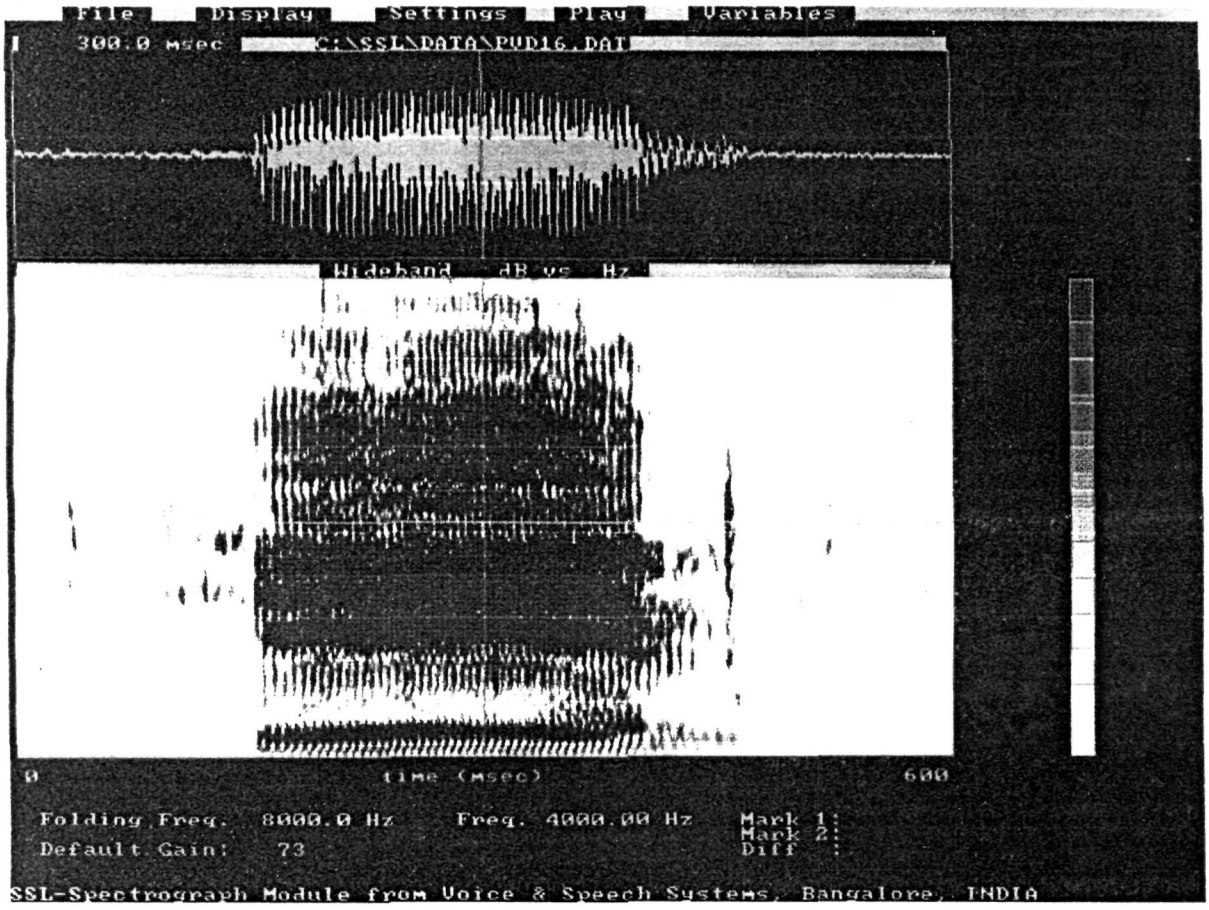
time (msec)
1000
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-16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Settings
Play
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Wideband dB vs Hz
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time (msec)
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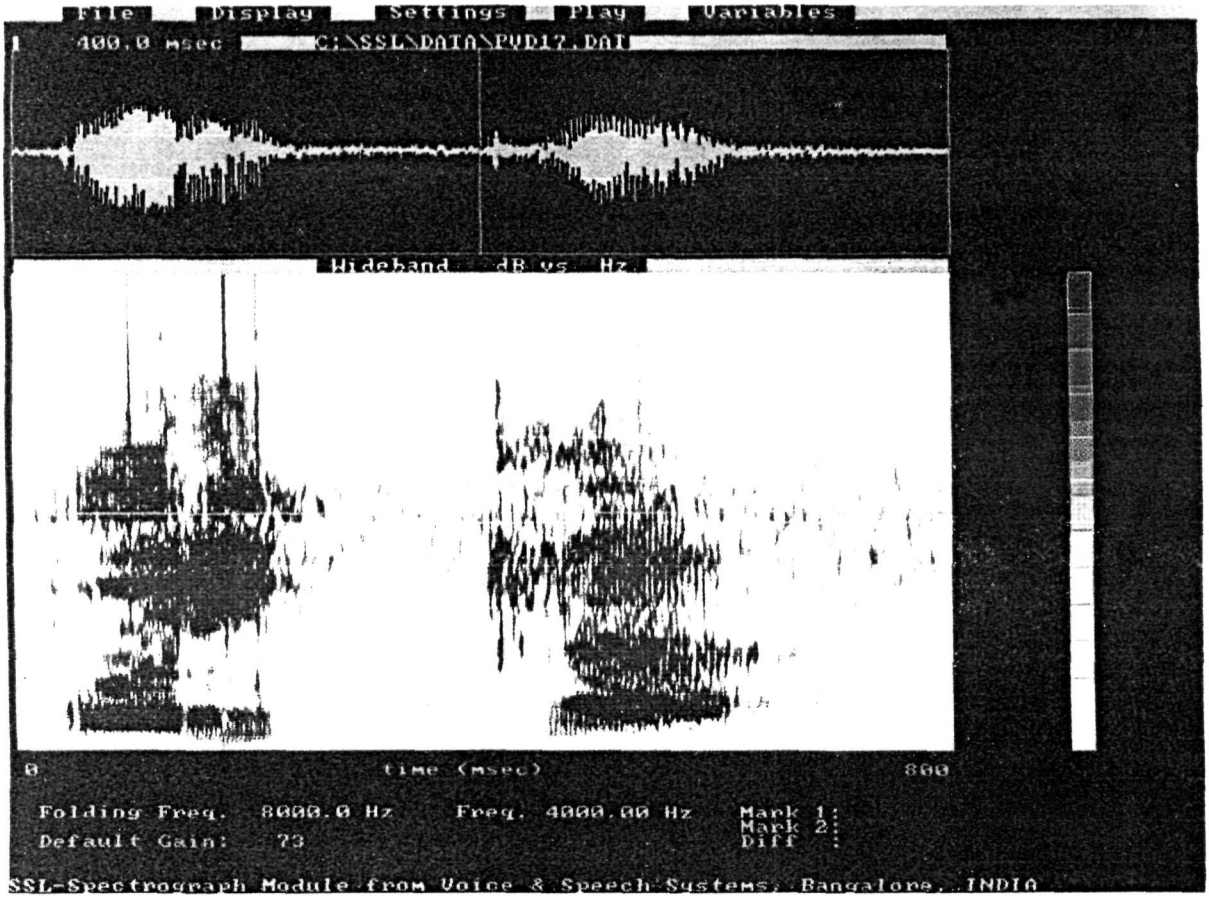
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-17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Wideband dB vs Hz
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time (msec)
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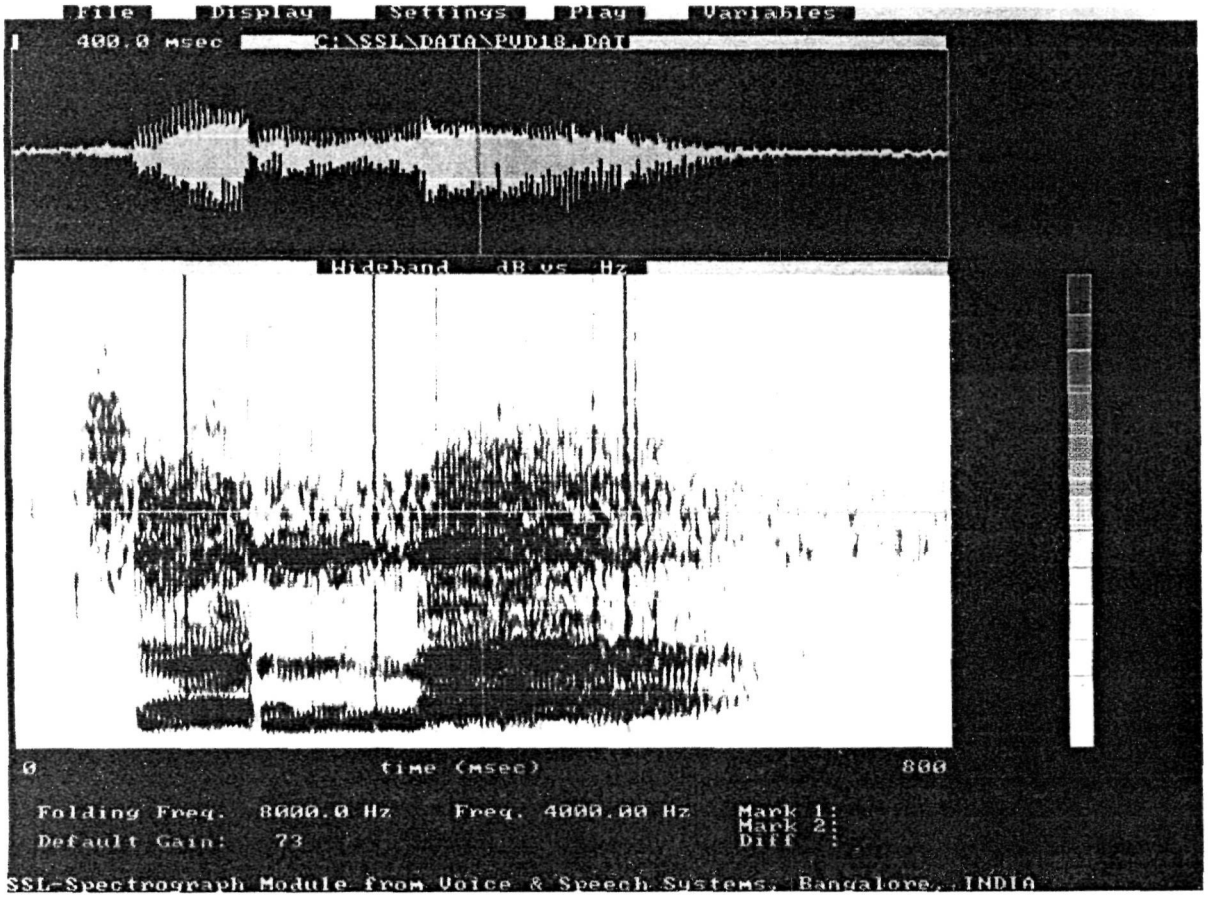
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-18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Play
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Wideband dB vs Hz
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time (msec)
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Folding Freq. 8000.0 Hz
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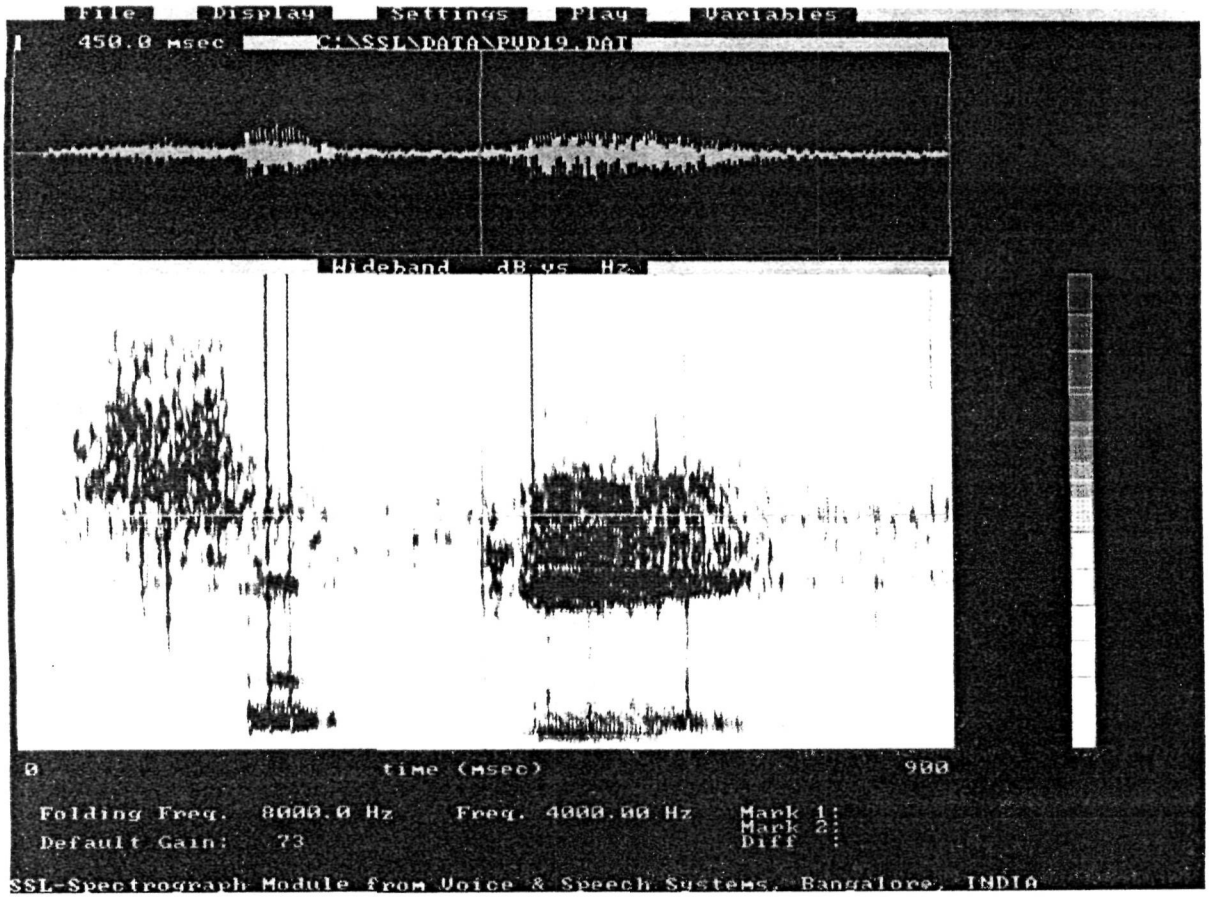
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-19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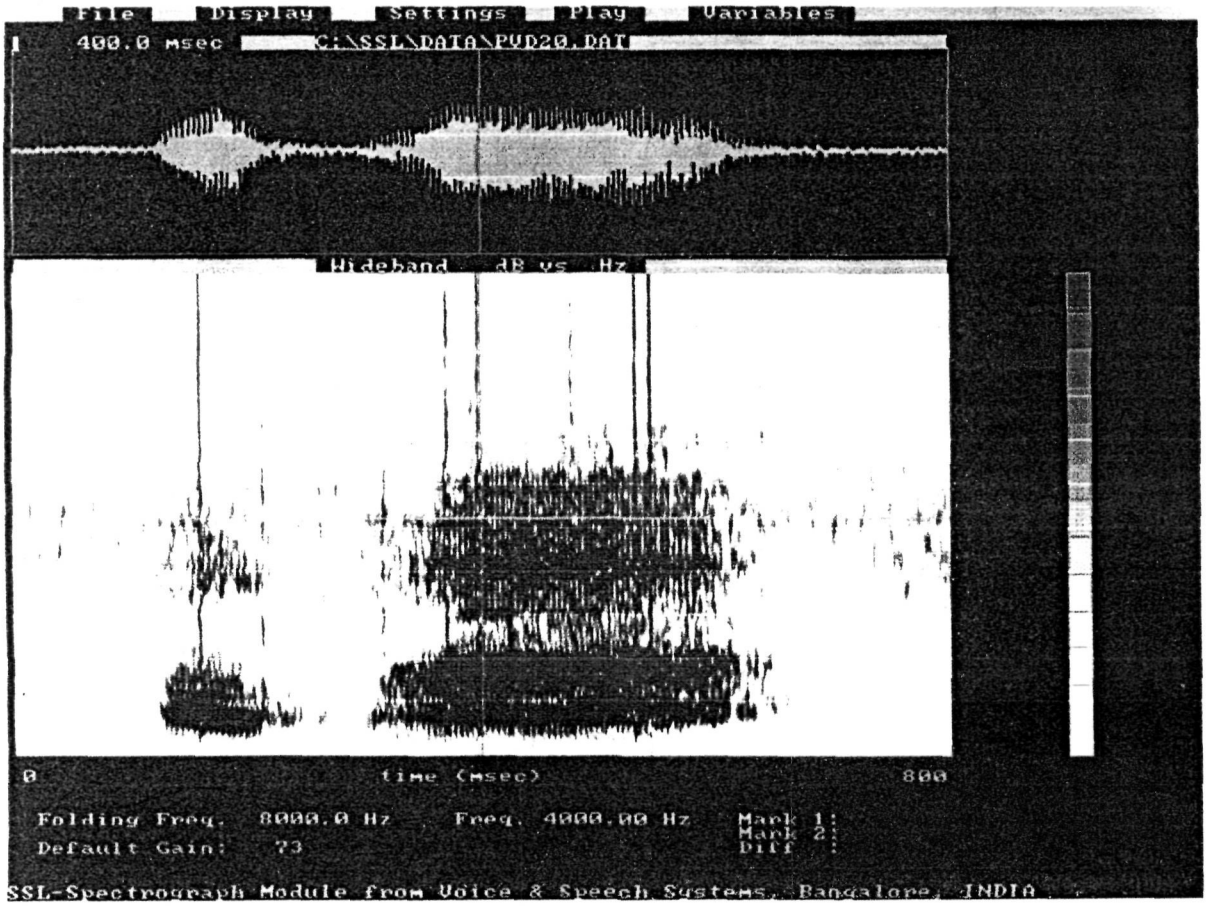
Wideband dB vs Hz.
0
time (msec)
900
Folding Freq. 8000.0 Hz
Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-20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Wideband dB vs Hz
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time (msec)
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Folding Freq. 8000.0 Hz
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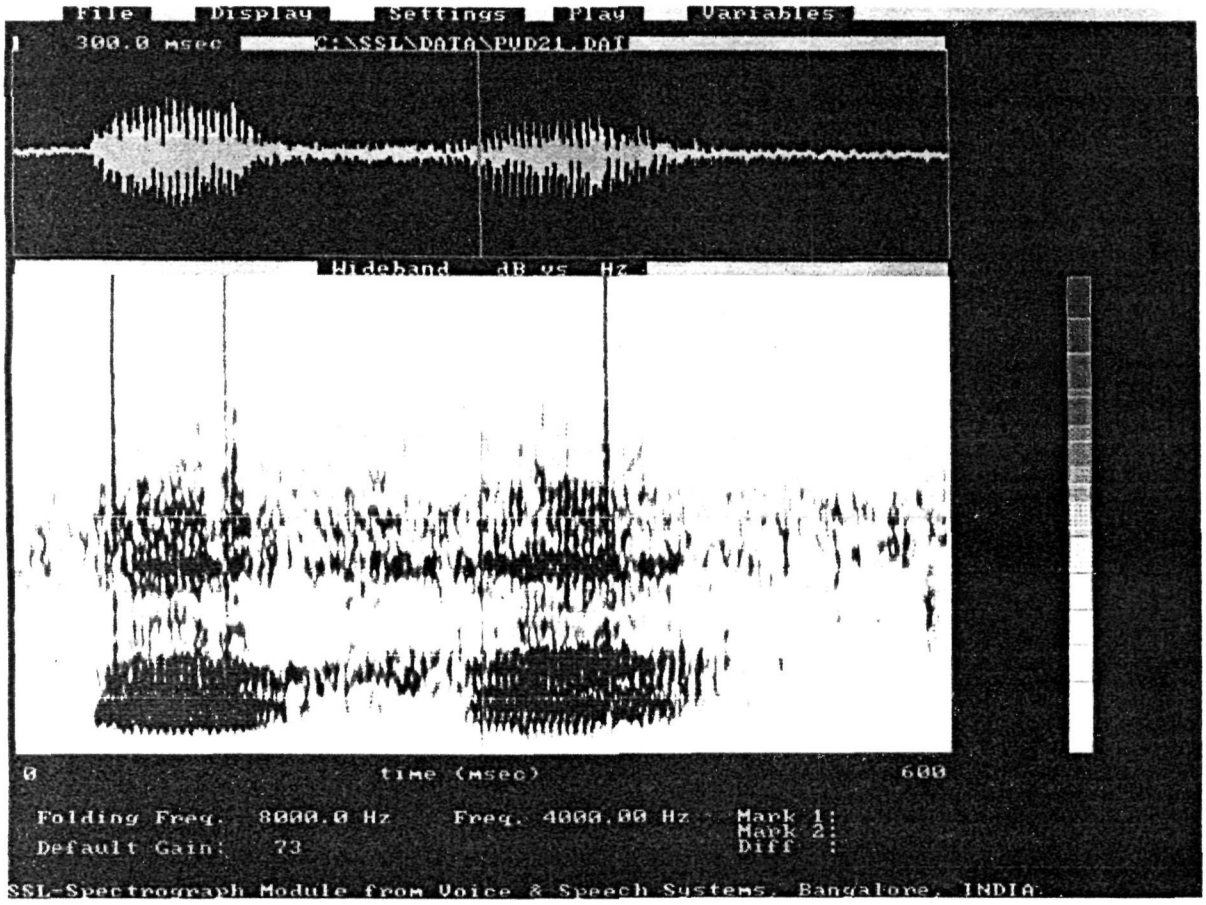
Mark 1:
Mark 2:
Diff :
Default Gain: 73
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA

PVD-21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Wideband dB vs Hz
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Freq. 4000.00 Hz
Mark 1:
Mark 2:
Diff :
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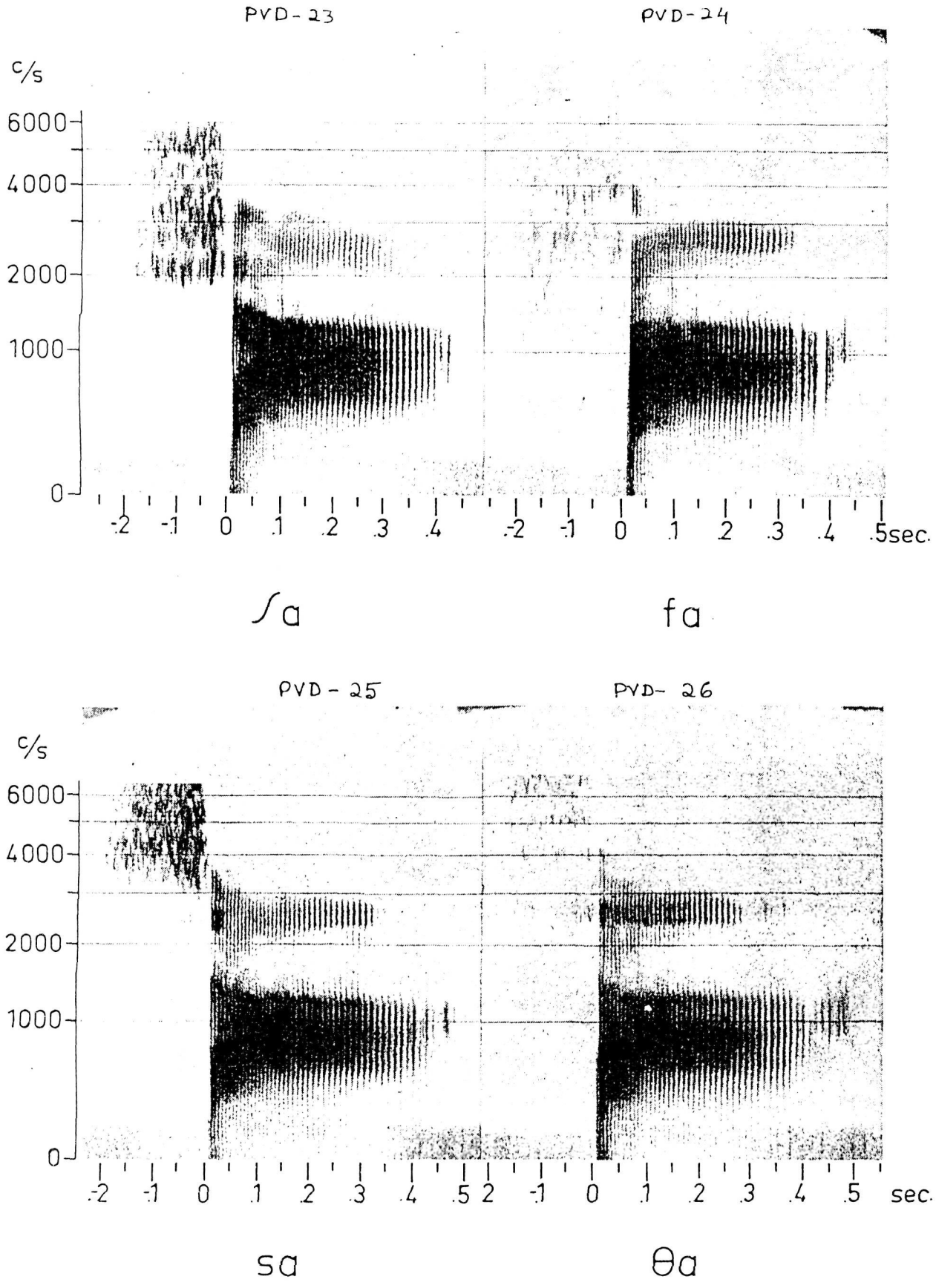
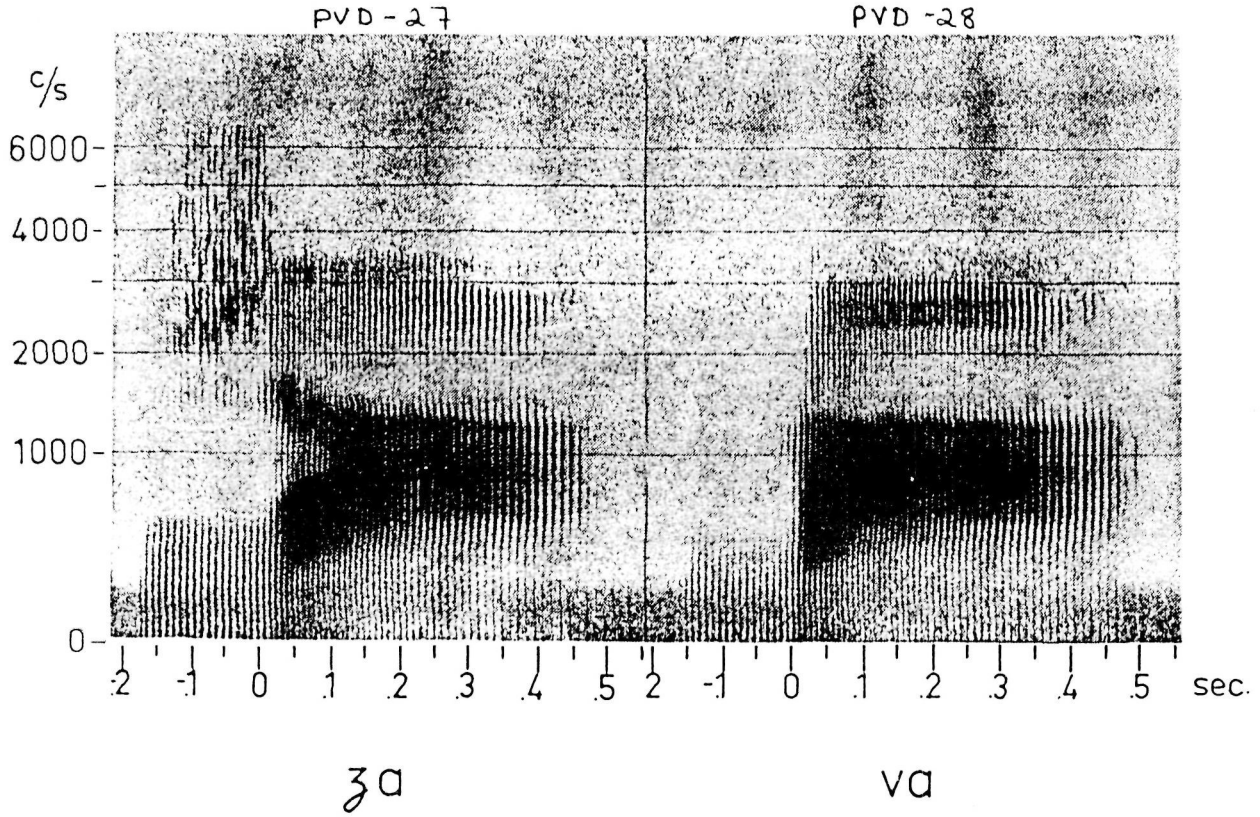
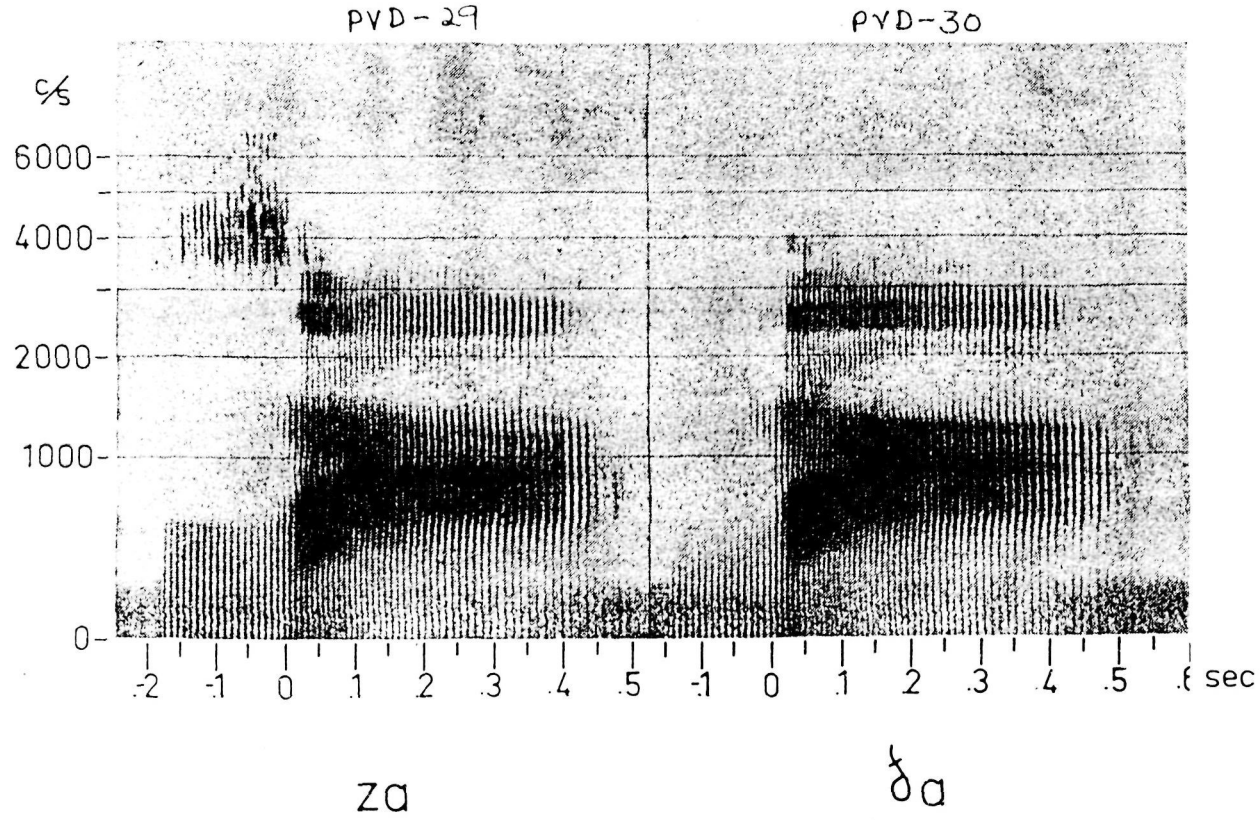
SSL-Spectrograph Module from Voice & Speech Systems, Bangalore, INDIA



Spectrograms of English unvoiced fricatives.

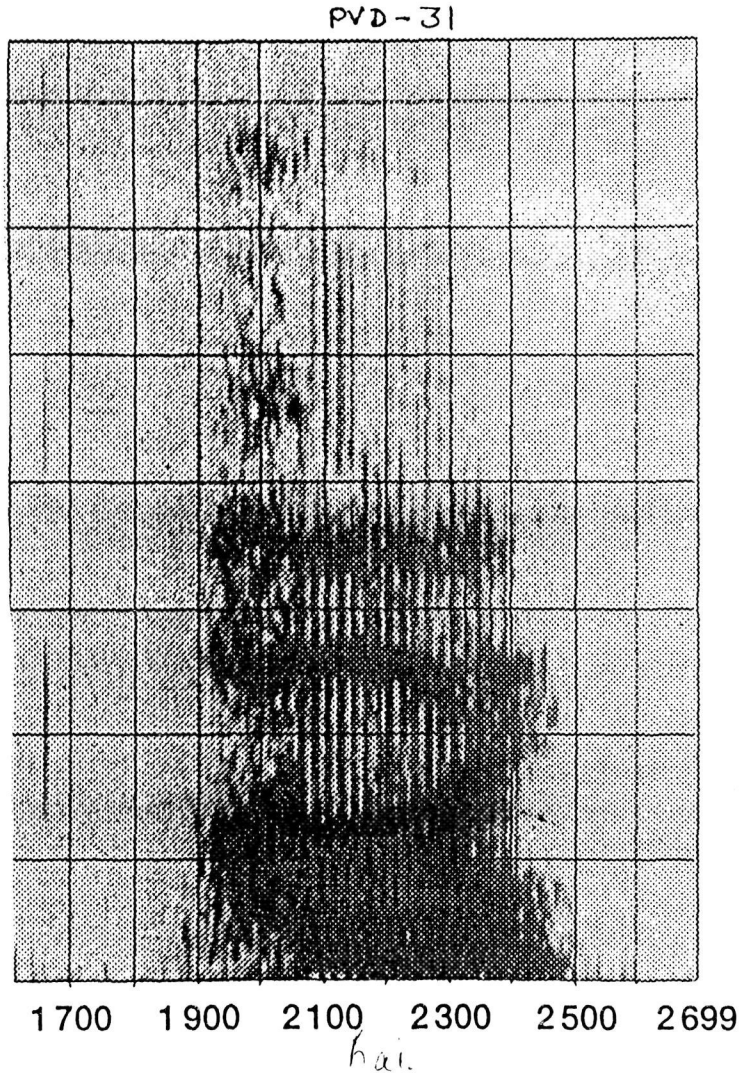
Courtesy: Gunnar Fant





Spectrograms of English voiced fricatives.

Courtesy: Gunnar Fant



Courtesy: Mike Davenport and S.J. Hannas.

6.2. Contrastive Features of Fricatives

In this section a comparison of fricatives across the four languages under consideration namely. Assamese , Bengali . English and Malayalam is done inorder to bring out the features of differences of fricatives among these languages.

	Assamese / s / z / x / ɦ /	Bengali / ʃ / ɦ / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ/ /ʒ/ /h/	Malayalam / ʂ / ʃ / s / h /
1	Assamese has four fricatives, two voiced and two voiceless fricatives.	Bengali has three fricatives, one voiced and two voiceless fricatives. s ' is treated as an allophone of / ʃ /.	English has nine fricatives, four voiced and five voiceless fricatives.	Malayalam has four fricatives. All these are voiceless fricatives
2	A descendant of Sanskrit. in its earliest times. Assamese had all the three sibilant fricatives of Sanskrit	A descendant of Sanskrit, in its earliest times, Bengali had all the three sibilant fricatives of Sanskrit	Upto West-Germanic period there were only two voiceless sibilant fricatives. / z / and / ʒ / were added later.	A descendant of Proto-Dravidian, Malayalam had no sibilant fricative in its earliest times

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ / /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
3. Spirantalization turned the affricates into fricatives.	Affricates are retained. They wre not turned into fricatives.	Affricates are retained. No spirantalization took place in English.	Affricates are retained. No spirantalization took place in Malayalam.
4. Sibilant fricatives of Sanskrit are substituted with / x / in Assamese in certain environments.	Sibilant fricatives are reduced to one phoneme / ʃ / with the allophonic variation of / s /. Occasional / x / substitution is found in Eastern Bengali.	No / x / substitution in English is found, though / x / is heard in some dialects, but not in standard dialect.	Sibilant phonemes are replaced by other phonemes like / tʃ /, / t̲ / and / ṭ / by the less educated people.
5. Fricatives are derived from Sanskrit, but some are formed by spirantalization.	Fricatives are derived from Sanskrit, but some are modified.	Distinctions were made from within and / ʒ / evolved out of / z /.	Fricatives entered Malayalam through Sanskrit influence and they retain their original sound value.

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ/ /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
6. There is no one-to-one relation between the phonemes and the letters which represent them	There is no one-to-one relation between the phonemes and the letters which represent them	There is no one-to-one relation between the phonemes and the letters which represent them	The number of fricatives and the number of letters are the same.
7. There are no labial fricatives in Assamese.	There are no labial fricatives in Bengali / p / is produced as fricative in eastern Bengali dialect.	There are two labial (labio-dental) fricatives in English.	There are no labial fricatives in Malayalam.

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ/ /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
8. Fricatives occur in all positions.	Fricatives except / ɦ / occur in all positions. / ɦ / occurs only in initial and medial positions.	Most of the fricatives occur in all the positions. /ʒ/ occurs normally in medial positions. it occurs in other positions in loan words. / h / never occurs in word final position.	Fricatives occur in word initial and medial positions. They do not occur in final positions because they are accompanied by / ə / in that position.
9. There are only two sibilant fricatives.	There is only one sibilant fricative.	There are four sibilant fricatives.	There are three sibilant fricatives.
10. There are two non-sibilant fricatives.	There are two non-sibilant fricatives.	There are five non-sibilant fricatives.	There is only one non-sibilant fricative.

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ/ /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
11. Under what circumstances / x / substitution took place is not precisely known.	There is no / x / substitution except in Eastern dialect. The circumstances are not known.	There is no / x / substitution in English.	Under what circumstances / tʃ /, / t̠ /, and / ṭ / were substituted for fricatives are known.
12. There are instances of / h / dropping in Assamese.	There are instances of / h / dropping in Bengali.	There are instances of / h / dropping in English.	There are instances of / h / dropping in Malayalam.
13. There is one velar fricative in Assamese.	There is no velar fricative except in some dialects.	There is no velar fricative in English.	/ h / is velar for some and glottal for others.

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ / /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
14. Syllable initial clusters with fricatives are possible.	Syllable initial clusters with fricatives are possible.	Syllable initial clusters with fricatives are possible.	Syllable initial clusters with fricatives are possible.
15. Syllable final clusters involving fricatives are found but very rarely.	No known syllable final clusters involving fricatives exist in the language.	There are instances of syllable final clusters involving fricatives.	Syllable final clusters involving fricatives are not found in the language
16. / s / alone can form a CCC initial cluster.	/ ʃ / and / s / form a single phoneme. / ʃ / including the allophone [s] alone can form a CCC initial cluster.	/ s / alone can form a CCC initial cluster.	/ s / alone can form a CCC initial cluster.

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ / /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
17. There are instances of / s / replacement in Assamese.	There are instances of / ʃ / replacement in Bengali.	There are no instances of / s / replacement in English.	There are instances of / s / replacement in Malayalam.
18. In CC initial clusters involving fricatives, fricatives occupy the first position.	In CC initial clusters involving fricatives, fricatives occupy the first position.	In CC initial clusters involving fricatives, fricatives occupy the first position.	In CC initial clusters involving fricatives, fricatives occupy the first position.

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ / /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
19. / ʒ / is the most difficult English phoneme for the Assamese people to articulate. It is articulated as an affricate by the Assamese speakers.	/ ʒ / is the most difficult English speech sound for the Bengali people to articulate. It is articulated as an affricate by the Bengali speakers.	/ ʒ / is the rarest occuring speech sound in the language.	/ ʒ / is the most difficult English speech sound for the Malayalees to articulate. It is articulated as a voiceless palato-alveolar fricative.
20. / s / is the easiest to articulate and it is available in the language.	/ s / is the easiest to articulate and its equivalent is available in the language as an allophone of / ʃ / .	/ s / is the maximum occuring fricative, alone and in clusters in English.	/ s / is the easiest to articulate and its equivalent is available in Malayalam.

Assamese / s / / z / / x / / ɦ /	Bengali / ʃ / / ɦ / / h /	English /f/ /v/ /θ/ /ð/ /s/ /z/ /ʃ/ /ʒ/ /h/	Malayalam / š / / ʃ / / s / / h /
21. English / f / is rendered as voiceless bilabial aspirated plosive by the Assamese speakers.	English / f / is rendered as voiceless bilabial aspirated plosive by the Bengali speakers.	———	English / f / is rendered as voiceless bilabial aspirated plosive by the Malayalees.
22. English / v / is rendered as voiced bilabial aspirated plosive in Assamese.	English / v / is rendered as voiced bilabial aspirated plosive in Bengali.	———	English / v / is rendered as voiced labio-dental continuant in Malayalam.
23. The dental fricatives in English are produced as plosives in Assamese.	The dental fricatives in English are produced as plosives in Bengali.	———	The dental fricatives in English are produced as plosives in Malayalam.

7. PEDAGOGICAL IMPLICATIONS

In these days of national integration, cultural exchange and scholastic sophistication the knowledge of languages other than one's mother tongue is surely an added advantage. Therefore people learn many second languages for communication within the country. Today even this is not enough because the present world of twenty-first century is increasingly becoming a village. Faster means of transport facilities and instant communication have made these things possible. Hence the learning of some foreign languages has become almost an imperative. Such necessities demand the teaching and learning of second and foreign languages. Keeping this in mind the syllabus is prepared. In India we have the three language formula — mother tongue, one second language and one foreign language. Most of the states in the country follow this pattern. In such teaching situations what problems the learners face are the subject of discussion here.

When a person learns a second or foreign language he or she comes across speech sounds that are quite different from those of his mother tongue. He often finds it difficult to articulate them. He substitutes these speech sounds with some other speech sounds of his mother tongue. This can be explained in terms of the pull of L_1 . This causes much unintelligibility. Such problems are to be handled by the language teacher in the classroom. The problems faced by the three Indian language communities with regard to the articulation of English

fricatives and the solutions are discussed here.

The Assamese people have problems in articulating six of the nine English fricatives. It is because these six fricatives (/ f /, / v /, / θ /, / ð /, / z /, / ʒ /) do not have equivalent sounds in Assamese. By this I mean the speech sounds they produce for these sounds have some features different from those of the fricatives given here. We can consider these fricatives one by one. The English / f / is a labio-dental unaspirated voiceless fricative. The sound that is substituted for this in Assamese is / p^h / which is a bi-labial aspirated voiceless plosive. The differences and similarities of these two speech sounds can be shown with the help of distinctive features as below.

English / f /	Assamese / p^h /
+con.	+con.
–son.	–son.
–cor.	–cor.
+ant.	+ant.
–voice	–voice
+cont.	–cont.

One could add some more features to capture the presence of 'dentality' in / f / and the absence of it in / p^h /. But in the six features that are listed here / f / and / p^h / differ in one feature, that is, / f / is a continuant while / ph / is not. Still it makes a lot of difference in the quality of sound in / f / and / p^h /. It is for the

language teacher to take note of this and make necessary corrections so as to acquire the features of the English / f /. In this case the learner has to acquire the feature of ' +cont. ' The learner has to be told to keep his upper teeth very close to his lower lip in the articulation of / f /. The air in the vocal tract is to be allowed to flow continuously causing friction. In this way he can acquire / f /. As he acquires the feature of 'continuant' he will also get rid of aspiration. In the normal case or when such corrections are not made the words given below on the left hand side are understood as the words given on the right hand side by the English.

Words uttered by the Assamese		Words understood by the English
fin	→	pin
fan	→	pan
feign	→	pain
fate	→	pate
fig	→	pig

This is because / p / in initial positions in stressed syllable and when not preceded by / s / is / p^h / in English, a bi-labial aspirated plosive, which is equivalent to the Assamese / p^h /. Therefore in all these words and in all such contexts unintelligibility can be caused. The same remedial measures are to be suggested to the learners of English.

/ v / is a voiced labio-dental unaspirated fricative. This is substituted with / b^h / the voiced bi-labial plosive. In terms of distinctive features the similarities and differences can be shown as below.

English / v /	Assamese / b^h /
+con.	+con.
–son.	–son.
–cor.	–cor.
+ant.	+ant.
+voice	+voice
+cont.	–cont.

Again the result is the same as that of / f / and / p^h /. These two sounds are similar with regard to five features and different with regard to one feature. This much of difference is enough to distort the message considerably. The words given below on the left hand side are uttered by the Assamese and they are understood as the words on the right by the English.

vowel ⟶ bowel

vest ⟶ best

van ⟶ ban

veil ⟶ bail / bale

The remedial measures suggested for acquiring / f / can be applied here also.

/ θ / is a voiceless dental fricative. This is substituted with / t^h / an aspirated voiceless dental plosive by the Assamese speakers. The distinctive features of both these speech sounds are given below.

English / θ /

[+con.
–son.
+cor.
+ant.
–voice
+cont.]

Assamese / t^h /

[+con.
–son.
+cor.
+ant.
–voice
–cont.]

If the learner is asked not to touch the teeth with his tongue but keep it very close to it and allow the air to escape slowly and continuously he can acquire the feature of ' +cont. ' and at the same time get rid of aspiration which is not needed for / θ /. If this is not done the following words on the left hand side as uttered by the Assamese people can be understood as the words given on the right hand side causing much unintelligibility which has to be overcome.

Words uttered by the Assamese		Words understood by the English
thin	→	tin
thank	→	tank
thigh	→	tie
thick	→	tick

/ t / in syllable initial position in stressed syllable and when not preceded by / s / is / t^h /, an aspirated allophone of / t /. Therefore / θ / uttered as an aspirated plosive is heard as / t^h /. Hence the distortion of meaning in the above list of words.

With regard to / ð / the same unintelligibility can be caused in the following pairs of words.

Words uttered by the Assamese		Words understood by the English
then	→	den
there	→	dare
thy	→	die
they	→	day

Here too, the problem is that a fricative is substituted with a plosive, in other words, instead of forming a stricture of close approximation the Assamese people make a stricture of complete closure. They are to be told of the basic difference between a fricative and a plosive. They are to be given sufficient practice to articulate this sound without the tongue touching the teeth but bringing it very close to the teeth.

Another problematic speech sound is / z /. Many Assamese people touch the hard palate and the alveolar ridge with the blade of

the tongue obstructing the air passage completely and then slowly releasing it, turning this fricative into an affricate. Their articulation in this manner causes unintelligibility with regard to the words given below on the left hand side as they are understood as words on the right.

zoo ⟶ jew

zealous ⟶ jealous

raised ⟶ raged

The distinctive features of / z / and / dʒ / are listed below.

/ z /	/ dʒ /
+con.	+con.
–son	–son.
+cor	+cor
+ant	–ant
–high	+high
+cont.	–cont.
+voice	+voice

On three features we can see differences. If these are modified we can produce the correct sound. The learner has to lower the body of tongue and place the tip of the tongue very close to the alveolar ridge so that the air can escape continuously through the narrow gap.

And finally, the /ʒ/ is also produced as an affricate by many Assamese people. The remedial measures suggested for acquiring /z/ out of /dʒ/ can be applied in this case too.

When Bengalees learn English they face the problems listed so far and in addition they have the following problem as well. They can't differentiate /ʃ/ from /s/. In most cases /s/ is rendered as /ʃ/ causing much unintelligibility with the following words.

Words uttered by the Bengalees		Words understood by the English
same	→	shame
sigh	→	shy
sign	→	shine
son	→	shun
ass	→	ash
sip	→	ship

The distinctive features listed below for /s/ and /ʃ/ bring out the similarities and differences.

/s/	/ʃ/
+con.	+con.
–son.	–son.
+cor.	+cor
+ant.	–ant.
–voice	–voice
+cont.	+cont.
–high	+high

Two features differentiate / s / from / *ʃ* /. These are anterior / post anterior and high / non-high. Inorder to articulate / s / correctly the learner has to modify these features. He has to raise the tip of the tongue towards the alveolar region, keeping the body of the tongue at neutral position. Thus '+high' becomes '–high' and '–anterior' becomes '+anterior'.

The Malayalees share the same problems as those of the Assamese with regard to the non-sibilant fricatives, that is, they substitute them with plosives. It does not apply to / h / as this is not a problematic fricative for any of these language groups. The remedial measures suggested earlier are equally applicable to the Malayalees too.

Secondly Malayalees render / z / as / s / causing much unintelligibility. The distinctive features of both these sounds are given below.

/ s /	/ z /
+con.	+con.
–son.	–son.
+cor.	+cor.
+ant.	+ant.
–voice	+voice
+cont.	+cont.
–high	–high

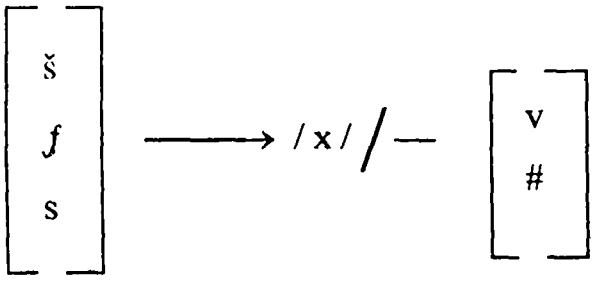
Among the features listed here the two speech sounds differ on one feature, that is, 'voice.' One is '+voice' and the other is '–voice'. The language teacher has to demonstrate the difference between a voiced sound and its voiceless counterpart, and then ask the learner to acquire the voice by regular practice. As long as the learner is unable to acquire 'voice' feature his speech will have the problem as shown below.

word uttered.		word understood.
zeal	⟶	seal
zink	⟶	sink
eyes	⟶	ice

Another fricative that the Malayalees articulate wrongly is / ʒ /. This is substituted with / *ʃ* /. Here again the only difference is 'voice' feature. The remedial measures suggested for acquiring / z / out of / s / can be applied in this case.

So far we have looked at the difficulties of the Indian learners of English, particularly the speakers of Assamese, Bengali and Malayalam. It is also necessary to see how second language learning can be fruitful or made easier for these language communities. If Assamese people learn Bengali or Malayalam or if a Malayalee learns Assamese or Bengali he or she can learn the same in an easier way provided the teacher makes the learner aware of the sound changes that take place in each target language.

Let us imagine that a Malayalee is learning Assamese. The findings given in the foregoing pages are of immense help. Words of Sanskrit origin with sibilants are in abundance in Malayalam as well as in Assamese. Speakers of Malayalam while learning Assamese can be guided by the / x / substitution rule in Assamese. This can help him acquire the Assamese words. The sibilants are to be replaced by / x / when they are followed by vowel or when they are in word final position. This rule



can be applied to get the Assamese words for the Malayalam words given on the left hand side below.

Malayalam	Meaning	Assamese
/ *a*:k*a*:šəm /	sky	/ akax /
/ s*a*:gərəm /	ocean	/ xagɔr /
/ šɔ:kəm /	sorrow	/ xok /
/ š*a*rət /	name of a season	/ xɔrɔt /
/ š*a*ri:rəm /	body	/ xɔrir /

This kind of a substitution is not required when the sibilant fricative is followed by a consonant. The following words in Malayalam illustrate this.

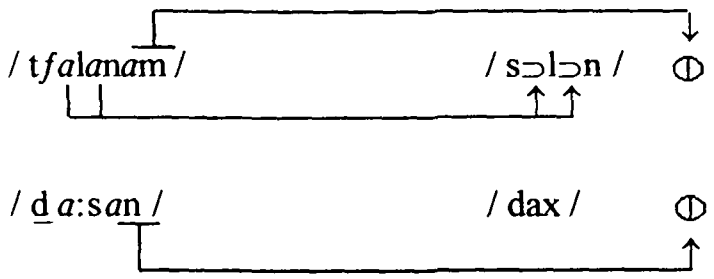
Malayalam	Meaning	Assamese
/ k*a*ftəm /	trouble	/ kɔstɔ /
/ *a*šli:ləm /	obscenity	/ ɔslil /
/ šre:*f*təm /	noble	/ srestɔ /
/ p*a*risrəmə*n*m /	effort	/ pɔrisrɔm /

An Assamese person learning Bengali or Malayalam can be asked to substitute the / x / with sibilant fricatives to arrive at the equivalent words in Bengali or Malayalam language.

The language teacher also requires some other facts about changes in the words inorder to get the correct words in the target language. Some of these are :

a) / *a* / in Malayalam becomes / ɔ / in Assamese.

b) / *a* /, / *a*m / and / *a*n / word endings in Malayalam are dropped in Assamese. This can be illustrated with the help of the following words.



The language teacher can also make use of the spirantalization rule to acquire Assamese words from Malayalam words. Thus in Malayalam words of Sanskrit origin the voiceless affricate can be

replaced by the fricative / s /. The other words with affricates cannot be replaced like this. Both these are illustrated below with the help of examples.

Malayalam	Assamese	Meaning
/ t*ʃa*turtə /	/ sɔturtɔ /	fourth
/ t*ʃa*r*a*n*a*m /	/ sɔrɔn /	feet
/ t*ʃ*umb*a*k*a*m /	/ sumbɔk/	magnet
/ t*ʃ*itr*a*m /	/ sitrɔ /	picture
/ t*ʃa*l*a*n*a*m /	/ sɔlɔn /	movement
/ t*ʃa*r*ʧa* /	/ sɔrsa /	discussion
/ t*ʃa*ritr*a*m /	/ sɔritrɔ /	character

Words of Dravidian origin having the voiceless affricate cannot be changed in this way to get Assamese words. This can be shown with the help of the following words.

Malayalam	Assamese	Meaning
/ t*ʃ*ilə /	*/ sil /	some
/ t*ʃa*k*a* /	*/ sɔk /	jackfruit

[Star indicates such words are not the correct substitution for the words given on the left hand side.]

Similarly the / s / sound resulting from the orthographic

symbols চ and ছ in Assamese words of Sanskrit origin can be substituted with / tʃ / to get Malayalam words or even Bengali words because spirantalization has not taken place in Bengali. The seven words given above and hundreds of other words in Assamese can thus be changed in this manner to get Malayalam words.

In the same way the conjunct consonant / kʃ / (ক্ষ) and its variation in these two languages as illustrated earlier will also help in the second language learning process. It has a sibilant phonetic realisation in Malayalam and a stop realisation in Assamese and Bengali. Therefore when we have the orthographic symbol of this conjunct consonant it yields only / ʃ / in Malayalam. But this / ʃ / has the force of a geminate. In such environments we can go for a / k^h / substitution to get Assamese or Bengali words.

Malayalam	Assamese	Meaning
/ pariʃʃa /	/ pɔrik^{h}æ /	examination
/ paʃʃi /	/ pɔk^{h}i /	bird
/ aʃʃaram /	/ ɔk^{h}ɔr /	letter of the alphabet
/ šiʃʃa /	/ xik^{h}ə /	learning
/ laʃʃam /	/ lɔk^{h}ɔ /	lakh
/ laʃʃmi /	/ lɔk^{h}i /	name of a girl

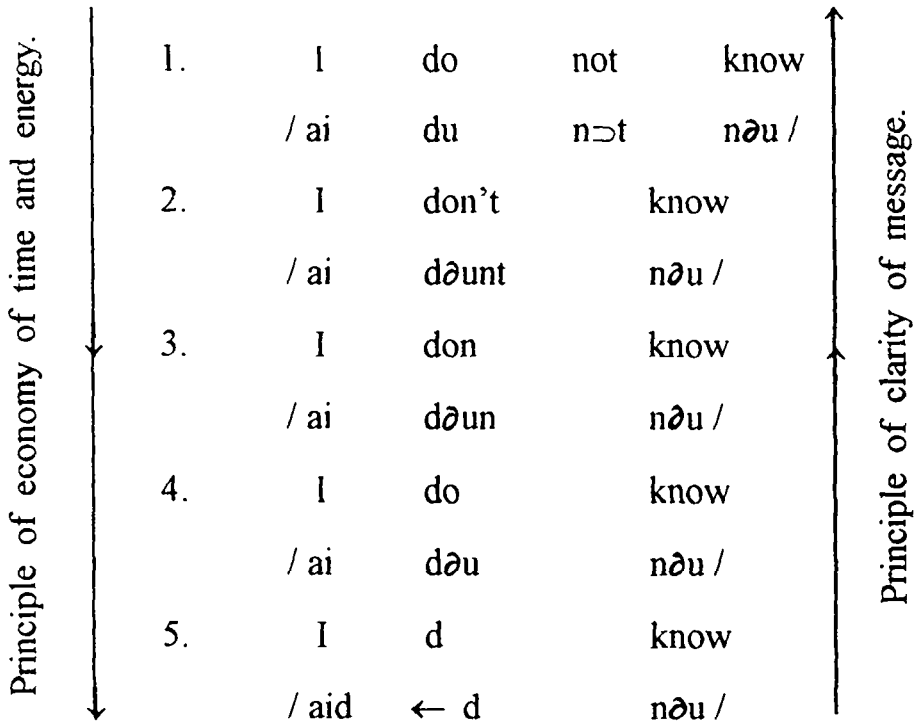
One of the great problems that Indians face while learning other Indian languages is that they do not realise the fact that there

are many features common to them far below the surface which look quite different. It is pertinent to note that though Assamese and Bengali are descended from the same source as that of English, that is, Indo-European, Malayalam is not. Yet in matters of cluster formations we have seen that the Indian languages have more or less the same pattern whereas English has a different pattern with regard to the number of consonants permitted at syllable final position. The language teacher can make use of these facts while teaching Indian students who learn second languages.

It will also be good to keep in mind that wherever any change takes place it is not taking place overnight nor is it an arbitrary change. Any change in language is slow and is based on definite laws of sound change. The language teacher while explaining some of the changes, as mentioned above, can make his students aware of these so that they too can be aware of the intricacies of sound change.

It is good that the language teacher realises the fact that the law of least effort as given by Saussure is one of the chief causes of sound changes. It is a good guideline for any language teacher. I add something more to it. Sound change takes place based on the principle of economy of time and energy. But such change can't go on indefinitely because the principle of clarity of message is working in the opposite direction. The economy principle can't be at the cost of

clarity of message. This can be shown as below.



The words 'do not' have undergone change in these sentences. For the principle of economy sentence 5 is the best. But for clarity of message sentence 1 is the best. The message in sentence 1 can be understood upto sentence 3 but not beyond that. Therefore in fast speech we often hear sentence 3.

This is what is taking place in the case of phonemes as well. By substituting / x / for / š / in / a:ka:š / we get / akax /. The principle of economy of energy has taken place here. / x / can be produced with less energy than / š / and at the same time the message is not lost because there is no other word in Assamese with the pronunciation of / akaš /.

It is quite natural that we like the easy path and this path is followed in our language behaviour too. What is important is the awareness that the language teacher must have about this so that he can make the language teaching process much more easy. The students too will learn faster than before because of these new insights into the working of language.

8. CONCLUSIONS

Having completed this research, I have been able to draw the following conclusions :-

1. Two major sound changes are found in Assamese language with regard to fricatives. (a) Affricates are spirantalized and become fricatives. (b) Sibilant fricatives of Sanskrit are changed to / x / in certain phonetic environments.

2. / s / derived from / tʃ / does not further change into / x /.

3. These changes are not isolated features of Assamese language but are found in a number of languages across the world.

4. Sound change is governed by some definite laws.

5. The three Sanskrit sibilants which exist separately in Assamese and Bengali alphabet are reduced to a single phoneme in these two languages, having two allophonic variants. In Malayalam these are separate phonemes.

6. In Cachar Bengali the affricate / tʃ / and the plosives / p and / k / are turned to fricatives.

7. There is a tendency of dropping / h / in all the four languages under consideration.

8. / s / is replaced by some other consonant in some contexts in the three Indian languages.

9. Either by dropping one of the consonants of a cluster or by vowel insertion many clusters are reduced to single consonants in these three Indian languages. Vowel insertion is found in words beginning with / s / when spoken by some Assamese and Bengali speakers. When the cluster consists of two consonants of +cons. and –cons. features it is the consonant having –cons. feature that is dropped. Similarly when a +conti. feature consonant and a –conti. feature consonant are the members of a cluster , the member that is usually dropped is the +cont. feature consonant.

10. The most commonly occuring member of a cluster is / s / in all these languages. / s / is an allophone of / ʃ / in Bengali.

11. The most preferred place of / s / in cluster is the initial position in an initial cluster and final position in a final cluster.

12. Clusters are formed more with voiceless phonemes than with voiced phonemes.

13. Initial clusters with a maximum of three consonants are found in all these languages. Final clusters permit four consonants in English but a maximum of two (and that too very rare) is permitted in some Indian languages.

14. Initial clusters with three consonants always begin with / s / in all these four languages.

15. In clusters of two consonants involving fricatives , fricatives occupy the first position.

16. In the three Indian languages / s / is dropped in some words.

17. / s / and / h / are the fricatives that are found in all these four languages. Most other English fricatives are replaced by plosives in Indian languages. / s / occurs as an allophone of / ʃ / in Bengali.

18. The errors that Indian learners of English make are identified and the remedies are suggested. If the language teacher makes use of these remedies language communication can be more effective.

19. Laboratory work (spectrographic analysis) of fricatives of these three Indian languages has enabled me to describe

the fricatives more accurately. In some cases this has shown results different from those of conventional analysis.

20. This study has opened various avenues for future research particularly in Assamese and Bengali. A phonetic and phonological study of these languages with the help of scientific instruments can be taken up by future researchers. The traditional descriptions of speech sounds which are very often vague can be substituted by more precise , accurate and verifiable descriptions , taking language study to a higher level of scientific accuracy. It is therefore essential that research is carried out on the speech sounds of these two languages with scientific instruments.

21. Finally , the present researcher makes a humble suggestion that any language learner while being taught the basics of the written language , effort may be made to see that the basics of spoken language are taught. This will be of great help to the learners of any language as they can communicate more effectively. The latter is taught after many years of school going and after learning the speech sounds wrongly. It takes more time to unlearn the wrong things than learn the correct things. So teaching the students the basics of spoken language along with the basics of the written language is of great importance. The government and syllabus planners may take note of this and implement this suggestion for the greater good of the learners of languages.

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