PHONATION TYPES IN GUJARATI

ON THE BASIS OF THE OBSERVER'S OWN PRONUNCIATION

Thesis

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ABSTRACT OF THESIS

This is a study of Phonation-type differences in Gujarati, using the approach of Prosodic analysis. The observer's own pronunciation is used as the basis for this analysis. A phonological analysis of Gujarati in these terms has not been attempted before.

The presentation of this thesis is made in three main parts. The introduction refers to the general background of the language, its origin, its literary beginnings and previous studies of the language. The writing system of the language presents an outline of orthographic patterns which it may be useful to compare with the phonetic forms. Notes on the phonetic notation have been given to provide values for the broad reading transcription of the examples.

Section 1:- This deals with the phonetic basis of the analysis in broad terms. Chapters one and two are concerned with the description of vowel and consonant sounds. Chapter two also refers to symbols which are used in the thesis when a narrow transcription of examples is required. Sounds are described in three places in the word, initial, medial and final; and examples have been given.

Chapter three outlines different syllable patterns of the language and gives tables to show different possibilities of consonant groups.

Chapter four deals with previous work done in the field of general phonetics with regard to different types of phonation in Gujarati which is frequently instanced as a language showing special characteristics of 'breathy' or 'murmur' articulation or, to use Catford's recent (1977) terminology, 'whispery voice' and 'ligamental voice' articulations. This chapter serves as a link between the phonetic and phonological

aspects of the problem.

Section 2:- This deals principally with the phonological statement of phonation differences in Gujarati word structures, and to apply the principles of prosodic analysis to the statement of the systems.

Chapter five gives the phonological statements on phonation types which are broadly grouped as (a) 'clear' phonation type and (b) 'breathy' phonation type. It also serves as a basis for the sort of analysis which will be given in the following two chapters.

Chapter six, on word prosodies, deals with the main characteristic features of the phonological word, which has been studied as a maximum unit in the thesis.

In Chapter seven the phonetic exponents of the two prosodies are related to the syllable as a whole and syllable-initial and syllable-final. In conclusion the usefulness of this approach has been indicated.

Chapter eight contains a limited amount of instrumental support for the prosodic analysis.

Appendices follow which contain the text of words used as examples, spectograms, aerometer readings, and a taped sample* of the observer's pronunciation.*

*The tape is deposited in the Department of Phonetics and Linguistics at the School of Oriental and African Studies.

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CONTENTS

Based upon Survey of India map with permission of the Surveyor-General of India. The territorial waters of India extend into the Sea to a distance of twelve nautical miles measured from the appropriate base line.

INTRODUCTION

The earliest literary work in Gujarati goes back to about the twelfth century, when Gujarati was known as 'Gurjar-apabhransh'. The first literary milestone, 'Bhartesar-bāhubalirās' shows some features of Gujarati as an independent language, but it was not until the fifteenth century that Gujarati had its own literary tradition. Since then it has been in use as a language in its own right in the province of Gujarat (see the map, p. 6).

Gujarati is one of the fourteen languages listed in the Indian constitution and it is a medium of instruction in the schools and universities in the state of Gujarat which is located on the West coast of India. According to the last Census in 1971[1] Gujarati is spoken by approximately 25.6 million people.

As Gujaratis are generally businessmen, they are generally found all over India, and have emigrated to many countries of the world. After the Punjabis, the Gujaratis are the second largest emigrating community from India. In Britain also, it is possible to find Gujarati speakers in large numbers in Bradford, Leeds, Preston, Wolverhampton, Birmingham, Leicester and in the North and East London areas.

Gujarati is an Indo-Aryan (Indic family of the Indo-Iranian sub-family) language. This language area is surrounded by Sindhi in the North-West, Kacchi in the North, Hindi and Rajasthāni in the East and Marāthi in the South.

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1 Census of India (1971) Appendix II, p. 333.

The name of the language, Gujarati, has been given from the small tribe called 'Gurjars', who came through the area of the Punjab and travelled down towards the South-Western coast and settled there. This area came to be known as Gujarat.

Dialects of Gujarati vary widely on the basis of geographical location, castes, classes and religions. The Census of India (1971) lists three distinct dialects of Gujarat :

(1) The northern dialect spoken between the Banās and Sābarmati rivers;

(2) the central dialect spoken between the Sābarmati and the Narmadā rivers;

(3) the southern dialect spoken beyond the Narmadā river and South of the Tāpi river (pp. 269-70).

Still, it does not cover many dialects. There are two or three sketches on dialects of Gujarati which are of significance. P.B. Pandit has described the 'Bhilli' spoken on the Northern boundary of Gujarat (1952) as well as a brief sketch on the Carotari boli (1954) of Central Gujarat. D.R. Mankad's paper on 'Some Peculiarities of Sorathi dialect'[1] is an earlier contribution. T.N. Dave's phonetic variations in the dialects on the border of Gujarat and Rajasthan and his phonetic notes on Girassia dialect on the Northern border (near Runn of Kucch), on loss of aspiration, deserve notice.[2] Dialect surveys are yet to be made, therefore, it is rather difficult to point any

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1 Proceedings of the 6th All India Oriental Conference.

2 'Linguistic survey of Border lands of Gujarat', Journal of Gujarat Research Society, T.N. Dave.

particular region of Gujarat, which has the 'murmur'[1] or 'whispery voice' feature. But, approximately, it is Central Gujarat, i.e. north from Ahmedabad to Surat. I come from Baroda which is centrally situated in this area.

In spite of dialect variations and bi-lingualism on the borders, the standard Gujarati of which I myself am a speaker, is easily understood everywhere.

In this study, phonetic statements are based on my own pronunciation. Since no dialect survey has yet been completed for Gujarati, a brief description of myself as a native speaker may be appropriate. I was born and brought up in an educated middle class family in Baroda which is a large city of Gujarat state. It is an educational and cultural centre. I taught as a senior lecturer in Gujarati (language and literature) for three years in an Arts and Science college in Dabhoi (near Baroda) which is affiliated to Gujarat University, before coming to the United Kingdom. I spent most of my time in a highly literate society and speak a style of Gujarati which can be accepted as standard. I have subjected my own speech to phonetic and phonological analysis.

Previous studies in the language

A critical, excellent, brief sketch on linguistic background on different periods as well as different aspects of linguistic studies

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1 "The term 'murmur' was perhaps first used by Bell (1867, p. 46) for a sound which he describes as 'whisper and voice heard simultaneously' ... For general phonetic purposes it is best designated by the unambiguous analytic term 'whispery voice'" (Catford, 1977, p. 101). Ladefoged (1971) uses this term, following Pandit (1957), for Gujarati 'murmured' vowels and consonants.

in Gujarati, such as early grammars, dictionaries, historical-comparative studies, philological studies, etymological studies, dialectology, etc., has been given by P.B. Pandit (1969). Major linguistic work has been in the field of comparative philology. Excellent work on Gujarati was produced during the thirties, following the developments in linguistics in Europe in the last quarter of the nineteenth century. The publication of 'The linguistic survey of India', (Vol. ix, Part II, 1903) by Sir G.G. Grierson, gives an account of Gujarati. He describes 'weak h' in Gujarati (1927). Another scholar, Dr. R.L. Turner (1921-1925) has done considerable work on 'Gujarati Phonology' in the Journal of the Royal Asiatic Society (1921). Dr. Turner's paper "E and O vowels in Gujarati" (1925) established the old Indo-Aryan and Gujarati correspondences. P.B. Pandit has explained changes in the vowel system of the syllabic structure of the word, historically (1961).

Dr. Turner laid the foundation of the historical-comparative work in Gujarati. K.H. Dhruva presented the work on "On the mugdhāvabodhamaukatika" an old Gujarati text to the Oriental Congress, London, in 1893. K.H. Dhruva described h as vocalic feature and called it 'prānadhvani' (a breathy sound). Dr. Tessitori's work, especially his well-known paper "Notes on the Grammar of old western Rājasthāni with special reference to Apbhrnsh and Gujarati and Mārwāri" (Indian Antiquary, April, 1914-16) is the first exhaustive treatment of old Gujarati grammar in historical context.

Dr. T.N. Dave's 'A Study of the Gujarati language in the 16th Century V.S. with special reference to the ms. bālāvbodh to Updeshmālā' (1935) is based on an old Gujarati commentary on Prākrit verses, composed in the late 15th century. He has also contributed

many papers on various aspects of Gujarati phonology. (See bibliography).

In 1915 to 1916, a Gujarati scholar, N.B. Divetia, prepared the ground for the linguistic analysis by giving a lecture series, viz. Wilson Philological Lectures. Later, these lectures were published in two volumes as 'Gujarati Language and Literature' (1921-1923). This is a major work in which the author deals with most of the features of the Gujarati language. He was against the Shastri tradition in Gujarati which was established mainly on Sanskrit tradition. He considers 'murmur' ('whispery voice') as "laghu prayatna h-kār" or "laghuswarup h-kār", a different variety of the consonant 'h' or "laghuuccaran h-kār" (the weak h). Divetia calls the consonant h "guruprayatna h-kār" (or 'strong h'). He uses the terms aurasya h (produced from the chest) or the weak h, and kanthya (glottal) or the strong h for the two kinds of h. In Gujarati literature generally, it is referred to as the ha-sruti or sort of h sound.

Dr. H.C. Bhayani, attempted to give systematic, sound, and reliable Gujarati etymologies from his knowledge of Apbhrnsh and Sanskrit. His first collection of different papers 'Vāgvyāpār' (1954) gives sections on (1) Principles, (2) history, (3) phonological history, (4) terminations, (5) lexical study, (6) etymologies and (7) reviews of relevant books. In his revised edition called 'Anushilano' (Studies) (1965), he has added some new etymologies and omitted a number of articles from the old edition dealing with phonetics and general linguistics showing his awareness of contemporary thinking in linguistics.

Since the fifties, work on Gujarati has been done by applying

new linguistic theories, especially the phonemic analysis. Dr. P.B. Pandit's work on Gujarati phonology applying phonemic theory has been considerable and he also published a number of papers of historical-comparative interest in Indian Linguistics. In 'Indo-Aryan Sibilants in Gujarati' (1954) he has tried to establish that s - $\overset{v}{s}$ contrast belongs to the proto-Gujarati period; the contrast was maintained before the front vowels and y. The loss of length distinction in the high front and back vowels i and u and the introduction of height distinction e and ɛ and o and ɔ, ʊ discussed in Pandit's "E and O in Gujarati" (1955). The paper gives a detailed historical account of e, ɛ, and o, ɔ in Gujarati. He continued this work in the larger framework in 'Historical Phonology of Gujarati Vowels' (1961) where intervening phonemic systems of Gujarati vowels from the Middle-Indo-Aryan to Modern Gujarati are described and it was suggested that the change from one system to another was connected with the changes in the morphological systems. Instead of the earlier practice of establishing individual etymologies, this is a very good effort to interpret linguistic history in terms of changing systems.

Some problems of Gujarati phonetics are discussed in 'Nasalisation, Aspiration and Murmur in Gujarati' (1957) and 'Syllable, Duration, and Juncture in Gujarati' (1958). In 'The phonetics and phonology of Gujarati' (1966)[1] all the aspects of Gujarati phonology have been discussed in terms of descriptive linguistics; and at the same time, provided a sound base for the understanding of a fast-developing subject like linguistics for the Gujarati readers. Pandit's 'Phonemic and morphemic frequencies of Gujarati language' is on the

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1 Gujarāti bhāshānu dhwaniswarupa ane dhwanitantra (in Gujarati) (1966)

earlier statements of phonemics of an Indo-Aryan language, and some of the statements may be of typological interest. His statements regarding 'murmured' (or 'whispery voiced') vowels will be considered later in this discussion at a more appropriate point.

There has been, during the last fifteen to twenty years, some experimental research work on Gujarati phonology, especially on characteristic features of murmured vowels. One important research entitled 'The structural analysis of the phonology and morphology of Gujarati' has been done by Mridula Adenwala, a Gujarati student, for a doctoral dissertation at an American University (1965). 'A Gujarati Reference Grammar' by George Cardona (1964) has been written using new linguistic terminology. It provides the detailed grammatical categories of Gujarati. He has given detailed rules of accentuation and shown that the tonic syllable is predictable in terms of the syllabic structure and juncture. He has raised some interesting problems of ambiguities and variations in constructions involving pronominal (object) and verb phrases of the type 'joie' 'is necessary' and with the auxiliary 'che' 'is'. Apart from this, there are several books of Grammar of Gujarati. They are written either in Gujarati or in English by Gujarati as well as Western scholars. But Cardona's grammar is very useful for foreign students and teachers.

The sounds of Gujarati have been described by Pramila Harry (1962) in a dissertation on the difficulties of the Gujarati learners in coping with English pronunciation. This appears to be an interesting exercise in using the techniques of structural linguistics for the purpose of dealing with practical problems of language teaching.

Some characteristic features of Gujarati phonology have been

analyzed instrumentally by various phoneticians/scholars. Detailed spectographic technique has been developed for a problem very similar to this study. 'A formant analysis of the clear, nasalized, and murmured vowels in Gujarati' (1967) has been made by Mr. R.V. Dave, a Gujarati scholar, under the guidance of Professor Eli-Fischer Jørgensen in the University of Copenhagen. Professor Jørgensen has herself discussed a vast amount of experimental evidence in her lengthy paper entitled 'Phonetic analysis of breathy (murmured) vowels in Gujarati' (1967) using different instruments like aerometer, spectographs, etc.

Dave and Jørgensen reach the same conclusion that consistent differences between the formant frequencies of the clear and murmured vowels are found. They state that spectograms only show 'strong air flow' for the murmured vowels . "This is a very stable feature. It seems to be due to the presence of a small opening in the rear part of the glottis. Since murmured vowels have, in spite of this opening, the same physical intensity as clear vowels, a stronger activity of the expiratory muscles may be assumed."[1]

Very recently, Dave has done a detailed phonetic analysis of dentals and retroflex consonants of Gujarati for his doctoral research, 'Studies in Gujarati phonology and phonetics' (1977). He has used distinctive feature analysis of Roman Jacobson.

The present study is in no sense in competition with Dave's and Fischer-Jørgensen's detailed instrumental analysis; but, since there may well be dialectal differences between the Gujarati they studied and my own, and since I felt that whispered speech had been unduly neglected, I decided to collect a certain amount of experimental data on my own account.

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1 p. 138, Jørgensen, 1967.

Purpose of this work:

Reviewing the previous work on Gujarati it soon becomes apparent that no study has yet been attempted applying the prosodic analysis as suggested by Professor Firth. (See Sounds and Prosodies, 1948)

Previous phonemic analysis applied to the problem of "Aitchiness" in Gujarati by Pandit and others has taken the view that aspiration and murmur can be handled as segmental elements which form part of the sequence which constitutes the Gujarati word or syllable in which they are found. H is therefore set up as a phoneme with three allophones (i) occurring after plosive consonants, voiced and voiceless, (ii) as murmured with the vowels, and (iii) also as a glottal fricative occurring as initial, medial and final, element in words.

In this study, the prosodic point of view has been explored in which the phonetic characteristics of 'aspiration' and 'murmur' are related to the largest structure for which they can be shown to have relevance, and in all cases are shown as properties related minimally in the structure of the word in Gujarati. Different patterns of contrast are found at different places in structure and the resulting multidimensional analysis seems more useful in that only those contrasts which have a phonological role are selected for special attention at any one time.

One should not directly compare phonematic units of a prosodic analysis with phonemes of a phonemic analysis. To quote Bendor-Samuel "This is the marked contrast with a phonemic phonological analysis in which one overall system is set up. For example, an analysis in such two phones not in complementary distribution at one point in the structure are assigned to two different phonemes, and this distribution is maintained even at those points in the structure where no contrast exists and the two

phones are in complementary distribution. The treatment adopted in this thesis, however, would set up different systems for the two points of the structure. It is polysystemic whereas the phonemic treatment is monosystemic."[1]

Since the detailed analysis of different phonematic systems in Gujarati appears to play no special role with regard to the prosodic analysis of phonation types, they have been left out of this account along with other patterns such as retroflexion, nasalisations, palatalisations, etc, which merit consideration in prosodic terms on their own account. Reference to such features is only made where they co-occur with breathy articulation in a word.

Prosodic features are phonological elements with phonetic exponents extending over more than one place in the structure. It is hoped that the treatment of the phonetic features of aspiration and murmur as the expression of a prosodic component of different types of structure (i.e. of the syllable as a whole, of parts of the syllable, or of the word in which the syllable occurs) shows more clearly the phonological role they play than to treat them as allophones of a given segmental phoneme or as different segmental phonemes in one overall system.

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1 Word, 17, pp. 16-17, 1961.

Gujarati Writing System

The Gujarati syllabary and some notes on Gujarati orthography have been given here to help those who know the scripts to appreciate the special phonetic value of some of the characters of Gujarati. Traditional characters from the Devanāgari scripts have been adopted in the Gujarati syllabary with some modification. The syllabary has four main groups. I Vowel (svara), II Consonant (vyanjana), III Semivowels (antahstha), and IV Fricatives (ūsman).

Gujarati Syllabary: The syllabary is shown in the transliteration[1] used in H.M. Lambert, 1953, Gujarati Section, pp. 135-170.

I Vowel Characters and Vowel Signs:

	અ	આ	ઇ	ઈ	ઉ	ઊ
	ə	a	i	ii	u	uu
ઋ	એ	ઐ	ઓ	ઔ	અં	અઃ
r̥	e-ɛ	əy̆	o-ɔ	əv̆	əṃ	əḥ

Conjunct forms of vowel signs occur before, after, above and below the consonant characters with which they are conjoined, the vowel ə being symbolized by the consonant character itself, which is therefore, syllabic, e.g. ક (kə). The signs are illustrated with the consonant character ક-, (k-).

કા	કિ	કી	કુ	કૂ	કે	કો	કૈ	કૌ
ka	ki	kii	ku	kuu	ke	ko	kəi	kəu
◌ા	◌િ	◌ી	◌ુ	◌ૂ	◌ે	◌ો	◌ૈ	◌ૌ

The vowel character ઋ, syllabic r̥, and its vowel sign ◌ૃ, as in કૃ /kr̥/ occur only in a few Sanskrit words.

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1 My own transliteration; it is not given in Lambert, 1953; see pp. 154-5.

All the vowel characters in Gujarati represent syllables, consisting of a vowel only; and vowel signs are added to consonant characters to represent syllables consisting of an initial consonant followed by one of the vowels in the series.

II Consonant characters and conjunct consonants:

All consonant characters are divided according to their particular group (or Varga); they may include the vowel - ə. These characters are classified according to the five positions of articulation.

1	Kanṭhya	ક	ખ	ગ	ઘ	ઙ
	velar	kə	khə	gə	ghə	ṅə
2	tālavya	ચ	છ	જ	ઝ	ઞ
	Palatal	cə	chə	jə	jhə	ñə
3	murdhnya	ટ	ઠ	ડ	ઢ	ણ
	Retroflex	ṭə	ṭhə	ḍə	ḍhə	ṇə
4	dantya	ત	થ	દ	ધ	ન
	dental	tə	thə	də	dhə	nə
5	oshthya	પ	ફ	બ	ભ	મ
	Labial	pə	phə	bə	bhə	mə

The characters ઙ / ṅə / and ઞ /ñə/ are not generally used in the modern writing system. Instead the modifier 'ənusvar' (the term used by Lambert, p. 152) is used over the appropriate characters.

III Semivowels:

ય	ર	લ	વ
yə	rə	lə	və

The characters ય and વ occur initially or medially pronounced with a following vowel. They also occur medially in positions in which the consonant characters are pronounced as consonant. In final position they are pronounced in such a way as to form diphthongs with the main

vowel of the syllable.

Examples:

યજમાન	સાયકલ	ભય
yəjəmanə	səyəkələ	bhəyə
વન	સેવડો	જવ
vənə	cevəḍo	jəvə

Fricative characters:

શ	ષ	સ	હ	ળ
ʃə	ʂə	sə	hə	ɭə

ષ ʂə occurs only in a few Sanskrit words. Gujarati words generally have ʃə . ળ - ɭə is pronounced as a retroflex lateral consonant with ə .

Consonant conjuncts: The two conjunct characters ક્ષ kʂə and જ્ઞ gjnə each represent syllables consisting of two consonants followed by the vowel ə , and they are placed at the end of the syllabary.

Some notes on Gujarati Orthography:

The characters of the Gujarati Orthography resemble the Devanāgari characters and the arrangement of the syllabary parallels the Devanāgari. But sometimes one character represents two phonetic values, e.g. એ and ઓ .

The character એ , e has different phonetic values associated with it, viz. /e/ in some words and /ɛ/ in others. Similarly the character ઓ , o has the values /o/ and /ɔ/ in appropriate words. Nowadays in modern Gujarati writing the special characters એ - ઑ with the slightly different vowel signs, ે and ૅ are used for /ɛ/ and /ɔ/ respectively.

Examples: તે /te/ 'he, she, or it'

તો /to/ 'if'

લે /lɛ/ 'take' (Imp.)

લો /lɔ/ 'take' (respective form).

The characters ક્ષ, ક્ષ્ય and ઝ , ઝ્ય are realised medially as flapped sounds [kʂə] and [kʂʰə] in certain words.

Each consonant character may represent a syllable. When naming a character, a consonant articulation indicates the consonant and is followed by a short vowel which has a central quality. This is often called the 'inherent' vowel. This inherent vowel is usually equated with the first vowel of the vowel characters and symbolised in the same way. This can give rise to problems of interpreting the pronunciation of forms in transliteration since in some positions the consonant character of the script is not given a vocalic value. In this thesis the vowel character, which must be pronounced, is also symbolised by [ə], in the same way as the inherent vowel.

When the case arises that no vocalic release is possible there are alternative ways of indicating this in the Orthography. Where the consonant character is final in the word the sign ્ is written below the character. This sign is called the Gujarati "khodo" (Sanskrit term Virāma). Thus ક્ is pronounced as 'k' and not as kə.

For regular consonant groups special conjunct character signs are used. So the written form ક્ર indicates the pronunciation /kram/, whereas the written form ક્ત્ત is to be read as /karta/. The superscripts 'ર' and 'ત્ત' above the character and with the character indicate consonant groups in which /r/ precedes the consonant and /r/ follows the consonant respectively.

The following four words show the differences:

Gujarati form	Transliteration	Transcription	
કર્મ	karma	/karm/	'work'
ક્રમ	krama	/kram/	'usual'
કર્તા	karta	/karta/	'doer'
કરતા	karata	/karta/	'work' (past tense)

Consonant characters may be combined to represent two or more consonants which are to be realised without any intermediate vowel. These are called jodakSharo જોડાક્ષર in Gujarati. These will be shown in the transcription by successive consonant letters.

Gujarati form	Transcription	Meaning
શક્તિ	/Shakti/	'strength'
પ્રચ્છન્ન	/prachchann/	'covered'
અડ્ડો	/addo/	'usual meeting place'

Modifiers: - signs like anusvar ◌ं (for nasalisation), ◌् virāma (khodo) for closed syllable, and ◌ः visarga (for syllable final aspiration), are marks added to characters to represent the modifications of the syllable concerned.

ः (visarga) is used with Sanskrit words such as -

દુઃખ	duhkh	'sorrow'
નિઃશ્વાસ	nihShvas	'sigh'

In words with short vowels where there is nasalisation there are alternative written forms, one with the anusvar sign, written above the appropriate full vowel or consonant character, the other with a conjunct nasal/plosive character. The nasal character is always of the same varga as the plosive character. These alternative ways of indicating

nasalisation are shown below:

with anusvar		with conjunct nasal/plosive character	
અંદર	or અન્દર.	/əndər/	'in'
ચંપલ	or ચમ્પલ	/cəmpəl/	'slippers'
કુંડળ	or કુણ્ડળ	/kundəl/	'round earrings'

Here, only some essential characteristics of the Gujarati writing system have been pointed out, in particular those which have some bearing on the phonetic section which follows. These notes on the Gujarati writing system would also be helpful to those who know the Gujarati script and can study the different phonetic patterns to be associated with different characters in various positions in the word and phrase.

Transcription

In this thesis a broad phonetic transcription using I.P.A.[1] symbols has been given, wherever it is necessary to indicate broadly the pronunciation form of a word. This transcription will be shown between slant lines, thus /adaʃ/ 'obstruction'.

Where a transcription related to a more detailed phonetic description is given, it will be shown, in square brackets [əˀaʃ] 'obstruction'.

For the purpose of typographic convenience some modifications in the use of I.P.A. symbol values have been made, following the usual practice in 'systematic transcription' of Indian languages. The typographically simple symbols /c/ and /j/ are used for voiceless and voiced alveolo-palatal affricate articulations, [tɕ] and [dʑ] respectively, instead of with their usual I.P.A. values, i.e. voiceless palatal plosives and voiced palatal semivowel or frictionless continuant. Consequent on this change the symbol /y/ is used for the palatal semivowel, instead of with its I.P.A. value of a close rounded front vowel. Retroflex sounds are indicated as follows: ʈ, ɖ, ʈʰ, ɖʰ, ɳ, ɕ, ɻ and ɽ.

As far as vowels are concerned, the nearest cardinal vowel symbols are used.

For showing whispery voiced vowels, subscript diaeresis is now adopted. Gujarati scholars had previously suggested various transcriptions for Gujarati. However, most of them interpreted this feature as a variety of consonant 'h' and not as a vowel, and so for

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1 'The principles of the International Phonetic Association', 1949, new edition 1966, p. 10.

Gujarati transcriptions 'h' has been suggested at the appropriate place. The book written in Gujarati by K.K. Shastri[1], uses the term 'mahāprāṇit - svarās', 'aspirated vowels' instead of 'murmured vowels' and he suggests that the sign : should be used following the vowel sign in the orthography. This would not be appropriate where I.P.A. transcription is used since this sign : is similar to the sign for vowel length in I.P.A.

For the first time for Gujarati, Dr. Pandit suggested the term 'murmured vowels' for the breathy or more unambiguously 'whispery voiced vowels'. Pandit provided the sign _ under vowels for showing 'murmured' vowels. But, in this study, 'whispery voiced' vowels are shown by using a subscript umlaut, following Ladefoged (1971)[2], with subsequent approval by the I.P.A.[3] Thus whispery voiced vowels and consonants will be indicated by the use of ə̤, a̤, ṳ, i̤, ɛ̤ and ɔ̤ and, b̤, d̤, ɖ̤, g̤ and j̤.

Examples showing the different symbols used in the transcription will be set out in the next chapter. The phonetic values to be associated with the symbols will be given and the various environments in which they can occur are briefly discussed.

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1 Shāstri, K.K., 'Gujarāti bhāshāno vikās ane arvāchin Gujarāti bhāshānu svarup, 1965, p. 127.

2 Ladefoged, P., 'Working papers in phonetics', U.C.L.A. - 6, 1969, p. 9, and Preliminaries to Linguistic Phonetics, 1971, p. 12.

3 Journal of the International Phonetic Association, 6, (June 1976), p. 2.

Section 1 - Phonetics

The brief descriptions of vowels and consonants given in this section is intended to provide some notion of phonetic values to be attributed to the broad transcription forms used in the thesis, and to serve as a general phonetic basis for the phonological statements.

The consonant symbols in Chapter II cover the general consonant system of the language and all symbols used for examples shown between / /. (covered in Table I). Many of these symbols are also used in narrow transcriptions shown in [ ]. Thus 'systematic transcription'[1] /kholi/ and the narrow transcription [kholi] use identical symbols. Table II shows all the special symbols only required for narrow transcriptions, shown in [ ]; they will not be found in examples between / /. Thus the systematic transcription /ghoḍo/, but the corresponding narrow transcription [ghoṛo].

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1. Term used by D. Abercrombie, 1953, p. 32.

C H A P T E R I

Phonetic description of vowels

Eight vowel symbols are needed to differentiate the sounds in the monosyllabic words illustrated below:

Vowel symbols		Examples	Meaning
i	/i/	/mil/	'mill' (l.w.)*
ii	/e/	/mel/	'put' (Imp.)*
iii	/ɛ/	/mɛl/	'dirt'
iv	/u/	/mul/	'price'
v	/o/	/mol/	'crop'
vi	/ɔ/	/mɔl/	'nausea'
vii	/ə/	/məl/	'meet'
viii	/a/	/mal/	'storey'

General statements regarding vowel sounds in the language:

All these vowels are voiced syllabic sounds, though voiceless when whispered. In the examples above, the vowels are all 'clear' vowels, made with 'normal' voice (Catford, 1964, p. 32).

It is necessary to recognise six vowels, viz. [i̥], [u̥], [ɛ̥], [ɔ̥], [ə̥] and [ḁ] as whispery voiced, i.e. with a considerable escape of air through the posterior, or arytenoidal glottis. In my speech no distinction is made between half-close and half-open vowel sounds. Only the more open vowels [ɛ̥] and [ɔ̥] are used. The whispery-voice vowels (or more commonly known as murmured vowels, after Pandit, 1957) are symbolised as shown below. (cf. p. 27). The words show contrasts

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* Abbreviations: 1 Loan words.
2 Imperative.

between 'normal voiced' and 'whispery voiced' vowels in monosyllabic words.

Before giving contrastive examples from 'normal voiced vowels' and 'whispery voiced vowels', it should be stated that historically, 'whispery voiced vowels' pronounced in intervocalic positions as h, e.g. /bəhen/ 'sister', /bəhar/ 'outside' etc. In modern Gujarati such pronunciations are not found as a regular feature of any dialect, although they are often heard. Generally, instead of 'h' the word, is pronounced either with 'normal voice' or with whispery voiced vowel: /bɛ̤n/ or /bɛn/. But words with the 'normal voiced vowels' cannot be pronounced as with whispery voiced vowels, e.g. /bar/ 'twelve'.

Examples:

	Vowel symbols	Normal voiced vowels	Whispery voiced
i	/i/	/pid/ 'pain'	/pi̤d/ 'mature'
ii	/ɛ/	/mɛr/ 'die'	/mɛ̤r/ 'favour'
iii	/u/	/dur/ 'far'	/dṳd/ 'milk'
iv	/ɔ/	/pɔr/ 'placename'	/pɔ̤r/ 'last year'
v	/ə/	/əpi/ 'she touched'	/əpi̤/ 'two and a half'
vi	/a/	/bar/ 'twelve'	/ba̤r/ 'outside'

Six vowels, viz. /ĩ/, /ũ/, /ɛ̃/, /ɔ̃/, /ə̃/, and /ã/ are nasalised. For nasalised vowels also, no distinction is made between half-close and half-open vowel sounds. Only the more open vowels /ɛ̃/ and /ɔ̃/ are used. Th e contrast between clear and nasalised vowels is demonstrated by the following:-

	Vowel symbols	Clear vowels	Nasalised vowels
i	[ĩ]	[iɲa] 'a vein on the wrist'	[ĩda] 'eggs'
ii	[ɛ̃]	[vɛr] 'enmity'	[vɛ̃t] 'span'
iii	[ɔ̃]	[pɔʃ] 'hollow made with palms'	[pɔ̃k] 'roasted corns'
iv	[ũ]	[uɲu] 'fly'	[ũdu] 'deep'
v	[ə̃]	[sət] 'truth'	[sə̃t] 'saint'
vi	[ã]	[sat] 'seven'	[sãt] 'land rented for agriculture'

One may find the combination of nasality and whispery voice, in the same six vowels. But they are rare. A few examples are illustrated below:-

	Nasalised normal vowels	Nasalised whispery voice
1	[pɛ̃ɖo] 'kind of sweet'	[pɛ̤̃do] 'used to'
2	[pɔ̃ci] 'wristlets'	[pɔ̤̃ci] 'she reached'
3	[lũgi] 'kind of dress'	[ṳ̃gi] 'she slept'
4	[ĩc] 'an inch'	[ḭ̃c] 'swing' (Imp.)
5	[ãk] 'number tables'	[ã̤k] 'drive' (Imp.)
6	[ə̃t] 'end'	[mə̤̃t] 'saint'

Length of the vowels: In Gujarati Orthography certain vowel characters and vowel signs are traditionally considered long vowels and the distinction between long and short vowels and vowel signs will regularly be maintained in written Gujarati. In spoken Gujarati, however, the length of the vowel and the nature of the syllable are closely bound together. Thus no difference between the length of the close vowels as in

દિન	din	'day'
દીન	diin	'poor'

is apparent when they are spoken. Similarly with the close vowels

in:

મુઠ્ઠ mutʰ 'fist' and

મૂળ muuɽ 'root'.

The length of the vowel will vary according to the type of syllable, i.e. whether open or closed, and the relation of the syllable to other syllables in the word. Traditionally considered long vowels appear quite short in certain positions when the syllable in which they occur is open syllable.

e.g. e in vecaɳ 'sale'

khedut 'farmer'.

However, a difference in vowel length is maintained in pairs such as /sət/ /sat/, /məɽ/ /maɽ/, /mər/ /mar/, where the vowel quality is open.

If there are two similar vowels in a word the second tends to be longer than the first.

e.g. arpāɣ 'through'

korō 'dry'

ʃiʃī 'bottle'.

Further mention is made of vowel length in the chapter on syllable structure. However, it can be said here that whispery voiced and nasalised vowels are in general longer than the 'normal-voiced' vowels. But it has not been thought useful in this study to show in the transcription, differences in the length of vowels in various positions.

A detailed comparison between 'The clear, nasalised and murmured vowels in Gujarati', has already been made spectographically. Dave (1967) states that, "There are no constant and regular differences between the F-frequencies of clear and murmured vowels ... F1 for the close vowels is generally not affected by the process of murmurization or aspiration of the vowels ... Fs for the nasalized vowels is

raised a little, that for the murmured vowels is slightly lower ... Sometimes an extra stress is heard in the murmured vowels but it is not clear whether it is due to a conscious effort by the informants at the time of the recording or a regular feature of the murmured vowels." And about length he has to say that, he "has not observed any constant change in the length of the murmured vowels. [However, an increased length is often seen in his and his informant's sentences]. In bisyllabic words the consonant following the murmured vowels is relatively short" (pp. 29-30).

Pitch characteristics associated with the vowels:

Pandit mentions lowering of pitch as an important characteristic feature of the murmured vowels including it in his definition as, "Murmur is voiced breath, low-pitched and simultaneous with the vowel"[1] (p. 169). I and Dave also have the same subjective feeling, but Dave's measurements do not support this assumption. "Words which show a lower pitch average are those having the vowels /ʔ/ and /i/. Here too, the change in Fo is small. It must,however, be kept in mind that the measurements of Fo for different vowels took place approximately in the middle of the vowel, and not exactly at the same place" ... "Formants for the clear vowels are more clearly visible than those for the nasalized vowels. A comparison between the nasalized and murmured vowels gives the same result. This does not mean that the formants for the murmured vowels are quite normal and regular." (Dave 1967, pp. 28-29) No special pitch marks are used in this study.

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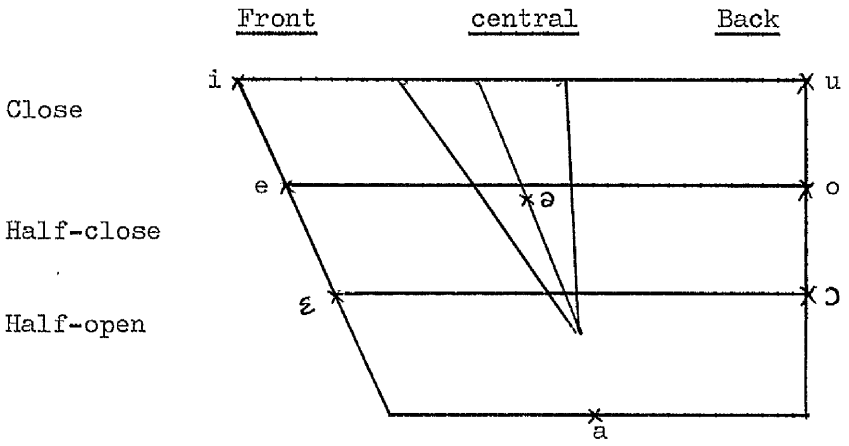
1 Definition of murmur given by Pandit. Indian Linguistics, 1957.

Phonetic description of the vowels:

Brief identifications of the quality of selected 'normal voiced vowels', illustrated by examples of their occurrence in initial, medial and final position, are given below:



Front Vowels

The lips are spread for the front vowels, /i/, /e/, and /ɛ/.

I /i/ is a front, close unrounded vowel approximating to the position for Cardinal vowel No. 1.

e.g. /is/ 'upperpart of bedstead'

/niʃal/ 'school'

/maʃi/ 'mother's sister'

II /e/ is a front, half-close, unrounded vowel, approximating to the position for Cardinal vowel No. 2.

e.g. /ek/ 'one'

/tel/ 'oil'

/kale/ 'to-morrow'

III /ɛ/ is a front, half-open, unrounded vowel, approximating to the position for Cardinal vowel No. 3.

e.g. /ɛdh/ 'a kind of tree'

/mɛl/ 'dirt'

/bɛ/ 'two'

Back Vowels

The lips are rounded for the back vowels, /u/, /o/ and /ɔ/.

IV /u/ is a back, close, rounded vowel, approximating to the position for Cardinal vowel No. 8.

e.g. ⌈uɬh⌋ 'stand up' (Imp.)

⌈əkhuɬ⌋ 'endless'

⌈ju⌋ 'lice'

V /o/ is a back, half-close, rounded vowel approximating to the position of Cardinal vowel No. 7.

e.g. ⌈orado⌋ 'room'

⌈khoɬ⌋ 'cover'

⌈aso⌋ 'last Hindu-month'.

VI /ɔ/ is a back, open, rounded vowel, approximating to the position for Cardinal vowel No. 6.

e.g. ⌈ɔɬo⌋ 'shadow'

⌈khɔɬo⌋ 'lap'

⌈khɔ⌋ 'persistent habit'.

Non-front, non-back vowels

The lips are spread for the two vowels /ə/ and /a/ which are neither fully front nor fully back in articulation.

Front and back vowels have three degrees of openness, viz. close, half-close and half-open, while /ə/ and /a/ show only two degrees of openness, half-open and open.

VII /ə/ is a central, half-open, unrounded vowel.

e.g. ⌈əkəɬ⌋ 'mysterious'

⌈səkəɬ⌋ 'whole'

⌈datəɳ⌋ 'toothbrush from tree'.

VIII /a/ is an unrounded vowel, halfway between the front and the back open position.

e.g. /ˌakarˌ/ 'shape'

/ˌməkanˌ/ 'house'

/ˌhəvaˌ/ 'air'

In the next chapter the phonetic description of consonant symbols used will be given.

Note: /e/ and /ɛ/ and /o/ and /ɔ/ are always differentiated in monosyllabic words and in the first syllable of dissyallabic words. In words of three syllables and over /e/ and /ɛ/, and /o/ and /ɔ/, are in free variation in the first syllable. My own preference is for /ɛ/ and /ɔ/ in this position. In the second syllable of dissyllabic words, and in the second and final syllables of polysyllables, /e/ and /o/ are preferable; and the vowels in those positions tend to be the close varieties.

CHAPTER II

The phonetic description of consonants

Gujarati has a large number of stop consonants. They are distinguished by the place of articulation, as velar, palatal, pre-palatal (or retroflex), dental and labial. Recently, Dr. Dave (1977) has done a detailed study of stop consonants, particularly phonetic analysis of dental and retroflex consonants, using distinctive feature analysis by Roman Jakobson. According to Dave " ... the retroflex stops are prepalatal, but post-alveolar in combination with i". (p. 2)[1] He has done the accoustic analysis of the retroflex and dental consonants, on the basis of spectograms. The burst analysis is done by a computerized linear prediction analysis method.

Two consonant tables have been given below and short descriptions of all the consonant signs symbolized used in the tables have been provided.

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1 'Studies in Gujarati Phonology and Phonetics', Dr. R.V. Dave, Doctorate Thesis, 1977.

Consonant Table I

Symbols used for systematic transcription:

	Velar		Palatal		Pre Palatal*		Alveolar		Dental		Labial		Glottal	
	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd
Plosive unasp.	k	g	c	j	ʈ	ɖ			t	d	p	b		
Plosive aspi.	kh	gh	ch	jh	ʈh	ɖh			th	dh	ph	bh		
Nasal						ɳ				n		m		
Lateral					ɭ			l						
Fricative			ʃ							s			h	ɦ
Semivowel				y						v				
Flapped														
Tapped								r						

Consonant Table II

Symbols used for narrow transcription only:

◌̥	Velar		Palatal		Pre Palatal*		Alveolar		Dental		Labial		Glottal	
	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd	vcl	vcd
Plosive unasp.	k̥		c̥		ʈ̥				t̥	d̥	p̥	b̥		
Plosive aspi/ whispery voiced		gɦ		jɦ		ɖɦ				dɦ		bɦ		
Nasal		ŋ		ɲ										
Lateral														
Fricative					ʂ					z				ɦ
Semivowel														
Flapped						ɽ ɽh								

* Retroflex

Plosive:- Plosive articulations may be voiced or voiceless and also aspirated or unaspirated. For the plosive articulations a complete closure takes place at some point in the vocal tract behind which the air pressure builds up and can be released explosively. There are five places of articulation, viz. velar, palatal, retroflex, dental and labial.

Palatal plosives (see p. 23) have affricated release which means that the separation of the organs is comparatively slow, so that friction is a characteristic element heard on the release of the closure. For further details of the articulation see p.37

In word initial position, voiced unaspirated plosives, especially bilabial and dental are often implosive in my speech, in which case they may be transcribed as /ɓ/ and /ɗ/.

In word final position, voiceless unaspirated plosives are always accompanied by simultaneous glottal closure and are thus ejective in my speech. /kˀ, cˀ, ʈˀ, tˀ, pˀ/ Words that may have the whispery voiced plosives /gɦ, jɦ, dɦ, ɖɦ, and bɦ/ in final position, have alternative pronunciations: they can be pronounced with a clear vowel followed by the whispery release of the consonant or, more commonly in my speech, the vowel is pronounced with whispery voice and the final consonant has a weak release. Thus /vagɦ/ or /vag̈/ 'tiger'.

1 Velar Plosives: The back of the tongue touches the soft palate or velum.

	Voiceless	Voiced
unasp.	/koʈi/ 'tribal name	/goʈi/ 'water pot'
	/ekloˀ/ 'lonely'	/gagar/ 'special shape of water pot'
	/aˀk/ 'number-tables'	/ag/ 'fire'.

	Voiceless			Voiced	
aspi.	/kholi/	'small room'	whispery voiced	/ɦoɭi/	'stir'
	/əkhroʈ/	'walnut'		/ɦugɦəro/	'rattle'
	/ãkh/	'eye'		/vagɦ/	'tiger'

2 Palatal Plosives: The articulation is made by the blade and front of the tongue against the back part of the teethridge and the forward part of the hard palate. The tip of the tongue is down. The release is affricated. The narrow phonetic description is therefore of voiceless and voiced alveolo-palatal affricated plosives, for which the symbols /tɕ/ and /dʑ/ could be used.

	Voiceless			Voiced	
unasp.	/cəkli/	'sparrow'		/jəmən/	'dinner'
	/cə̃cəɭ/	'active'		/əjgər/	'python'
	/nac/	'dance'		/gaj/	'buttonhole'
aspi.	/cha/	'skin of fruit'	whispery voiced	/jɦal/	'hold'
	/achaklu/	'arrogant'		/mujɦvaʈ/	'difficulty'
	/puch/	'ask' (Imp.)		/sujɦ/	'understanding'

3 Retroflex Plosives: The forward part of the hard palate is the passive articulator and the tip of the tongue is curled back to make contact with it. The sounds are therefore retroflex apico-palatal articulations. /ʈ/ and /ʈh/ are voiceless unaspirated and voiceless aspirated retroflex plosives.

	Voiceless				
unasp.	/ʈoɭi/	'little mob'	aspi.	/ʈhaʈh/	'pomp'
	/kəʈar/	'knife'		/ɛ̃ʈhu/	'leftover'
	/kaʈ/	'rust'		/aʈh/	'eight'

/ɖ/ and /ɖh/ symbolized voiced and whispery voiced retroflex plosives,

(/ɽ/ and /ɽʰ/) in the following situations (elsewhere they symbolized the flapped retroflex articulation, which is described at the end of this Chapter, p.43).

A word initially

unasp.	whispery voiced
/ɖol/ 'bucket'	/ɖʱol/ 'drum'
/ɖaɽ/ 'branch of a tree'	/iɖʱoɳi/ 'cusion to put water pots'
/ɖagʱ/ 'stain'	/gaɖʱ/ 'thick'

B with the nasalized vowels

/pɛ̃ɖo/ 'kind of sweet'

/gɛ̃ɖo/ 'an animal'

/ɖũɖũ/ 'corn-cob'

C when following a retroflex nasal or preceding a retroflex lateral

/paɳɖit/ 'scholar'

/pəɖəɽ/ 'layer'

D when /ɖ/ is doubled in a word as in /əɖɖo/ 'usual meeting place'

/cəɖɖi/ 'pants'

E word finally

/taɖ/ 'a kind of tree'

/kɛɖ/ 'waist'

4 Dental Plosives: The upper front teeth are the passive articulator, and either the point or the blade of the tongue is the active articulator.

	Voiceless	Voiced
unasp.	/t̪ap/ 'heat'	/d̪ãt/ 'teeth'
	/ʃat̪a/ 'peace'	/dad̪a/ 'grandfather'
	/mat/ 'mother'	/dad̪/ 'complain'

	Voiceless		Voiced	
aspi.	/theli/	'bag'	whispery /dʱoɭi/	'white'
	/cotho/	'forth'	/ədʱoɭ/	'smallest measurement of weight'
	/hath/	'hand'	/kə̃dʱ/	'shoulder'

5 Bi-labial Plosives: The articulation takes place between the lower lip and the upper lip and there is usually full contact between them.

	Voiceless		Voiced	
unasp.	/pap/	'sin'	/bap/	'father'
	/təpeli/	'pan'	/ə bola/	'not speaking with someone'
	/cup/	'quiet'	/ub/	'fungus'
aspi.	/phul/	'flower'	whispery /bʱul/	'mistake'
	/əphaɭ/	'bang'	/abʱo/	'surprised'
	/bərəph/	'ice'	/abʱ/	'sky'

Nasals: - The nasals are voiced sounds in all positions. They can occur as simple sounds or in various combinations. Among the five possible nasals only three commonly occur. These are /m/, /n/ and /ɳ/. Palatal nasal (/ɲ̃/) and velar nasal (/ŋ/) occur in a few examples only. The velar nasal is restricted to use in combination with the velar plosives.

e.g.	/rəŋg/ 'colour'	/rəŋk/ 'poor'
	/cuŋgi/ 'pipe'	/bʱəŋg/ 'disturbance'

The palatal nasal can occur only with palatal plosives or the palatal semivowel /y/.

e.g.	/amə̃ɲɲa/ 'obedience'
	/ɲyayə/ 'justice'
	/ɲyat/ 'caste'

with the exception of word-initial position (where /ɳ/ cannot occur)

the simple nasals /m/, /n/, and /ɳ/ are in contrast and examples are given to show the possibilities of distribution.

1 /m/ is a bi-labial nasal.

2 /n/ is a dental nasal.

3 /ɳ/ is a retroflex nasal, except that in medial and final position it is on occasions nasalized flap i.e. made with momentary sliding contact only, between apex and hard palate. Examples are given below to show the differences: -

	/m/	/n/	/ɳ/
<u>initial</u>	⌈mat⌋	⌈nat⌋	-
	'mother'	'caste'	
<u>medial</u>	⌈juma⌋	⌈juna⌋	⌈kũɳa⌋ / ⌈kuɳ̃a⌋
	'name of tomb'	'old'	'tender'
<u>final</u>	⌈kam⌋	⌈kan⌋	⌈kaɳ⌋ / ⌈kaɳ̃⌋
	'work'	'ears'	'mourning after death'

<u>Laterals</u>: /l/ is a voiced alveolar lateral and can occur in any position. It has a front-vowel resonance in all positions.

e.g. ⌈lili⌋ 'green'
⌈luli⌋ 'tongue' (colloquial)
⌈lal⌋ 'red'

/ɭ/ is a retroflex lateral articulation, and has a front vowel resonance. /ɭ/ does not occur in word-initial position. In medial and final position, it may have rather weak contact. /l/ and /ɭ/ are in contrast as in : -

/l/		/ɭ/	
⌈mal⌋	'luggage'	⌈maɭ⌋	'storey'
⌈lal⌋	'red'	⌈laɭ⌋	'saliva'
⌈cəlni⌋	'current'	⌈gaɭni⌋	'stainer'

/r/ is a lingual tap, /r/ is articulated by tapping the tongue-tip once on the teeth ridge and may occur in all three positions.

e.g. /rat/ 'night'

/sarəs/ 'nice'

/nar/ 'woman'

Fricatives:- There are six fricative symbols in the consonant table; but only /s/, /ʃ/ and /h/ are used frequently (Table 1, p. 35). The symbols /ʂ/, /z/ and /ɦ/ need be used only occasionally (Table II, p. 35).

1 /s/ is a voiceless post dental fricative.

2 /ʃ/ is a voiceless palato-alveolar fricative.

The tip of the tongue is down and the lips are spread for both /s/ and /ʃ/.

e.g.	/s/	/ʃ/
	/sap/ 'snake'	/ʃap/ 'curse'
	/asũ/ 'tears'	/aʃ̃ũ/ 'what is this?'
	/kos/ 'water pump in the farm'	/kɔʃ̃/ 'spade'

/ʂ/ is articulated further back, either at the back of the teeth ridge or on the fore part of the hard palate. It occurs only with other retroflex consonants and only in Sanskrit words. It is a voiceless retroflex fricative.

e.g. /ʂəʈkɔɳ/ 'hexagon'

/ʂəʂʈhi/ 'sixtieth birthday'

/kəʂʈ/ 'difficulty'.

3 /z/ is a voiced post dental fricative. It occurs mainly in borrowed words from English, Arabic, Persian or Urdu, such as,

/azadi/ 'freedom'

/zarina/ 'name of a muslim girl'

/ˈmyuzˌiyəm/ 'museum'

/ˈboz/ 'Bengali surname'

4 /h/ may be a voiced or a voiceless glottal fricative. Here the symbol /ɦ/ is only used for narrow transcriptions.

In pure Gujarati words /h/ occurs mostly initially[1] or between the preceding and following vowels.

e.g. /ˈhəˌrakh/ 'joy' /ˈhoˌli/ 'Holi'

/ˈhaˌhakar/ 'tumult', 'uproar' /ˈhaˌlvu/ 'lightweight'

/ˈvah/ 'bravo' /ˈrah/ 'road'

All words with /h/, whether Gujarati or Sanskritic forms, show alternative pronunciation patterns. One pattern will have sequences of clear vowels with preceding or following whispery voice but many speakers in my dialect area prefer a long whispery voiced vowel in these words as an alternative to those sequences. Thus,

/ˈholi/ or /ˈo̤ˌli/ 'Holi'

/ˈkahan/ or /ˈkan/ 'Lord Krishna'

/ˈvivah/ or /ˈviva/ 'engagements'

Note: In the Surati dialect which is spoken in and around Surat city, /s/ or /ʃ/ may be replaced by /h/ in Gujarati words by all speakers, whether literate or not. In other dialects this may also happen, but only in the speech of non-literate people, e.g.

/ˈsat/ or /ˈhat/ 'seven'

/ˈʃak/ or /ˈhak/ 'vegetables'

1 See Potter, Kopp and Green, 'Visible Speech', p. 111. "It is observed that h in this position is thought by many phoneticians to be a way of initiating a vowel rather than a sound entity".

Semi vowels:- /y/ is a palatal semivowel.

/v/ is a labio-dental semivowel.

In many Gujarati words, /y/ and /v/ can co-occur with vowels to form the nucleus of syllables. The resulting diphthongs /ey/, /əy/, /ay/, /uy/, /oy/, and /ɔy/ are found but not *iy and *ɛy. /v/ may co-occur with vowels to form the diphthongs /iv/, /ev/, /əv/, /av/, /ov/ and /ɔv/ but */uv/ and */ɛv/ are not found.

e.g. /saykəl/ 'bicycle' /navɒi/ 'small-boat'

/kərmay/ 'wither' / cevɒo/ 'snack dish'

Otherwise, /y/ and /v/ have syllable-initial and syllable final position, as in:-

/y/	/yadəvo/	'a historical tribe'
	/pyalo/	'glass' (for drink)
	/gay/	'cow'
/v/	/varta/	'story'
	/bavən/	'fifty-two'
	/vav/	'well with stairs'

Flapped consonants: /ɽ/ and /ɽʰ/ are retroflex flapped unaspirated and aspirated consonants. A retroflex flapped consonant is made by turning the tip of the tongue back under the hard palate and making a light and brief contact with the underside of the tip as the tongue moves forward. An unaspirated or aspirated retroflex flapped sound can only occur intervocalically in words where there is no other flapped sound articulation. It cannot occur in any consonant combinations. Thus it will be seen that /ɽ/ and /ɽʰ/ can only be used in words which could not have the full contact articulation of /ɖ/ or /ɖʰ/. (p.38)

e.g.	/aɸəʃ/	'obstruction'
	/paɸo/	'he buffalo'
	/gaɸi/	'train'
	/əɸhar/	'eighteen'
	/əɸhi/	'two and a half'
	/kaɸ̃/	'mourning after death'
	[baɸ̃]	'arrow'

In Chapter III, possible combinations of consonant-clusters are shown and general syllable-structures for Gujarati are discussed.

CHAPTER III

General Syllable - Structure

Gujarati words (see p.71) may consist of one or more than one syllable. For the most part simple words have a maximum of three syllables. Words with more than three syllables can be assumed to be compound or borrowed words, and polysyllabic words have not been dealt with in this thesis.

The nucleus of a syllable is either a vowel or a diphthong constituted by a vowel followed by a semivowel; and the nucleus may be either word-initial or word-final.

A syllable-nucleus may be preceded by one consonant or up to three consonants. It may be followed by one or two consonants. In other words, a group consisting of three consonants is restricted to word initial position. It further appears that an initial three consonant group does not combine within a word with a final two consonant group.

The types of syllable structure which make up monosyllabic words in Gujarati are listed below:-

The syllable-structures	Examples	
v	/e/	'that'
cv	/ke/	'or'
ccv	/tri/	'three'
cccv	/stri/	'woman'
vc	/ek/	'one'
vcc	/ərp/	'give'
cvc	/kap/	'cut'
ccvc	/mrut/	'dead'
cccvc	/smruti/	'rememberance'

cvcc	/mərm/	'deep'
ccvcc	/spərʃ/	'touch'

All the consonant sounds shown on the table (p.35) can occur medially and finally in Gujarati words. In word initial position the consonants ʈ, ɳ, and ʃ ŋ, ɲ and ɸ ʃ (Table II only) cannot occur, so that the commutations possible for consonants in syllable final position are not identical with the commutations for consonants in syllable initial position.

There are some restrictions about the occurrence of kinds of combinations of the consonant groups.

When considering consonant groups which occur as the onset of a syllable, it is important to note that, except for C+ v, y, all the other consonant groups are borrowed, viz. from Sanskrit, English, Persian, etc. The possible combinations in consonant groups as indicated by the + sign, are set out below:-

	k	g	c	j	ʈ	ɖ	t	d	p	b
y	+	+	+	+	+	+	+	+	+	+
r	+	+	-	-	+	+	+	+	+	+
l	+	+	-	-	-	-	-	-	+	+
v	+	+	+	+	-	-	+	+	-	-

Examples:	kyã	gyã	cyəvən	jyare	ʈyuʃən
	krəm	gram	-	-	ʈren
	kleʃ	glani	-	-	-
	kv̊cit	gvaliyər	cvi	jvər	-

ɖyu	tyare	dyabhai	pyalo	byan
ɖril	trəɳ	drakʃ	prit	brəʃ
-	-	-	plan	blu
-	tvəca	dvar	-	-

Aspirated word-initial consonant groups:-

	kh	gh	ch	jh	ʈh	ɖh	th	dh	ph	bh
y	+	-	+	-	-	-	-	+	-	-
r	-	+	-	-	-	-	-	+	+	+
l	-	-	-	-	-	-	-	-	+	-
v	-	-	-	-	-	-	-	+	-	-

khyal	-	chyaʃi	-	-	-	dhyan	-	-
-	ghraɳ	-	-	-	-	dhrasko		bhrəm
-	-	-	-	-	-	-	phlu	-
khvab	-	-	-	-	-	dhvəni	-	-

Unaspirated non-Plosives, word-initial consonant group:-

	m	n	y	r	l	v	s	ʃ
y	+	+	-	-	+	+	+	+
r	+	+	-	-	-	+	+	+
l	+	-	-	-	-	-	+	+
v	-	-	-	-	-	-	+	+

myan	nyat	-	-	lyo	vyapti	syadvad	ʃyam
mrut	nrup	-	-	-	vrutti	srot	ʃri
mlan	-	-	-	-	-	slav	ʃlok
-	-	-	-	-	-	svari	ʃvas

It will be seen that y and r cannot stand as a first element of any initial consonant group. One special consonant group g + n can occur word-initially e.g.

/gɲan/ 'knowledge'

/gɲati/ 'caste'

Word-initially voiceless dental fricative /s/ and voiceless stop consonants or nasals /m/ and /n/ may form consonant groups as in the examples:-

/spruʃy/ 'touchable'

/stʈeʃən/ 'station'

/skru/ 'skrew'

/stər/ 'level'

/smɤuti/ 'rememberance'

/snan/ 'bath'

In word-initial groups of three consonants the third consonant must be r, and furthermore these words are of Sanskritic or foreign origin.

/sprinɟg/	'spring'	/spruʃʈ/	'touched'
/stri/	'woman'	/smruti/	'rememberance'

Word-final consonant groups: Word-finally, groups of up to two consonants are possible. Only the following consonant groups occur:-

	k	g	c	j	ʈ	ʈh	t	d	p	b	s	ʃ	v
k	-	-	-	-	-	-	-	-	-	-	+	+	+
s	+	-	-	-	-	-	+	-	-	-	-	-	-
ʃ	+	-	-	-	+	+	-	-	+	-	-	-	+
r	+	+	+	+	+	-	+	+	+	+	+	+	+

Examples:	/bɔks/	'box'	/bhəkʃ/	'kill' (by wild animal)
	/pəkv/	'ripe'	/əst/	'sunset'
	/həst/	'hands'	/iʃk/	'love'
	/kəʃʈ/	'difficulty'	/kaʃʈh/	'wood'
	/puʃp/	'flower'	/əʃv/	'horse'
	/ərk/	'essence'	/sərg/	'canto'
	/cərc/	'church'	/kərj/	'debt'
	/ʃərʈ/	'shirt'	/mərd/	'male'
	/dərp/	'vanity'	/nərs/	'nurse'
	/pərv/	'festival'	/ərth/	'meaning'
	/spərʃ/	'touch'		

Nasal and plosive articulations combine in the following final consonant groups. It will be seen that the nasal and plosive sounds are homorganic and that there are the same places of articulations as with the simple plosive sounds.

/əmb/	'name of goddess'	/kəmp/	'thrill'
/kənth/	'husband'	/kəŋʈh/	'throat'
/vənd/	'to greet'	/liŋk/	'to join'
/liŋg/	'gender'	/uŋgh/	'sleep'
/cəɾcəɭ/	'active'	/əɾjəna/	'name of girl'

Medially, in intervocalic position all consonants, with the exception of /ɾ/ and /ɭ/ and /ɳ/, may be geminated. These geminated groups can be considered to function both as the coda of the preceding syllable and the onset of the following syllable and the syllable boundary will be between the two elements.

Examples:	/cəppu/	'knife'	/jəkki/	'obstinate'
	/ɖhəbbu/	'old paisa'	/chəggo/	'sixer'
	/bəccu/	'young of bird'	/ujjəɖ/	'barren'
	/sətta/	'power'	/əɖɖo/	'usual meeting place'
	/məll/	'heavyweight wrestler'	/khəmma/	'bless you'

Syllable boundary:- It is necessary to know the possible patterns of syllable initial and syllable final structures in determining the boundary between syllables. No syllable division is possible within word-initial or word-final consonant groups. But word-medial consonant groups may provide problems for syllable division. Thus the words vəsti, əstro, istri, might be divided in one of the following ways:-

/və-sti/ or /vəs-ti/ 'population'

/əs-tro/ or /ə-stro/ or /əst-ro/ 'razor'

/i-stri/ or /ist-ri/ or /is-tri/ 'pressing iron'

The consonant group -st - can occur at syllable final or syllable onset, so there is the possibility of dividing such words in alternative ways. In examples such as /əʈkəl/, /aʈkaʈ/, etc., the syllable boundary is always between ʈ-k, because in Gujarati words a consonant group -ʈk - is not a possible syllable initial or syllable final group.

As far as the interrelation between different types of syllable structure and types of phonation is concerned it can be said here that all types of syllable structure can be found in words of clear phonation (p. 69) including all patterns of consonant groups. Many types of syllable structure will have to be dealt with for words with breathy phonation but in no case will consonant groups either initial or final be included in these structures. Further discussion of these points will occur in Chapter IV.

CHAPTER IV

Phonetic Statements on Phonation Types

In this chapter the general phonetic features used by various phoneticians to characterise different types of phonation will be summarised; and previous accounts of the application of these statements to Gujarati will be referred to. Also, a brief summary of the particular phonetic patterns of my speech which are especially relevant to the question of phonation types, is provided. In a way, this chapter is forming a link between phonetic statements regarding phonation types and a phonological approach to those types.

Phonation types: the general phonetic approach:-

Formerly, 'phonation type' was generally termed 'voice quality'. For general use, it is still an acceptable term, while the term 'phonation-types', has come to be more widely used, especially since Catford's article in 1964, 'Phonation types: the classification of some laryngeal components of speech production'.

In the last decade, leading phoneticians have discussed and done experimental work in detail to find out different, complex, laryngeal activities and have made phonetic statements regarding these phonological features. Here, I intend to refer to those works which have specifically made reference to Gujarati.

In 1935, J.R. Firth in his paper 'Phonological features of some Indian languages' pointed out the special importance in Gujarati of the phonation[1] difference in the Surati dialect of what he described as

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1 This is the first use of the term 'Phonation' in this sense.

'tight phonation' contrasted with 'breathy phonation'. Since then other linguists on problems of phonation have quoted Gujarati as a language of particular interest in this respect.

Phonation types have been described in detail in general phonetic terms by J.C. Catford in his pioneering survey (1964). Catford describes twenty-three states of the vocal cords which may be linguistically useful, 'breath', 'whisper', 'whispery voice', 'creak', 'voice', etc.; and suggests that there may be some more. He gives the criterion by which phonation types may be defined as: "Laryngeal activity which generates a sound which is common to two or more terms in a system of phonematic units, differentiated by supraglottal modulation, is phonatory' (p. 27). Using this criterion, he defines phonation as "any laryngeal activity which is not initiatory in its phonic or sound-producing function whatever its phonological function may be" (p. 27). He refers to Gujarati which, according to him, has four of his phonation differences, these he terms 'breath', 'voice', 'ligamental voice'[1], 'whispery voice'. (p. 36)

In 'Typographical survey of South-east Asian languages' (1965) Professor Henderson refers to Gujarati as having 'lexically contrastive phonation types' and writes "It is possible that in some of the languages marked as having lexically contrastive phonation-type, the phonation type should be regarded as having optional concomitant pitch features". (p. 412)

Abercrombie in 'Elements of General Phonetics' (1967) describes the muscular adjustments of the vocal cords and suggests that the larynx may have in some cases a 'slightly lowered' position giving rise to

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1 What he describes as ligamental phonation is not in my kind of Gujarati.

breathy phonation, in others a 'slightly raised position' in the throat giving rise to 'tight phonation'. He accepts the terms used by Firth and describes 'breathy phonation', referring to the Surati dialect as follows: "... breathy phonation is produced by part of the glottis being in vibration while the cartilage glottis is sufficiently open to allow air to pass freely through it; and what was called 'tight phonation' has the cartilage glottis firmly closed, the rest of the glottis in vibration, and constriction of the upper parts of the larynx". (pp. 100-101)

Ladefoged, first in 'Working Papers in Phonetics - 6' (U.C.L.A., 1967) and then in substantially the same work published in book form as 'Preliminaries to Linguistic Phonetics' (1971), gives seven different types of phonation in the form of a single continuum, but leaves out other phonetically possible phonation types. (We shall discuss this point later in this chapter while discussing recent work in this direction.)

"The continuum model does not, it seems to me, 'predict' or 'explain' other interlocking variables, yet a satisfactory account of the mechanisms involved should surely do so." These words by Professor Henderson in a recent article entitled, 'The larynx and language: a missing dimension?' (1977) seem appropriate here. In that continuum, 'whisper' could be related with the voicelessness, although, in general, whisper is not linguistically related the same way as other features.[1]

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1 Ladefoged, however, mentions French and Wolof as having contrast between whispered and voiceless sounds in the environment of pause paralleling a voiced-versus-voiceless opposition in non-final position. (1971, p. 19) In these two languages, at least, it appears that whisper must be treated as linguistically significant.

To show this continuum by him, his table of phonation-types has been given here.

Table 1 Some states of glottis

Phonetic term	Brief description	Symbols
Voice	Vibration of the vocal cords	m,z,b,a.
Voiceless	Vocal cords apart	$\underset{o}{m}$, s, p, h.
Aspiration	A brief period of voicelessness during and immediately after the release of an articulatory stricture.	s^h p^h
Laryngealization	"Creaky voice" arytenoids tightly together, but a small length of the ligamental vocal cords vibrating	$\underset{\sim}{m}$, $\underset{\sim}{z}$, $\underset{\sim}{b}$.
Glottal stop	Vocal cords held together	ʔ
Whisper	Vocal cords together or narrowed except between the arytenoids	(no symbol)

(Ladefoged 1971, p. 8)

From these phonation types, one can see that he has included 'glottal stop' as one of the phonation types. For 'glottal stop', vocal cords are held together momentarily. [ʔ] is a 'laryngeal activity' but its function is articulatory (forming the articulation of a glottal stop) not phonatory (See Catford, 1977, p. 98). So this may not be accounted as phonation type within his scheme. Secondly, Ladefoged's phonation type of 'aspiration' is also not considered as a different type of phonation by Catford; since it can be related to voicelessness (as 'breath' phonation type).

On his continuum regarding the feature of glottal stricture (see Ladefoged, Figure 4, p. 17) no language makes more than three oppositions. He has shown Gujarati, on this continuum, as having three oppositions viz., voiceless, breathy-voice (murmur), and voice.

As for what he terms 'breathy voice' and 'murmur' there is marked distinction between 'breathy voice' and 'whispery voice' (murmur) according to recent work (Catford, 1977, pp. 99-100) as having different phonation types.

In the diagram presented by Ladefoged (Ladefoged, 1971, p. 17) entitled 'A (tentative) arrangement of some stop consonants', showing the relation between the two features dealing with aspects of glottal activity, among the Gujarati stops, the maximum differentiation is between b and p and ph (between voice and voiceless: "the two sounds b̥ and ph are alike in their voice onset time; p and ph are alike in their degree of glottal stricture". (p. 21)

There has been criticism regarding Ladefoged's way of describing the above-mentioned features of 'murmured consonants' of Gujarati and other North Indian languages like Hindi. He shows murmured consonants as having a specific degree of glottal stricture (in between voiceless and voice) during the closure phase and so-called aspiration phase; taking Hindi as an example, he shows these two-way differences as follows:

	'ph	p	b̥	b	
glottal stricture	0	0	1	2	
voice onset	2	1	2	0	(p. 97)

According to Jørgensen (1975), "It is probably correct that the vocal cords are not in the same position in bh and b̥ but, as demonstrated by Halle (1973, p. 927) in his review of Ladefoged's book, this feature specification is very inadequate for the formulation of Grassman's Law, which states that stops in Greek and Sanskrit are unaspirated if followed

in the same stem by an aspirated stop.[1] This law is valid both for voiceless and for voiced aspirates in Sanskrit, e.g. ph and bh, which thus seem to contain the same feature. The conception of ph and bh as containing two different features, is in conflict with Ladefoged's own aims, viz. that the feature specification should fit with natural classes required by phonological rules." (p. 385)

Thus it will be seen that what are usually named 'voiced aspiration stops' in the description of Indian languages are treated by Ladefoged as 'murmured stops'. He states that murmured stops "are clearly distinguished by having a different mode of vibration of vocal cords ... There is, it is true, an extra puff of air accompanying both the voiceless aspirated and murmured stops; but this puff of air is produced in a different way in each case, so that the release of the one sounds quite different from the other" (1971, p. 13). From the phonetic point of view, that may be; but according to arguments on p. 55 quoted from Jørgensen and from Halle, phonological rules regarding this feature should be "natural".

On this particular point, Pandit has followed the traditional view in Indian linguistics, (also cf. W.S. Allen's (1953) statement: "h and voiced aspirates are considered as more fully voiced than the

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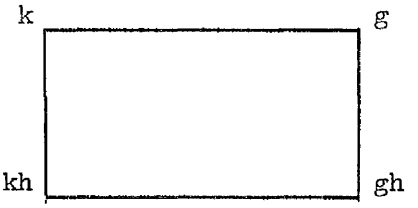
1 In fact Grassman's Law is restricted, as far as Sanskrit is concerned, to 'voiced aspirates' (his 'soft aspirates'): "If a root ends with an aspirate and begins with a consonant capable of aspiration, and if its final loses its aspiration through the operation of some other law, the aspiration moves to the initial. But this is true of Sanskrit only when the final of the root is a soft aspirate and when the initial is a non-palatal media ... (Grassman, 1863, in Lehmann (ed.) 1967, p. 112) though it is true that later he observes: "Some instances still remain to be treated in which the hard aspirate whether it was originally present or developed only later from a tenuis, exerted in the same way an influence on an originally present, soft aspirate, so that it lost its aspirate. For we note that - 'like roots with two soft aspirates, those with hard aspirates initially and soft finally, or the converse, are avoided in Sanskrit ..., apart from some individual ones which were probably taken from the dialects.' (p. 125)

non-aspirates, and the voiceless aspirates more fully breathed than the non-aspirates". (p. 38) which classifies them as 'voiced aspirated plosives'. The Sanskrit terms 'plosive sound' (sparsha vyanjana) can be distinguished according to whether they are voiced or voiceless (ghosa/aghosa) and also whether they are articulated with weak breath force or strong breath force (alpaprāna/mahāprāna). This two way relationship can be shown as:



In that figure horizontal lines show voiceless/voiced distinction, and vertical lines show weak/strong breath-force distinction.

The aspiration feature is defined by Pandit in the following way:

"Aspiration in Gujarati is the breathy release which immediately follows the stop consonants and which is voiced, unvoiced when the preceding consonant is unvoiced" (Pandit, 1957, p. 169). It will be seen, however, that Ladefoged, like Abercrombie, restricts the term 'aspiration' to voiceless articulation and excludes the use of the term 'voice' where there is breathy phonation of any kind. For phonetic classification, this is, no doubt, correct but for phonological purposes traditional views should be considered.

In 'Practical Phonetics' (1972), Bhaskararao has shown the interrelationships of various positions attained by the vocal cords and, due to that, resultant state of glottis. He has put the six different positions of the glottis into two groups (i) the positions for the glottal stop, voiceless sounds, and whisper as voiceless positions as opposed to (ii) the other three positions, namely, voice,

breathy voice and creaky voice as voiced positions. Aspiration (kh, ph, th, etc.), I presume, also can be grouped together with voiceless positions. Thus, production of these types from the specific part of the larynx gives a number of different varieties of phonation types.

Very recently, Catford (1977) has described some general phonation types with detailed instrumental evidence[1] as well as on the basis of his kinesthetic insight into the subject. His aim in describing different types of phonation is different from Ladefoged's. He also has made criticism on Ladefoged's (1971) single continuum: "This listing leaves out ventricular phonation (or ventricular articulation) but otherwise may be quite a useful listing for phonological purposes. It fails, however, to take explicit account of locational differences, and this makes it less useful for anthropophonic purposes for the unambiguous categorization of the phonatory possibilities of man." (p. 105) Obviously, his aim is different from Ladefoged's, nevertheless his descriptions give a phonetically profound basis for describing different types of phonation.

Here I would mention only the five different types of phonation, and combination of types, that are relevant to Gujarati; but his Table 11 (p. 106) is given in full:

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1 For Gujarati, at least, Jørgensen and R.V. Dave has produced detailed instrumental work on 'murmur' feature. See Bibliography.

Stricture-type		location		
		glottal	anterior	ventricular+glottal
1	Wide open	voiceless		
2	Narrowed	whisper	anterior whisper	ventricular whisper
3	Vibrating freely	voice	anterior voice 'tense', 'sharp' voice	ventricular-voice double voice
4	Low frequency taps	creak	anterior creak tense creak	ventricular-creak
1 + 3	Open, vibrating	breathy voice		
2 + 3	Narrowed, vibrating	whispery voice (murmur)	anterior whispery voice	

1 Voiceless: Glottis wide open, with egressive, pulmonic pressure and it is somewhat noisy. Controlling the outflow by means of the respiratory muscles, one can slow down to the point where turbulence ceases, and have merely silent breath. Breathing through open glottis like this produces voiceless sounds like ⌈p, t, k, s, ʃ, h⌋. There are two varieties of voiceless phonation (1) with the turbulent flow and resultant noise, which is breath phonation, and (2) with laminar, noiseless flow, which is nil-phonation ⌈h-⌋ in ⌈hel⌋ 'water pots in line', ⌈ha⌋ 'yes', ⌈hoy⌋ 'might be' etc. and in the aspirated release of initial voiceless ⌈ph-, th-, kh-⌋ etc. is normally breath phonation while voiceless fricatives ⌈f, s, ʃ⌋ is often nil-phonation.

2 Whisper: Whisper involves a narrowing of the glottis, and feeling of tenseness of the larynx. There is very small glottal orifice, smaller than in voiceless. In whispered speech normally voiced sounds are whispered, while voiceless sounds remain voiceless. One can theoretically have a continuum of degrees of glottal opening going from

1) widest possible - in breathing or voiceless (breath) phonation, and down to a very small glottal space, for strong whisper. But actually there are two quite distinctive glottal adjustments for the two phonation types: (1) a wide one, 60% to 65% of the maximum glottal area for voiceless, and (2) a distinctly narrow one for whisper, less than 25% of maximal glottal area.

3 Voice: The process of vocal cord vibration may start with the cords in a suitable state of tension, but slightly open. When glottis is closed and vocal cords are subjected to varying degrees of tension then they vibrate; and produce sounds like /b, g, d/ etc.

4 Whispery voice: In whispery voice, vocal cords are somewhat relaxed and they vibrate to generate voice with continuous, simultaneous, richly turbulent escape of air through a little space generating whisper. Two types of phonation are possible: (1) a common kind, in which the arytenoids are somewhat apart so that there is a whisper-generating space at the posterior end of the glottis, while the vocal cords forward (ligamental vocal cords) are vibrating; and (2) a type of whispery voice for which there is probably no localized arytenoid space. The airflow of whispery voice is naturally somewhat lower than the breathy voice because in whispery voice there must always be a glottal space, small enough to generate whisper than breath. This is also known as 'murmur'. 'The former [murmur] is clearly one form of whispery voice: that which occurs with and following "voiced aspirated stops" /bh, dh, gh/ etc.' (Catford p. 106).

5 Breathy voice: After taking deep breath, if it goes noisily and rapidly, this gives breathy-voice, sigh-like phonation. The glottis is narrow from its most open position but not narrowed enough to generate whisper. It is also a phonation type of 'voiced h'.

Catford distinguishes four different locations of these strictures (phonatory locations within the larynx): (a) full glottal, (b) anterior, (c) posterior, and (d) ventricular. From these, the following two are relevant to my dialect of Gujarati:

(a) full glottal: In this type of phonation, the entire length of the glottis - both anterior (ligamental) and the posterior (arytenoidal) parts - can be regarded as functioning as a single unit. There is no active restriction of activity to one particular part.

(b) posterior: At this location, whispery voice is produced. This phonation implies complete static closure of the forward, ligamental, part of the glottis, phonation occurring only at the arytenoidal end.

The table below illustrates the allotment of various sounds of Gujarati to the different phonetic features characteristic of different kinds of phonation at the phonetic level, and shows the phonetic symbols allotted to each section.

Phonation types in Gujarati:

	Phonation types	Associated sounds
A 1	Voiceless:	
	a Voiceless non-aspirated stops -	k, c, ʈ, t, p, (ʔ)[1]
	b Voiceless fricatives -	s, ʃ, (h)
	c Voiceless aspirated stops -	kh, ch, ʈh, th, ph

1 A further type of glottal articulation in Gujarati is, of course, glottal plosion, alias the glottal stop, which is an alternative to an initial-vowel articulation, and has no lexically distinctive function. In Catford 1964 it is treated as a phonation type in its own right; but here I have followed Catford's revised treatment of it in 1977, not as a phonation type but as an articulation or as a concomitant of initiation (as in my alternative pronunciation of ˀkʰ, cʰ, ʈʰ, tʰ, pʰ as ejctives.

Phonation types		Associated sounds
2 Voice:		
	a Voiced stops -	g, j, d, ɖ, b
	b nasals -	m, n, ŋ, ɳ,
	c liquids -	l, r,
	d fricatives -	z, ɦ
	e All 'clear' and -	ə, a, i, u, o, ɛ, e, ɔ.
	All 'nasalized' vowels -	ə̃, ã, ĩ, ũ, ɛ̃, ɔ̃
3 Whispery voice: (Murmur):		
	a vowels -	ə̤, a̤, i̤, ṳ, ɛ̤, ɔ̤
	b consonants -	g̤, j̤, d̤, ɖ̤, b̤

B 1 Whisper: All the (voiceable) consonants and vocal sounds in sections (A 2-3) above are examples of the whisper phonation type when they occur in whispered utterances.

2 Breathy voice:

Similarly, the sounds of sections (A 2-3) can be expected to be examples of breathy voice rather than merely examples of voice and whispery voice when they occur under conditions of heavy breathing or breathlessness (cf. Catford, 1977, p. 99: "'Breathy voice often occurs when one tries to blurt out a message when entirely out of breath".)

It will be seen that no reference is made in the last table to features of simultaneous glottal closure, of implosive release, of low pitch, etc. which figured in the phonetic descriptions in Chapter II. As Firth (1957) said, "It is difficult to suggest any overall

phonological scheme for all Gujarati, and it is no easy matter in any given dialect to recognise the exponents of phonematic as distinct from prosodic elements of the word, phrase, clause or sentence. The disentangling of these two classes of element is to be done for each dialect, but there may well prove to be many parallels". (p. 233)

It is the purpose of the phonological approach in the following pages to disentangle some of these elements with particular regard to the processes of 'clear' or 'normal' and 'breathy' phonation which are also characteristic of my form of Gujarati.

Section II Phonology

This section is concerned to examine the role of different types of phonation in the phonological pattern of Gujarati and to apply the principles of prosodic analysis to the statement of the systems. After giving an account of phonation types in Chapter IV, it is intended to approach those types phonologically.

Chapters VI and VII show the prosodic approach to the problem of the phonation types. Also, a brief summary of the particular phonetic patterns of my speech which are especially relevant to the question of phonation types is provided, with support from my experimental results. Where it is necessary I have also given experimental support from other scholars who have done detailed work on the similar problem.

CHAPTER V

The phonological approach

In this chapter a phonological approach has been outlined and more detailed statements will be made in the following two chapters.

In this study the term 'clear phonation' has been used instead of Firth's 'tight phonation', because my type of phonation is probably different from the type observed by Firth; but the term 'breathy phonation' has been retained (Firth, 1957, pp. 233-5). The reason for using the term 'clear' instead of 'tight' is that Firth presumably used the term 'tight' in the sense of approximation of the ligamental vocal cords in the glottis whereby not much air can pass through (the 'ligamental' phonation of Catford, 1964, p. 36, in comparison with his 'whispery type'). Here the term 'clear' is related to two of the phonation types described by Catford: 'breath', 'voice' (1964, p. 36). 'Clear' phonation in this phonological sense will exclude from its exponency phonetic features such as aspiration and whispery voice; but can refer to both voiced and voiceless articulations. As will be seen in his article 'Phonetic observations on Gujarati', Firth suggests the possibility of applying a prosodic approach to the problem but has not gone beyond that suggestion to give any phonological statements of the problem. It is the purpose of this study to follow up this suggestion.

The phonological analysis in this thesis deals with certain selected elements which can be considered as prosodic characteristics of the word and in relation to syllabic structure. It is in this sense that the term 'phonation type' is used here to refer to a system of prosodic abstractions.

Although certain prosodic abstractions are made, and syllable structures are described in order to handle the different types of phonation, it has not been thought useful to discuss in detail the phonematic systems of Gujarati since to deal with these fully would require abstractions of other prosodic characteristics such as retroflexion, nasalisation, and palatalisation, which would not materially affect the discussion of phonation types. In this sense a full phonological statement for Gujarati is not attempted because only a single system of prosodic abstractions has been made where a fuller analysis would require several. In this matter I follow W.S. Allen (1957) as he has pointed out that "the restriction of prosodic abstractions may make the method more easily comprehensible by focusing attention on the primary subject of discussion". (p. 70)

In this thesis, the word will be the maximum unit studied, since this is the maximum structure to which the prosodic system of phonation types can be refered. The term word is here used in the traditional manner. As far as the problem of phonation types is concerned, there is no conflict between the grammatical and phonological levels in the use of this term, though there is not necessarily a one to one correspondence between them.

The phonological shape of the word can be considered in terms of the number of syllables, the quantity of syllables - whether open or closed - the placement of the prominence and the particular phonation patterns in the word. Certain statements with reference to prosodic characteristics can be stated for the whole word. Thus whispery voice phonation as a feature of syllable nucleus cannot occur more than once in the word; but whispery voice as a syllable-initial feature can occur more than once in the word, though rarely, e.g. /ˌguugəro/ 'rattle', /ˌbəəbuut/ 'ash',

etc. 'Breath phonation', in the form of aspiration also can occur more than once, and can also combine with whispery voice as a syllable-initial feature; e.g. /khakhəro/ 'dry chapati', /b̤uukh/ 'hunger', respectively.

Here one general point regarding the combination of whispery voice and breath phonation (aspiration) should be made. In the examples like /b̤uukh/, /dukh/, etc. stylistically, there is a difference in release of the syllable final: when pronounced in a sentence, one hears a non-aspirated release, e.g. /-k/, as in the supporting tape-recorded example bhukh /mane b̤uuk lāgī chē/ 'I am hungry', on the other hand, in one-word utterances, in citation, one always hears the aspirated release (/-ch/). It is, therefore, possible to have non-aspiration in syllable-final position as an exponent of 'breathiness'.

Non-aspiration might seem a highly inappropriate sort of phonetic exponent for a phonological category to which a term such as 'breathiness' has been applied; but there is more to it than that: this syllable-final non-aspiration as an exponent of 'breathiness' combines with a further exponent pulmonic air stream; the contrasting 'clear term', on the other hand, combines syllable-final plosion with a glottalic air-stream mechanism, i.e. ejectiveness is one of its exponents; indeed it is more than an exponent; it is a phonetic criterion of the 'clear' phonation term, e.g.

/pɔ̃kʼ/ 'roasted corns'

/potʼ/ 'texture of cloth'

/kapʼ/ 'cut' (Imp.)

For the complete discussion of this it is necessary to set up prosodic systems of the syllable initial and syllable final (**V**, $\bar{\mathbf{V}}$); and phonetic exponents of the terms in those systems, aspiration, whispery

voice, pitch, prominence, duration, etc., are discussed for the various places. These exponents can affect more than one segment and have implications for the total structure of the syllable and its relations to other syllables within the larger structure. As Allen (1954-55) says, "prosodic features are phonological elements having phonetic exponents which either extend over more than one place in the syllable in that they delimit a structure from preceding or following structures" (p. 558). The prosodic analysis of phonation types and their exponents shows that it is necessary in Gujarati to set up different systems which must be related to the initial, medial and final places in the word structure.

Phonation types: At the phonetic level, three main types (and a sub-type as a 'breath' in the form of 'aspiration'-type) of phonation which are linguistically significant have been described in phonetic terms (see A.1, 2, 3, pp. 61-62), and may be assigned to one or the other of two terms in my phonological phonation system:

a. Clear

b. Breathy

Any word in the language can be assigned to one of these phonation types. At this point no distinction is yet made between syllable initial or syllable final properties. Words can, therefore, be classified as being either (i) of the 'clear' phonation type throughout or (ii) of the breathy phonation type, because of certain phonetic characteristics, in the case of the latter, in part of the word, which then, for the most part, require the presence of contrasting features.

2 Clear phonation type: This phonation type excludes breathiness of any kind as a phonetic exponent in the articulation. That is to say, this type does not have aspirated initials or finals in the syllable nor

does it have whispery-voice initials or finals or syllable nuclei. This type includes both voiced and voiceless articulations (Cf. "... in many languages, perhaps in most, voicing occurs more of the time during speech, than voicelessness". (Catford, 1977, p. 107)).

Examples:

Monosyllabic	/ kam /	'work'
Disyllabic	/gərəj /	'dependence'
Trisyllabic	/ ʃikari /	'hunter'
Polysyllabic	/ vasəɳkusəɳ /	'pots and pans'

A further phonetic characteristic of 'clear' words is that they may have nasalised or non-nasalised vowels. Since this phonetic characteristic is also shared by 'breathy', there seems no useful purpose in abstracting nasalisation as a prosodic component of the syllable for the purpose of this study.

The position of prominence in words with clear type of phonation is mentioned in Chapter VI on word prosodies on pp. 76-77.

b. Breathy phonation type: All words which do not conform to the phonetic patterns shown under (a) as having exponents of 'clear' phonation will be broadly counted as syllables of the 'breathy' phonation type without regard at this point as to whether the phonetic characteristics are properties of syllable nucleus, syllable initial, or syllable final, at greater length. Thus this type of phonation will include whispery voice and aspiration among its phonetic exponents.

To differentiate in phonological formulae between these two main phonation types, the prosodic sign H will designate a syllable containing exponents of the breathy type, and the prosodic sign $\mathcal{H}$ a syllable

containing exponents of the clear phonation type.

Later it will be necessary to discuss separately, the phonetic exponents of phonation appropriate to different parts of the syllable structure; but first, all prosodic characteristics which concern the structure of the whole word will be dealt with in Chapter VI.

C H A P T E R V I

Word Prosodies

At the phonological level words will be described and considered according to:

A. The number of the syllables in the word.

B. The nature of the syllables, which includes qualitative differences and various quantitative differences between syllables.

C. The placement of the prominent syllables.

D. The phonation type of the word.

A. Number of syllables: Gujarati words may be broadly grouped under two heads:-

a. Base forms.

b. Non-base forms.

a. Base forms:- Base forms are forms without prefixes or suffixes. Base forms may consist of from one to four syllables, though four syllables are rare in simple noun forms. Verbal base forms are generally monosyllabic with some exceptional dissyllabic forms, e.g.

/ ughaḍ /	'to open'
/ sacəv /	'to take care'
/ umer /	'to add'
/ ugaḍ /	'to saw'

Compound nouns consist of more than one base form and therefore polysyllabic by definition. The combination of two words in a compound, implies some added meaning over and above the meanings of the two words taken individually. It implies an altogether new meaning.

In 'A comparative study of English and Gujarati Syntax' Dr. J.J. Mody

(1973) writes about Gujarati compounds "Compounds in Gujarati consist mostly of two words (an exception is /tənməndhən/ 'body, mind and wealth'). Being a direct descendent of Sanskrit, Gujarati has compound words, which shows brevity. Usually one of the two constituents is the head-word and the other is the modifier, but there is one special type in which both are the head-words, e.g. Ramsita 'Ram and Sita', lal lal 'very red or blushing red'." (p. 125).

Examples of compound nouns are given below:-

pərəm + iʃvər	/ pərmeʃvər /	'God'
dev + ədhi + dev	/ devadhidev /	'God'
əgnan + avərəṇ	/ əgnanavərəṇ /	'illiteracy'
məha + puruʃ	/ məh͡apuruʃ /	'great man'

Reduplicative forms are also polysyllabic in nature and in forming reduplicative words, stems are repeated, with change of the first consonant in the second stem.

e.g.	/ ghoḍoboḍo /	'horse and something'
	/ vatobato /	'tale etc.'

Other reduplicated words may be formed in many different ways.

e.g.	/ aḍoʃipaḍoʃi /	'neighbours and friends'
	/ vasəṇkusəṇ /	'pots and pans'
	/ hãphəɭũphãphəɭũ /	'breathless'

The above examples of reduplicated forms show that these forms are polysyllabic. Compound and reduplicative noun-forms are also a structural device to indicate syntactical meaning.

b. Non-base forms:- Non-base forms are forms with prefixes and suffixes either derivational or inflectional.

Prefixes are mostly monosyllabic but in a few examples of Sanskritic forms dissyllabic prefixes may be found.

The table of examples shows the break up of some polysyllabic words in Gujarati. The base syllables are underlined. The examples are not restricted to a single word-class.

Table for non-base forms

		Prefix	base forms	suffix	Examples
1	Without a prefix but with a suffix	X	1	3	ghus-əɳiyo 'pushy natured'
		X	2	2	tabar-i-yo 'toddler'
		X	3	1	ɔlə khit-ũ 'known person'
2	With prefix and with suffix	2	1	1	p ə ʀopkari 'kind'
		1	1	2	ə-kə laməɳ
		1	2	2	ə-kəvitai 'unpoetic'
3	With a prefix but without a suffix	3	1	X	ən-ədhi-kar 'no rights'
		2	2	X	əbhi-nə̃dən 'congratulation'
		1	2	X	bin-rojgar 'without employment'

There are many other prefixes and suffixes apart from those shown in the table and the full range of structural possibilities is not exhausted, but sufficient examples have been given to show the various ways in which forms with similar number of syllables may be broken down into different structural patterns.

As regards the question of phonation types, there is a clear cut division between base syllables and prefixes and suffixes. Suffixes

show only 'clear' phonation. The Sanskritic prefixes /ədhi / and /əbhi / show the phonetic feature of whispery voice and are, therefore, contained in 'breathy' words; all other prefixes have 'normal voice' phonation only. Thus the characteristic Gujarati whispery-voice articulation as a feature of the syllable nucleus, e.g. ⟨ baːr ⟩ 'outside' is not to be found in either prefixes or suffixes. They are generally monosyllabic base forms, rarely dissyllabic form as / dɛːrũ / 'small temple', / sɛlũ / 'simple'.

The base syllables exhibit all the possible phonation types. This emphasises the importance of phonation differences in the structural analysis of word forms.

B. Nature of the syllables:

quantity and quality:- Gujarati words may consist of one or more open syllables i.e. those ending with a vowel, or of one or more closed syllables i.e. those ending with a consonant, or with various combinations of closed and open syllables.

Open syllables		Closed syllables		Combination	
/ ba /	'mother'	/ sap /	'snake'	/ lenar /	'one who takes'
/ poi /	'kind of creeper'	/ ərp /	'give'	/ kacbo /	'tortoise'
/ paʃi /	'young she-buffalo'	/ sətkar /	'greeting'	/ pururva/	'a historical king'

The nucleus of the syllable is a vocalic element, which may be simple, consisting of a single vowel, or complex, consisting of a vowel followed by the semivocalic glides y or v.

e.g. ⟨ bavɲu ⟩ 'shoulder', ⟨ pay ⟩ 'gives drink'

⟨ kevɲo ⟩ 'how much?' ⟨ bʰoi ⟩ '(a caste)'

⟨ avɲi ⟩ 'knew' (fem) ⟨ saykəl ⟩ 'bicycle'

Simple vowels in Gujarati may be distinguished as either long or short, complex vowels are always long. Some of the simple vowels are also invariably long, e.g. / e / and / o /. The other vowels are usually considered to pair off as short and long. This distinction (see pp.31-32) is rigidly maintained in literary Gujarati. In spoken Gujarati in monosyllabic open structures only long vowels occur and in final position will have their maximum duration, e.g. CV ja.[1] So in this position the only quantitative possibility is a heavy syllable for which the Gujarati term is 'guru'. For closed monosyllables literary Gujarati distinguishes both long and short simple vowels but in spoken Gujarati no difference in duration is possible for vowels of close quality in these structures. Thus,

din	'day'	diin	'poor'
muth	'fist'	muul	'root'

are pronounced the same, i.e. with the long vowel. These closed syllables can therefore be counted as equal heavy structures in final position and it may therefore be said that all monosyllabic free forms in Gujarati whether the syllables are closed or open can be counted as heavy syllables. Words of more than one syllable will have various combinations of heavy and light syllables.

In addition, notice has to be taken of certain qualitative features which are regularly linked to the quantity of the syllable. These are:-

1 Presence of nasality in association with the syllable nucleus.

2 Presence of whispery voice in association with the syllable nucleus.

3 Presence of both nasality and whispery voice in association with the syllable nucleus.

As can be seen from the examples on p. 28 all vowels, short or long, can co-occur with these features. The syllables are invariably heavy in quantity and the whispery voice sounds tend to be of longer duration

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1 Note: Except in the case of the particle jə which is not a free form.

than those of other types of syllable.

C. The Placement of the prominent syllable

Prominence is here considered only as a word prosody marking the inter-relation between syllables in words of more than one syllable. In all such words at least one syllable will stand out as more prominent than the others, owing to a combination of breath force, pitch and durational differences in the utterance. The position of the prominent syllable is not entirely predictable. The acute accent marks the prominent syllable in the examples below. A brief note on some of the patterns follows and attention is drawn to the relevance of different phonation types in regard to the prominent syllable.

Dissyllabic words in Gujarati have the following syllable arrangements:-

Initial and Final open syllables			Initial and Final closed syllables		
cv́cv̄	/ pán̪i /	'water'	cv́ccv̄c	/ kī́rtār /	'God'
	/ cɔ́̄ro /	'meeting place in village'		/ sā́rvār /	'nursing'
	/ bī́d̪ī /	'Indian cigarette'		/ kā́ṭmāl̪ /	'rubbish'
cv̆́cv̄	/ v̆ə́d̪ī /	'main'	cv̆ccv́c	/ sə̆tkā́r /	'greeting'
	/ kə̆́d̪ī /	'ring'		/ tə̆lvā́r /	'sword'
	/ hə̆́va/	'air'		/ sə̆rtā́j /	'greatest'
			cv̆́ccv̆c	/ kə̆́srə̆t /	'exercise'
				/ mə̆́slə̆t /	'conspiracy'
			cv́ccv̆c	/ kā́rvə̆ɳ /	[Place name of a town]
				/ jā́l̪və̆ɳ /	'carefulness'

Open and closed syllables			Closed and open syllables		
cv̆-cv̆c	/ kəmə̆l /	'waterlily'	cv̄c-cv̆	-	
	/ rəmə̆t /	'play'			
cv́-cv̆c	/ khétə̆r /	'farm'	cv̆c-cv̆	-	
	/ vétə̆r /	'cutting of cloth'			
cv̆-cv́c	/ məkán /	'building'	cv̆c-cv́	/ cərcá /	'discussion'
	/ pə̆káv /	'cook' (Imp.)		/ pə̆rcó /	'proof'
cv́-cv̄c	/ kúmaʃ /	'tenderness'	cv̄c-cv́	/ cēvḍó /	'kind of snack'
	/ vácāl /	'talkative'		/ kācbó /	'tortoise'

In trisyllabic words also, it seems that generally the first syllable has prominence. But here it is mainly governed by the quantity. However, it is very difficult to state invariable patterns for trisyllabic words. Either the first or the second syllable may be prominent in words where all three syllables have long vowels:-

e.g. / chógāli / 'beautiful woman'

but

/ hāhákār / 'uproar or tumult'.

Where all the vowels of a word are short, problems arise for the spoken form according to whether all possible vowels are pronounced. Thus forms /ə cəkən/ 'kind of dress' and /ə c-kən/ are both possible. All that can be said in general terms is that heavy syllables which have an open structure with a long vowel - which are heavy by nature - take precedence for prominence over syllables which are heavy by position through having a closed structure with a short vowel and both these heavy type syllables take precedence for prominence over light syllables, which have a short vowel in an open structure.

Polysyllabic words: It should be noted, however, that in compounds or reduplications, there is prominence on the first syllable of each

component part. And, both components, are counted as a single-compound word, on the basis of their syntactical and semantical criteria.

Compound words: / rámrám / [way of greeting]

/ ákaʃpatal / 'tried hard for something' (sky and subterranean)

/ uthʌlpathəl / 'havoc'

Reduplicated words: / ádoʃipadoʃi / 'neighbours and others'

/ kapakapi / 'massacre'

/ dodadod / 'hurriedly running'

D. Phonation types and word structures:

a. Clear:- As was pointed out on p. 69 the definition of 'clear' phonation in relation to the word structure makes more distinction in the first instance between features of syllable initial and syllable final. It is for this reason that some of the sounds which are phonetically classified as 'voice' and 'breath' (in the sense of voicelessness, apart from whisper) will from the point of view of clear phonation, fall into one category. 'Clear' words may therefore, have voiced articulation throughout,

e.g. / gagər / 'water pot'

/ dodo./ 'run' (Imp.)

No word in Gujarati will have voiceless articulation throughout, apart from whispered speech (in which voiceable sounds are voiceless, while 'breath' sounds remain voiceless), since the syllable nucleus is always voiced; but words may have voiceless syllable onset and voiceless syllable final or voiceless medial articulations and still fall within the category of the 'clear' phonation. Thus:-

/ kagəl / 'papers'

/ katər / 'scissors'

The features which are characteristic of the 'breathy' phonation type are aspiration and whispery voice associated with syllable onset or with the syllable final or, in the case of whispery voice only, with the nucleus of the syllable. Nasalisation associated with the syllable nucleus is also irrelevant and so too is the combination of nasalisation and breathiness in the syllable nucleus.

Thus the question of the prominent syllable in words which are clear will follow the patterns of quantity and quality inter-relations already set out in Section C.

b. 'Breathy': The other type of Gujarati word contains a syllable which is characterised by the whispery-voice or by the aspiration type of phonation. Gujarati also, like other Indian languages/dialects, faces similar problems regarding 'breathiness' features. To quote Siddeshwar Varma (1965), "The degree and quality of Aspiration in these dialects (North-west sub-Himalayan dialects)[1] are determined not only by position and environment, but also by controlling phonological principles" (p. 183).

At least for Gujarati, Pandit's (1957) statements regarding phonetic features of Aspiration/'murmur' (Catford's whispery voice) show their occurrence clearly: "When it is simultaneous with the vowel it is murmur (murmur being described as sotto voce, with voicing and slight lowering of pitch). When not simultaneous with the vowel it is the aspiration of the previous consonant... Aspiration in Gujarati is the breathy release which immediately follows the stop consonants, and which

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1 My brackets. 'Aspiration in North-west sub-Himalayan Indo-Aryan dialects', (1965).

is voiced when the preceding consonant is voiced, unvoiced when the preceding consonant is unvoiced." (pp. 169-70). The important general points to note are that in these words it is necessary to take account of patterns of syllable-initial, syllable-final and of the syllable-nucleus, and that it is not possible to have whispery-voice phonation as a characteristic of the whole word in Gujarati, except coincidentally in monosyllabic vowel words such as /a/ 'yes'. (Though in words with whispery-voice, the whispery-voice feature affects preceding and following consonants, especially in mono-syllabic words.) The details will be discussed in the following chapter; but it is sufficient to say that words of the 'breathy' type are mainly mono-syllabic or dissyllabic, and that 'breathiness' requires all syllabic nuclei within a word apart from the syllable containing the whispery-voice feature to have features other than this (mainly full-glottal phonation). A feature such as whispery voice in successive syllables would indicate two monosyllabic words in sequence, apart from rarities such as /guugəəro/ 'rattle', (further examples of all types are given at the end of this chapter). However, aspiration as a phonetic exponent of 'breathy phonation' (in syllable-initial and syllable-final position) can occur more than once in a word, as in the examples below, though this is not too common.

The following examples are arranged to exhaust the different possibilities of Gujarati words which show 'breathiness' in mono-syllabic, dissyllabic words (where aspiration can occur successively), and other polysyllabic words, and some exceptions, (where a combination of aspiration and whispery voice may occur).

Examples:

(i) Whispery-voice as syllable-nucleus:

Mono-syllable:	[ba̤· r]	'outside'
	[pa̤· ɽ]	'mountain'
	[a̤ɽ]	'bone'
Dissyllable:	[dɛ̤rũ]	'small temple'
	[pɛ̤lo]	'first'
	[kə̤yũ]	'said'

(ii) Whispery-voice as syllable initial/final:

Mono-syllable:	[ga̤a̤] / [gɦa]	'wound'
	[ba̤a̤r] / [bɦar]	'burden'
	[koɖɦ] / [kə̤ɽ]	'leprosy'
	[labɦ] / [la̤b]	'advantage'

More than one syllable: Whispery voice occurring twice (rare):

[ja̤ã̤jə̤ə̤r]	'anklets'
[ga̤a̤gə̤ə̤ro]	'petticoat'
[ba̤a̤bi̤i̤]	'brother's wife'
[də̤̃ə̤̃do̤o̤]	'job or business'
[ɖə̤̃ə̤̃ɖe̤ero]	'proclamation'

and most of the onomatopoeic word:

e.g.	[ba̤ã̤bə̤ə̤rvũ]	'noise made by cows'
	[gṳṳgə̤ə̤rɽi]	'tinkling of little bells'
	[gə̤ə̤mgə̤ə̤m]	'noise of bells'
	[jə̤ə̤ŋjə̤ə̤ŋaʈ]	'a kind of noise'

(iii) Aspiration as syllable initial/final:

Mono-syllable:

/kha/	'eat'
/phor/	'blossom'
/sukh/	'happiness'
/kukh/	'waist'

More than one syllable: Aspiration occurring twice (fairly rare):

/khəkhəɳdəəj/	'half broken'
/kʰãkʰãkʰoɭãː/	'looking hard for something'
/khakhakhikhi/	'giggling'
/khakhəro/	'dry chapati'
/chicʰərũ/	'shallow'
/ʈʰaʈʰəɳi/	'coffin'
/thothəvay/	'stammered'
/khokʰũ/	'box'
/khokho/	'name of a game'

(iv) Combination of whispery voice and aspiration (very rare):

/b̤uukh/	'hunger'	/kʰad̤uũ/	'ate'
/j̤ãakhu/	'dim'	/khad̤ɦ/	'loss'
/d̤ookho/	'regret'	/kʰəb̤oɔɭəj/	'name of a village in Gujarat'
/b̤iikhari/	'beggar'	/thob̤oo/	'stop'
/ɖɛɛkhalo/	'piece of brick'	/tʰãb̤əəlo/	'pillar'
/b̤aakhəri/	'thick chapati'	/kʰãb̤aa/	'name of a village in Kathiawad'
/b̤uukhrũ/	'discoloured'	/kʰəb̤aat/	'name of a town'

From the above examples in Gujarati so-called 'voiced aspirates' present some interesting phonological problems more than voiceless aspirates. As Varma (1965) has rightly said "... the parallel

correlates of the voiced aspirates of Sanskrit and other modern Indo-Aryan languages have developed forms which are infinitely more intricate than those of the voiceless Aspirates." (p. 185)

CHAPTER VII

Syllable Places

H and non-H prosodies:

The basic syllables structures in terms of C and V elements and their arrangements were set out in Chapter III (p. 45). It is now necessary to consider in detail features which characterise (I) Syllable Initial, (II) Syllable Final, and (III) the syllable as a whole, in so far as these have relevance for the different phonation types.

The first syllable of Gujarati words may be either V-initial, or CV-initial or V-final or VC-final. In the 'clear phonation' type of word, (for which the prosodic sign /A/ will be used in general formulae) there is no restriction on the vowels which can commute; and all types of consonants are possible apart from those few which cannot occur initially e.g. certain retroflex sounds (pp. 40-46). Plosive, nasal, fricative, lateral and tapped articulations can all be found in either syllable initial or syllable final positions.

I Syllable initial:

A Non-H:

The patterns in non-H syllable initial may be further classified according to contrasts involving voiced and voiceless articulations together with the nature of the strictures concerned.

V-initial syllables are voiced only; these have absence of stricture (or, alternatively, the minimum degree of stricture).[1]

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1 All voiced sounds have, of course, corresponding voiceless sounds in whispered utterances; for whispered examples of /ˆkhoɭi_/ 'found' (fem.), /ˆkoɭi_/ 'koli' (tribe), etc., see Appendix F.

CV-initial syllables involve both voiced and voiceless articulations. If the consonant is plosive then both voiced and voiceless contrast; these have total stricture (or, alternatively, the maximum degree of stricture), both oral and nasal.

If the consonants are not plosive, they must be either voiced or voiceless: the fricatives / s / and / ʃ / are voiceless[1]; the nasals, laterals, and tapped sounds are voiced. All these sounds have partial stricture (or, alternatively, an intermediate degree of stricture).

Using the symbol P to represent any appropriate plosive (⌜k, c, ʈ, t, p; g, j, ɖ, d, b⌝) and the symbol C as a summary symbol to represent all the non-plosive consonants, (⌜n, m, l, ʃ, s, y, r, v⌝) the following formularizations can be made:-

Non-stricture	Partial-stricture	Total-stricture
voiced # V-	voiced # CV-	voiced # PV-
	or	and
	voiceless	voiceless

Examples:

# V-	# CV-	# PV-
/ a / 'this'	/ maɭa / 'garland'	/ gaɖi / 'train'
/ e / 'that'	/ nari / 'woman'	/ jaɖi / 'fat'
/ aʃa / 'hope'	/ lal / 'red'	/ dadi / 'grandmother'
/ iʃ / 'God'	/ sari / 'good'	/ kaɭi / 'black'
/ uɽ / 'fly'	/ ʃir / 'head'	/ coɭi / 'blouse'
/ɛʃ/ 'relaxation'	/ vav / 'well with stairs"	/ tap / 'heat'
/ op / 'shine'	/ yad / 'remembrance'	/ ʈaʈ / 'special type of plate'
/ɔɭo / 'shadow'	/ rat / 'night'	/ pap / 'sin'

---

1 The voiced fricative consonant ⌜z⌝ is an exception. Since this occurs only in the pronunciation of literate speakers using borrowed words, it can be excluded from the general Gujarati system stated above. Many speakers use ⌜j⌝ instead of ⌜z⌝ in these words.

The phonetic exponents of H in these different types of syllable-initial will be dealt with after the general statement of the possible H prosodic exponents which follows.

B H -

Those syllable initials are exponents of the 'breathy phonation' type, which the prosodic symbol H indicates. The patterns for syllable initial may be formularized in a similar way to show the combinations of this larynx activity with stricture patterns which occur in these H - word syllable initials. There is no restriction here either on the vowels which commute in these types of stricture; but, as will be seen from the table, only plosives and affricates commute in consonant-beginning H syllable-initials.

Non-stricture	partial stricture	Total stricture
voiced ^{H} V -	-	voiced ^{H} PV -
or		and
voiceless		voiceless

Examples:

^{H}V -		^{H}PV -			
/ həst /	'hand'	/ kha /	'eat'	/ ghoɖo /	'horse'
/ hərʃ /	'joy'	/ thak /	'tiredness'	/ jhaɭ /	'flame'
/ hoɭi /	'Holi'	/ t̪har /	'cold'	/ dhak /	'fear'
		/ chap /	'impression'	/ ɖhaɭ /	'slop'
		/ phaɽ /	'tear' (Imp.)	/ bhaɭ /	'inquiry'

In the phonetic section (Chapter II) reference was made to the fact that / h / could be voiceless or voiced; the examples above could be read as ⌜həst⌟ or ⌜̬həst⌟, ⌜hoɭi⌟ or ⌜̬hoɭi⌟ etc. Preference in my own speech is for ⌜̬h⌟; but this statement requires amplification, as follows. For the complete account of phonetic forms

it is necessary to distinguish (a) literary words of Sanskritic origin (tatsama words), where the alternatives ⌈h- /ɦ-⌋ cover the range of phonetic variants, and (b) those Gujarati words (tadbhava words) - which are derived from Sanskrit via Apabhrmsa) which show a further variant possibility of syllable-initial: whispery-voice syllabic vowel (⌈V̤-⌋). In structural terms (a) the Sanskritic ^{H}V- words can be kept apart from (b) those ^{H}V- words which show an alternation between ⌈hV̤-⌋ / ⌈ɦV̤-⌋ and the syllable-initial whispery-voice of ⌈V̤-⌋.

Examples:

(a) Sanskritic			(b) tadbhava (pure Gujarati)		
/ həst /	'hand'	⌈həst⌋	/ hoḷi /	'Holi'	⌈hoḷi⌋
		⌈ɦəst⌋			⌈ɦoḷi⌋
/ hərʃ /	'joy'	⌈hərʃ⌋			⌈o̤ḷi⌋
		⌈ɦərʃ⌋			
			/ hiro /	'diamond'	⌈hiro⌋
					⌈ɦiro⌋
					⌈i̤ro⌋
			/ har /	'necklace'	⌈har⌋
					⌈ɦar⌋
					⌈a̤r⌋

Both these sets of words, (a) Sanskritic and (b) tadbhava contrast with the invariable ^{H}V- structures previously discussed (section A). It will also be necessary to show in due course that words in the alternating (tadbhava) class (⌈ɦv⌋ / ⌈V̤⌋ / ⌈hV⌋), must be kept separate from words in the invariable -V^{H} class, which will be discussed later (Section II).

In ^{H}PV - patterns, where there is total stricture, there are no

alternative phonetic forms within the scatter of single words. All of them show either (i) initial aspirate release of the stricture (and this cannot co-occur with whispery voice of the syllable nucleus; Cf. also set (b) above), or (ii) whispery-voice release, the closure, if voiced, being also characterized by whispery voice; i.e. it is not possible to alternate whispery-voice as a partial feature of the vowel (⌈P̤V̤V -⌋) with whispery voice for the vowel as a whole (*⌈P̤V̤ -⌋) for a given lexical item, though an alternation of partial whispery voice with whispery voice as a feature of the syllable-whole is possible in the syllable final (- VP^{H} ; e.g. ⌈- VPh⌋ / ⌈- P̤V̤P⌋, Section II B).

Examples:

/ phor /	'blossom'	/ bhor /	'dawn'
/ kha /	'eat'	/ gha /	'wound'
/ chəri /	'knife'	/ jhəri /	'silvery work'
/ ʈhɔr /	'kind of sweet'	/ ɖhor /	'cattle'
/ thɔr /	'cactus'	/ dhol /	'slap'

The table below brings together the contrastive types of syllable initial, and the contrasting phonetic exponents for syllable initial are discussed.

	Non-stricture	Partial stricture	Total stricture
i.	Ḧ : vcd.	vcd./vcls. ^{Ḧ} CV-	vcd./vcls. ^{Ḧ} PV-
ii.	H : vcd./vcls.		vcd./vcls. ^{H} PV-

Non-Stricture: It would not be possible on the basis of hearing a phonetic form such as ⌈hoɭi⌋ to know in which group of ^{H}V- initial, the Sanskritic or tadbhava, to classify it; but at least one can say that a form such as ⌈o̤ɭi⌋ could not be classified with the 'clear phonation' type or the Sanskritic type. Only when the former phonetic form is considered in relation to the latter two variants in the phonetic

scatter of the same word, can they formally be classified as belonging to the tadbhava group, which shows alternating possibilities for the syllable initial.

Partial stricture: Partial stricture forms are assigned only to the non-H type of syllable initial. The phonetic exponents here will naturally vary according to the particular C term of the given example; and nothing further requires to be said that has not already been stated in the phonetic section (Chapter II) and in section (A) above.

Total stricture: The total-stricture forms provide a structural contrast between H and non-H syllable-initial. The important exponents are (i) aspirated versus non-aspirated; (ii) whispery voice versus 'normal phonation'; (iii) release of the plosion. Where the stop is voiceless, the release in the H word will be voiceless; and voice will then mark only the medial phase of the syllable. (This syllable nucleus cannot be whispery.)

i) For the non-H term the phonetic exponent is the control of the breath stream so that on the release of the stop the vocal cords vibrate immediately, and the syllable nucleus cannot of course be breathy.

ii) Whispery voice release versus implosion. Where the stop is voiced, whispery voice can accompany the release (and the closure too); this whispery voice articulation continues a long way into the syllable. In voiced non-H syllables, on the other hand, there is never whispery voice; and the release tends to be implosive, particularly in the case of the dental and labial plosives.

Voicing prosodic system (v, $\bar{v}$):

At this point it is necessary to recognize a further syntagmatic distinction to be stated here for the 'breathy' word (H) prosodic type of syllable-initial piece, and to state it phonologically as a prosodic sub-system, for the H-word syllable-initial piece; it comprises the two terms v (so named from the initial letter of voice) and the contrasting term ($\bar{v}$). The phonetic exponents of the two terms are here (/P/ symbolizes a voiceless plosive/affricate consonant, and /B/ the corresponding voiced consonant):

	consonant	vowel
v:	voice	voice throughout /BVV -/
$\bar{v}$:	voicelessness	initial voicelessness, /PVV -/ with high volume velocity of the airstream

Examples:

v		$\bar{v}$	
/baai/	'brother'	/poor/	'blossom'
/gɛɛr/	'at home'	/kaa/	'eat'
/dool/	'drum'	/ɓɔɔr/	'kind of sweet'
/dool/	'slap'	/toor/	'cactus'
/jaal/	'hold'	/caal/	'skin of fruit'

II Syllable final:

A Non-H (И)

The patterns here may be formularized in a similar way:

Non-stricture	Partial stricture	Total stricture
[1] Vcd. $-V^{И}$	vcd. $-VC^{И}$	vcd. $-VP^{И}$
	or	and
	vcless.	vcless.

Examples:

$-V^{И}$		$-VC^{И}$ [2]		$-VP^{И}$ [3]	
/ ma /	'mother'	/ bar /	'twelve'		
/ ke /	'or'	/ mel /	'put'		
/ oɻo /	'roasted corn'	/ meɻ /	'total'	/ pak /	'harvest'
/ mɛ̃ /	'me'	/ mɛʃ /	'eyeliner'	/ kac /	'glass'
/ pi /	'drink' (Imp.)	/ kan /	'ears'	/ kaʈ /	'rust'
/ mɔ̃ /	'face'	/ kaɽ̃ /	'mourning after death'	/ vat /	'story'
/ tu /	'you'	/ kam /	'work'	/ ap /	'give'
/ jə /	showing emphasis	/ paɽ /	'fall'	/ ag /	'fire'
		/ is /	'bedstead'	/ ab /	'water'
		/ av /	'come'	/ yad /	'remembrance'
		/ boz /	a surname	/ aɖ /	'other'
		/ jay /	'went'	/ aj /	'today'

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1 See p.84, Note 1.

2 ⌈-C⌋ symbolizes the following set of consonants (non-plosives): ⌈r, l, ɻ, s, ʃ, z, ʒ̃, v, m, n, ɳ, y⌋ (12).

3 ⌈-P⌋ symbolizes the plosives and affricates: ⌈k, c, ʈ, t, ρ, b, ɖ, d, g, j⌋ (10).

There are no prosodically significant relations in non-H word syllables between the various syllable initial features and the various manners of syllable final. Thus plosives may be both initial and final in the same syllable, and so on for the other consonants. It will be recalled that in Chapter III, restrictions on combinations of consonants were pointed out. These are not in question here since they do not contrast in different phonation patterns.

B H:

Non-stricture		Partial stricture	Total stricture	
vcd.	$-V^H$	-	vcd. and Vcless.	$-VP^H$

Examples:

/ ca^h /	'tea'	/ vagh /	'tiger'
/ $kɔ^h$ /	'tell me' (respective)	/ dudh /	'milk'
/ $kɛ^h$ /	'tell me' (not respective)	/ labh /	'advantage'
		/ dukh /	'sorrow'
/ bi^h /	'scared' (fem.)	/ kodh /	'leprosy'
/ $ũ^h$ /	'I' (1st person singular)	/ sajh /	'evening'
/ $ɔ̃^h$ /	'[answer to call]'	/ maph /	'forgive'
		/ path /	'road'
		/ vãch /	'wish'
		/ ath /	'eight'

As with the syllable-initial exponents of the H prosodic term, it will be seen that H syllable finals may have either total stricture or non-stricture; all partial strictures are excluded from this phonation type.

It is necessary, before dealing with the exponents of syllable-

final non-H and H to show that certain words have alternative phonetic forms. These are where there is total stricture with voice in the syllable final position in H words e.g. / dudh / 'milk', / vagh / 'tiger', / labh / 'advantage', etc. The alternative phonetic forms show either (i) 'normal' voice for the vowel, together with (ii) plosion with whispery-voice /⌒dudʱ⌒/, /⌒vagʱ⌒/, etc. or (i) whispery-voice vowel together with (ii) plosion with 'normal voice' release /⌒dud̤⌒/, /⌒vag̤⌒/ etc. The alternation in phonetic form can be shown as /⌒-VPʱ⌒/ / /⌒-V̤P⌒/. This alternation is not possible where the final plosive is voiceless: the structural pattern there is limited to /⌒-VPʰ⌒/.

There are some words which appear to contradict the general rule that it is not possible for H words to have their phonetic criteria (i) whispery voice, (ii) aspiration, in both syllable-initial and syllable final (together in a word).

/⌒khakhəro⌒/	'dry chapati'	/⌒gʱagʱəro⌒/	'petticoat'
/⌒cʰa̤chiyṳ⌒/	'to be cross with someone'	/⌒jʱajʱər⌒/	'anklets'
/⌒thothəvay⌒/	'stammered'	/⌒dʱa̤dʱəl⌒/	'disturbance'
/⌒ʈʰaʈʰə̤ɖi⌒/	'coffin'	/⌒ɖʱə̤ɖʱero⌒/	'proclamation'
/⌒phephəsa̤⌒/	'lungs'	/⌒bʱəbʱerɳi⌒/	'to incite'

From the above examples it is clear that the /⌒Ch - Chʱ -⌒/ and the /⌒Cʱ - Cʱ -⌒/ types are more common than the type /⌒Ch - Cʱ -⌒/, where either (i) the syllable initial has aspiration and the syllable final has whispery voice, or vice-versa, e.g. /⌒bṳukh⌒/ 'hunger', /⌒khadṳṳ⌒/ 'ate' and most of the examples listed in Chapter VI, p. 82, IV.

Here, it would be proper to mention of Grassmann (see p. 56, footnote), that he, too, was aware of corresponding exceptions in Sanskrit, and that he

suggested onomatopoeia as an exception for some Sanskrit words, (e.g. ghurghurā, ghərghurghā, jharjhar etc; see p. 112, 1967, ed. Lehmann); this may be true of some Gujarati examples e.g. [guugəəro] 'rattle', [babərvũ] 'sound made by cows', [jaajər] 'anklets' etc. but as he has suggested in his article that "Originally [i.e. in the Indo-European language] then the aspirate must have been repeated as such too, and only later when the repeated root combined into one word and the above stated law (see Grassmann, p. 112) of euphony entered into effect did one of the aspirates give up its aspiration". (p. 112) It appears that at least a few Gujarati words have retained their historical characteristics in repeating aspiration in the same roots in the examples like / bhukh / etc. and some onomatopoeic words like / ghughəro / etc.[1] However, the citation forms [buukh], [khakhəro], etc. lose their syllable-final aspiration in their conversational form like [məne buuk lagi che] 'I am hungry', or [məne khakro apo] 'give me dry-chapati'. Possibly these conversational forms represent a tendency for Gujarati to move towards phonetic forms in which H ('breathiness') has its aspiration/whispery voice exponent only once in the word, without exception. It would be an interesting research work to study this feature not only in Indo-Aryan languages but also in the whole area of Indo-European languages.

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1 Punjabi and Nepali have already solved this problem of the over-representation of H phonetically by developing pronunciations in which the whispery-voice feature or its aspiration alternative occurs only once; thus for 'hunger' Punjabi has [pəkh], 'bukh' in which only the syllable-final has aspiration, while Nepali has [bɦok] bhok in which whispery voice occurs only in the syllable-initial.

III Syllable as a Whole:

It remains to point out that there are words in which whispery voice as an unvarying component of the syllabic vowel, but linked to syllable-initial and syllable-final, can be set-up. Such words will be (C) $V^{H}C$, where the final /C/ is a summary symbol for all partial stricture articulations (pp. 92-93); and the initial /C/ symbolizes partial stricture and total stricture equally. They are in contrast not only with all non-H examples but also with those H alternative patterns dealt with under non-strictures and total strictures in section (II B) above.

In this third type, whispery voice occurs as a feature of the syllabic vowel in a syntagmatic relationship with features other than the plosion described in the immediately preceding section (II B): features that occur following /V/ are tapped sounds, non-syllabic vowels and laterals; (C) $V^{H}C$

Examples:

/ba̤:r/	'outside'	/pa̤:ʔ/	'mountain'
/mɛ̤:l/	'palace'	/ʃɛ̤:r/	'city'
/na̤:vṳ̃/	'to take a bath'	/dud/	'milk'
/sa̤:yu/	'suffered'	/pi̤ʔ/	'mature'
/mɔ̤:r/	'blossom of mango'		

As far as the preceding consonant is concerned there is no feature of place or manner of articulation, (apart from some retroflex sounds already mentioned ɳ, ɾ, ɭ, ɽ̃) with which this whispery-voice in the vowel is not syntagmatically related. The above examples show voice + plosion, voicelessness + plosion, friction + palato alveolarity, nasality. (For further examples see p. 27). Aspiration + plosion is of course excluded.

The same relation with the features of the initial consonant applies equally to the examples considered in section II B above, H words in which the exponency of H characterises a word final ($-V^{H}$). In the examples given there whispery voice throughout the vowel is shown to be associated with the following features of preceding consonants: voice + plosion, voicelessness + plosion, (+ non aspiration), friction + palatoalveolarity, tap, etc.

IV Non-H and H comparison:

a V-: The phonetic exponents which characterise non-H and H are:

1 'Normal' glottal phonation with a bright voice quality and comparatively high pitch for Ḿ throughout the word.

2 (i) In the **V**-syllable-initial piece, whispery-voice phonation (with a chesty voice quality) and comparatively low pitch for H. Vowels tend to be longer in these syllables than in corresponding non-H word syllables.

(ii) in the $\bar{\mathbf{V}}$ syllable-initial piece the phonetic exponents of H are: (i) aspiration, in which the high volume velocity of the airstream is an important factor, associated, of course, with voicelessness of the initial consonant.

b -VP: Phonetic exponents which characterise the terms H and Ḿ in this type of syllable-final piece have to be stated with reference to the larynx activity in syllable final position.

In Ḿ words,

1 Where the syllable-final consonant is voiceless the air-stream mechanism in Ḿ words will be glottalised, and the release will be ejective; e.g. /'tap'/ 'heat' /'tak'/ 'aim'.

2 Where the syllable-final consonant is voiced the release will be very weak and with 'normal' voice, e.g. /'bag̬/ 'garden',

/ab/ 'water'.

3 All vowels have 'normal' voice, e.g. /ɓa/ 'mother', /ɓi/ 'seed'.

4 The voice quality will be clear and bright and the pitch will be comparatively high.

In H words,

1 Where the syllable final is voiceless, the plosion must be pulmonic and the release may be made with aspiration. Frequently, as for example in conversational style, (where voiceless aspiration is unaccented or not stressed e.g. /mạri ãk̓/ 'my eye' Cf. I-2 /pəkʃi ni pãk̓/ 'bird's wing' etc.) there is little or no aspiration and the major difference will be that the release cannot be ejective in this case.

2 Where the syllable final is voiced, the alternative patterns of (i) whispery-voice release with 'normal' voice vowel and (ii) whispery-voice vowel, with 'normal' voice release, have already been referred to. (p. 93)

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1 As in Ambalavi, (Varma 1965) "It is notable that / h / maintains entirely its aspiration in [sath] "with", when stressed, but with the same meaning, the word losing in aspiration, when it is unaccented, in sentences:

/malən sath leli/ "he took the gardener's wife with him" p. 183.

Also Cf. S.K. Chatterji, for Bengali, "Aspirated plosives commonly lose their aspiration finally and intervocalically ... An aspirated plosive which is followed by another plosive loses its aspiration and behaves like a stop".
e.g. (1) megɦ korec(h)e > mekkorec(h)e. (it's cloudy)
(2) rɔth tɔla > rɔttla (field where the car-festival is held.)

In conclusion we may say that, apart from a very few exceptions (pp. 81-82), it is not possible to have aspiration and whispery voice in the same syllable. It may further be said that no word will exhibit both these phonetic characteristics even in subsequent syllables, apart, again, from the rare exceptions on pp. 81-82.

Examples:

(i) Syllable-finals

-VC$^{\not H}$		(C)V^{H}C	
/bar/	'twelve'	/ba:r/	'outside'
/vɛɳ/	'promise'	/kɛ:ɳ/	'invitation'
/mɛl/	'dirt'	/mɛ:l/	'palace'
/cɛn/	'not in a good mood.'	/bɛ:n/	'sister'
/lav/	'give' (Imp.)	/la:v/	'chance'
/keʃ/	'hair'	/kɛ:ʃ/	'I will tell'
/lay/	'give' (Imp.)	/la:y/	'fire'
/gɔɭ/	'molasses'	/ɔ:l/	'hair do'

-VP$^{\not H}$		-VP^{H} (alternative phonetic exponents)	
/tapˀ/	'heat'	/vagɦ/ / /vag/	'tiger'
/takˀ/	'aim'	/aɖɦi/ / /əɽi/	'two and a half'
/kacˀ/	'glass'	/dudɦ/ / /dud/	'milk'
/vatˀ/	'story'	/labɦ/ / /lab/	'advantage'
/kaʈˀ/	'rust'	/sãjɦ/ / /sãj/	'evening'
/ag/	'fire'	/maph/	'forgive'
/aɓ/	'water'	/dukh/	'sorrow'
/aj/	'today'	/much/	'moustache'
/aɖ/	'other'	/sath/	'with'
		/aʈh/	'eight'

(ii) Syllable-initial

$\not H_{V-}$		H_{V-} (alternative phonetic forms)	
/a/	'this'	/a/ // /ha/	'yes'
/e/	'that'	/i:ro/ // /hiro/	'diamond'
/ɛ̃/	'eh'	/oli/ // /holi/	'Holi'

$\not H$ PV-		H PV-	
/gaɽi/	'train'	/phor/	'blossom'
/jaɽi/	'fat'	/boor/	'dawn'
/coɭi/	'blouse'	/thok/	'beat'
/kaɭi/	'black'	/dool/	'drum'

It will be seen that prosodic analysis deals with the multiple phonetic patterns exhibited in Gujarati in a different manner from the linear monosystemic phonemic approach, which has as one of its concerns the systematic transcription of the examples. The emphasis in prosodic analysis is on those elements which have syntagmatic implications for the whole structure or structures under consideration. To quote Robins (1957), "The aim of prosodic analysis in phonology is not that of transcription or unilinear representation of languages, but rather a phonological analysis in terms which take account not only of paradigmatic relations and contrasts, but also of the equally important syntagmatic relation and functions which are operative in speech. These syntagmatic factors should be systematized and made explicit in phonology, no less than paradigmatic contrasts". (pp. 3-4)

Variation in the phonetic forms is given recognition in different ways; and the function of the differences in relation to the structures set up is formally recognised. Thus ejectiveness is recognised as a phonetic exponent of non-H in a word-final syllable-final piece, where other supporting differences would include voicelessness and total stricture.

e.g. ⌈kapˀ⌋ 'cut'

⌈kaʈˀ⌋ 'rust'

⌈kacˀ⌋ 'glass'

⌈pakˀ⌋ 'crop'

⌈kə̃tˀ⌋ 'making string from raw cotton'

The contrasting phonetic exponents for H in the same (syllable-final) type of piece are release with weak breath force and pulmonic air-stream mechanism.

e.g. ⌈mə̃kh⌋ 'fly'

⌈kakh⌋ 'waist'

⌈sukh⌋ 'joy'

These are phonetic exponents of prosodic terms characterising comparable word finals, and provide phonological contrasts in this type of piece. These phonetic exponents will not be in contrast in other types of piece.

The emphasis throughout has been to show the interrelation between phonetic features which provide exponents for the various terms of prosodic systems in given structures in Gujarati words, and to provide simple formulaic expression of this in general terms. The limitation made at the outset to phonation types has meant that other prosodic systems have been left out of consideration, and, in particular, detailed differences which did not appear to bear on this problem have been ignored. The examples in transcription have attempted to cover a wide range of phonematic possibilities. These further problems remain for investigation in Gujarati.

CHAPTER VIII

Some Instrumental Evidence in Support of the Analysis

The main difference between the earlier detailed instrumental analysis by Dave (1967) and Fischer-Jørgensen (1967) and my study is that they were very much concerned with exploring the potentialities and the limitations of the instruments that they were using or had developed. Also, they were interested in finding out how far the instrumental analysis could help in finding out different physical characteristics of this special feature of Gujarati (i.e. 'murmured/breathy' vowels of Gujarati). While my instrumental data is limited to supporting my analysis, a further difference is that they have used several different informants speaking notably different dialects of Gujarati. My use of instrumental techniques applies only to my own speech.

Mingograms: Fischer-Jørgensen deals first with airflow and comes to the conclusion that "the difference between clear and murmur is great and the significance level is high" (p. 86). Her examples do not include words with initial aspiration (and therefore voicelessness - cf. Abercrombie (1967), p. 148; "Aspiration, in other words is a period of voicelessness that follows the voiceless closure phase of the stop".). When my two examples of the H word-prosody in word-initial position /khoḭi/ 'found' (fem.) and /g̈oḭi/ 'stirred' (fem.) are compared with the two examples (Chapter VII, section I) of non-H /koḭi/ 'koli' /tribe/ and /goḭi/ 'water pot', it is clear that there are good grounds for associating the aspirated (voiceless) example with the whispery-voice example. The excursion that marks the initial plosion in the air-flow curve is manifestly greater for the former two; indeed if measured, crudely, in terms of the large and small square of squared

paper, they show an excess of at least 100% in the case of the voiceless H initial example ⌜khoɬi⌟ over the correspondingly voiceless non-H example ⌜koɬi⌟ and about 40% in the case of the voiced initial example ⌜ɡ̈ooɬi⌟ over the correspondingly non-H example ⌜ɡoɬi⌟.

It is worth noticing that both the voiced examples, the whispery voiced and the full-glottal, are alike, and they also give evidence of implosion. (Cf. also Fischer-Jørgensen (1967) p. 88: "A slowly rising air-flow curve is also often found after voiced stops, in some cases the curve may even remain on the zero line for some centiseconds. This is probably an indication of implosive stops ..." Also on p. 89: "The occurrence of implosive stops is not limited to the position before murmured vowels, they are even more common before clear vowels (which may be explained by the weaker air flow of these vowels) but it may nevertheless be a possible explanation of the curious description given by Chatterji and quoted by Pandit, 1957, p. 171), according to which the "slight h-sound" of murmured vowels should simply be "nothing but" the sound of an accompanying glottal closure. He may have heard implosive stops in connection with murmured vowels and considered these two peculiar phonetic features as one and the same.")

The examples in which the exponents of H and non-H are associated with a syllable-nucleus (Chapter VII, Section III) such as ⌜ba·r⌟ 'twelve' and ⌜b̤a:r⌟ 'outside', the mingo-grams show an excess of air flow for ⌜b̤a:r⌟ of approximately 50% over ⌜ba·r⌟ throughout the word, though as far as ⌜b̤a:r⌟ is concerned the air flow reaches its peak soon after the release of the initial consonants, differing in this respect from ⌜ɡ̈ooɬi⌟ where maximum air flow clearly occurs immediately on the release of initial consonant.

In addition to the phonation difference there is a marked vowel quality difference between /ˈba·r/ and /ˈbɑ̈:r/: the vowel in the latter is sufficiently back to be symbolized with the italic *ɑ* symbol of the open back non-rounded category as opposed to the open-front non-rounded features (a of /ˈba·r/). This can easily be heard in the tape recordings; it can also be readily seen in the spectograms from the lower formants. (Compare also the spectograms of /ˈca·/ and /ˈcɑ̈:/ in this respect.) Fischer-Jørgensen uses the symbol italic *ɑ* for both types of examples, and it is true that their spectograms (Figure 2) both look similar, unlike my own.

Whisper in Gujarati has much the same social significance as in other languages and by no means is uncommon. It was not ignored by Fischer-Jørgensen: (p. 89) "A very short series of <u>whispered words</u> (five examples of /ˈbar̈/ and five of /ˈba·r/) ... There was also in whispered speech, an obvious difference in airflow between murmured and clear vowels, but the difference was smaller than in normal speech ... an increase of 45% in murmured vowels." (Cf. p. 116 "Although murmured vowels are quite clearly distinct from whispered vowels, they have certain features in common, above all the opening of the glottis and the strong air flow".) In my own material the air flow towards the beginning of /ˈbɑ̈:r/ continues to be about 50% greater than for /ˈba·r/ in whispered utterances.

A further and rather mysterious difference in whisper between H and non-H is the appearance of very brief vibration on the larynx tracings of my mingograms corresponding to the release of the plosive in the H examples e.g. /ˈbɑ̈:r/. This tiny vibration is matched by a small peak on the intensity readings. Though small, these peaks are noticeably larger than the small peaks that also occur in intensity in

tracing for the non-H examples /ko{i/ and /go{i/. The same features, though on a smaller scale, are also present on the larynx and intensity tracings of /vaːgh/ 'tiger' /iro/ 'diamond' and /pɛlo/ 'first'.

Spectograms: I have already drawn attention to the difference in the appearance in the lower formants of examples of H and non-H when spoken aloud in spectograms. As exemplified in /ɓa·r/ and /ɓaːr/ and /ca/ and /caː/, and when spoken aloud, a further difference between my two phonation categories that appears in spectograms is the difference in white noise between them. (Cf. Fischer-Jørgensen (p. 112) "It would be natural to expect more 'noise' in murmured vowels because of the stronger air stream".) Pandit (1957, p. 172) also found some random distribution of energy particularly in high frequencies in /pɔr/ as compared with /pɔr/. In the examples of H this feature comes down much lower in the spectrum than in the non-H, e.g. the left hand halves of the spectograms of /a/ 'yes' as against /a/ 'this'; /ɓaːr/ 'outside' as against /ɓa·r/ 'twelve'.

This is less easy to observe in whispered examples, but even there /ɓaːr/ 'outside' and /paːɽ/ 'mountain' in whispered speech give an impression of having a more 'feathery' appearance in which the vertical lines seem to be more wavy and less dense and to band more especially just above the voice bar than they do in non-H examples.

A couple of suggestions with regard to extending, for future investigations the kind of analysis reported here may now be made. It may be interesting to see whether whispery voice feature is retained in the Gujarati speech of native Gujarati speakers who have settled abroad for a long period of time. Arising from that there is also an

interesting possibility of researching into the extent to which whispery voice feature is acquired by a non-native learner of Gujarati as a second or a foreign language.

The comparative study of H feature and its disappearance or being retained only in one place in the word would be an interesting problem remaining for further investigation.

APPENDIX A - To Section I Phonetics

List of the examples, which are used in Chapter I.

Group 1 Words with the clear vowels:-

1	əkəɭ	'mysterious'
2	əkhuʈ	'endless'
3	əɽi	'she touched'
4	akar	'shape'
5	aso	'a name of the month'
6	arpar	'through'
7	bar	'twelve'
8	bɛ	'two'
9	dur	'far'
10	din	'day'
11	diin	'poor'
12	datəɳ	'toothbrush' (from the tree)
13	ek	'one'
14	ɛɖh	'a kind of tree'
15	həva	'air'
16	is	'leg of bed'
17	iɽa	'a vein on the wrist'
18	ju	'lice'
19	koro	'dry'
20	kale	'tomorrow'
21	kheɖut	'farmer'
22	khoɭ	'cover'
23	khɔ	'persistent habit'
24	khɔɭo	'lap'
25	maʃi	'mother's sister'
26	mil	'mill' (l.w.)

27	mel	'put' (Imp.)
28	mɛl	'dirt'
29	mul	'price'
30	mol	'crop'
31	mɔɭ	'nausea'
32	məɭ	'meet' (Imp.)
33	maɭ	'storey'
34	mər	'go to hell'
35	mar	'slap' (Imp.)
36	mor	'peacock'
37	məkan	'house'
38	muʈh	'fist'
39	niʃaɭ	'school'
40	oɽo	'room'
41	ɔɭo	'shadow'
42	piɖ	'pain'
43	pɔʃ	'hollow made with palms'
44	pɔr	/place name/
45	sat	'seven'
46	səkəɭ	'whole'
47	ʃiʃi	'bottle'
48	tel	'oil'
49	uʈh	'stand up' (Imp.)
50	uɽu	(9) 'fly'
51	vecaɳ	'sale'

Group 2 Words with nasalized vowels:-

1	ĩɖã̀	'eggs'
2	vɛ̃t	'span'
3	pɔ̃k	'roasted corns'
4	ũɖu	'deep'
5	sə̃t	'saint'
6	sãt	'land rented for agriculture'
7	pɛ̃ɖo	'kind of sweet'
8	pɔ̃ci	'wristlets'
9	lũgi	'type of dress'

Group 3 Words in contrast with the clear and whispery-voice vowels:-

	'Clear'		in contrast with the	Whispery voiced
1	piɣ	'pain'	p̤iɣ	'mature'
2	mel	'put' (Imp.)	m̤ɛl	'palace'
3	dur	'far'	d̤ud	'milk'
4	mor	'peacock'	m̤ɔr	'blossoms'
5	əɣi	'she touched'	ə̤ɣi	'two and a half'
6	bar	'twelve'	b̤ar	'outside'

Group 4 Words in contrast with the nasalized and the whispery-voice vowels:-

1	pɛ̃ɖo	'kind of sweet'	p̤ɛdo	'used to'
2	pɔ̃ci	'wristlets'	p̤ɔci	'she reached'
3	lũgi	'type of dress'	ṳ̃gi	'she slept'
4	ĩc	'inch' (l.w.)	ĩ̤c	'swing' (Imp.)
5	ãk	'number-tables'	ã̤k	'drive' (Imp.)
6	ə̃t	'end'	mə̤t	'saint'

APPENDIX B

Lists of the examples which are used in Chapter II, showing their occurrence as initial, medial and final.

1	əkhroʈ	'walnut'
2	əjəgər	'python'
3	ədhɔɭ	'kind of measure'
4	əphaɭ	'bang'
5	əbola	'not to be on speaking terms'
6	əɲjəna	'a girl's name'
7	əɖhar	'eighteen'
8	əɖhi	'two and a half'
9	əɖɖo	'usual meeting place'
10	ag	'fire'
11	ãk	'number-tables'
12	ãkh	'eye'
13	achəklu	'arrogant'
14	abho	'surprised'
15	abh	'sky'
16	aməɲya	'obedience'
17	ãsu	'tears'
18	aʃũ	'what is this?'
19	aʈh	'eight'
20	azadi	'freedom' (l.w.)
21	aɽəʃ	'obstruction'
22	bərəph	'ice'
23	bap	'father'
24	bhul	'mistake'
25	bhəŋg	'disturbance'
26	boz	'Bengali surname' (l.w.)
27	bavən	'fifty-one'

28	cəkli	'sparrow'
29	cə̃cəɭ	'active'
30	chal	'skin of fruit'
31	cɔthɔ	'fourth'
32	cəddi	'underpants'
33	cuŋgi	'pipe'
34	cələɳi	'current'
35	cup	'quiet'
36	cevɽo	'kind of a snack dish'
37	dā̃t	'teeth'
38	dada	'grandfather'
39	dad	'complain'
40	dhoɭi	'white' (fem.)
41	ɖol	'bucket'
42	ɖaɭ	'branch of tree'
43	ɖagh	'stain'
44	ɖhoɭ	'spill' (Imp.)
45	ɖũ̃ɖũ̃	'corn'
46	eklo	'lonely'
47	gaj	'buttonhole'
48	goɭi	'water pot'
49	gagər	'a special shape of water pot'
50	ghoɭi	'stir'
51	ghughro	'rattle'
52	gəɭɳi	'stainer'
53	gay	'cow'
54	gaɽi	'train'
55	ghoɽo	'horse'
56	gɛ̃do	'rhinoceros'

57 hath 'hand'

58 hərəkh 'joy'

59 hahakar 'uproar, tumult'

60 hoɭi 'spring festival'

61 jəməɳ 'dinner'

62 jhal 'hold'

63 juma 'name of a tomb'

64 juna 'old'

65 koɭi 'a tribe'

66 kholi 'small room'

67 kə̃dh 'shoulder'

68 kam 'work'

69 kan 'ears'

70 kaʈ 'rust'

71 kũɳa 'tender'

72 kaɳ̃ 'mourning after death'

73 kos 'water pump on the farm'

74 kɔʃ 'spade'

75 kəʈar 'small knife'

76 kəɕʈ 'difficulty'

77 kəhan 'Lord Krishna'

78 kərmay 'wither'

79 lili 'green'

80 luli 'tongue' (collo.)

81 lal 'red'

82 laɭ 'saliva'

83 mujhvəɳ 'scare'

84 mat 'mother'

85 mal 'luggage'

86 maɭ 'garland' / 'storey of house'

87	myuziyəm	'museum' (l.w.)
88	nat	'caste'
89	nac	'dance'
90	nar	'woman'
91	navɕi	'small boat'
92	puch	'ask'
93	pap	'sin'
94	phul	'flower'
95	paɕo	'he-buffalo'
96	pyalo	'glass' (for drinking)
97	rəŋg	'colour'
98	rəŋk	'poor'
99	rat	'night'
100	rah	'road'
101	sujh	'understanding'
102	ʃata	'peace'
103	sərəs	'nice'
104	sap	'snake'
105	ʃap	'curse'
106	saykəl	'bike'
107	ʂəʈkɔɳ	'hexagon'
108	ʂəʂəʈhi	'sixtieth birthday'
109	ʈoɭi	'little mob', gang'
110	ʈhaʈh	'pomp'
111	theli	'shopping bag'
112	təpeli	'cooking pan'
113	tap	'heat'
114	ub	'fungus'
115	vagh	'tiger'
116	vav	'well with stairs'

117	varta	'story'
118	vah	'bravo'
119	vivah	'engagements'
120	yadəvo	'a historical tribe'
121	zərina	'name of a mohammedan girl'

APPENDIX C

List of the examples which are used in Chapter III, which shows the possible syllable structures of Gujarati:

1	ərp	'give'
2	əst	'complete', sunset'
3	əʃv	'horse'
4	ərth	'meaning'
5	əmb	'name of a goddess'
6	əɲjəna	'name of a girl'
7	əɖɖo	'usual meeting place'
8	əstro	'razor'
9	əʈkəɭ	'guessing'
10	aʈkaʈ	'rubbish'
11	blu	'blue' (colour) (l.w.)
12	bhrəm	'illusion'
13	bɔks	'box' (l.w.)
14	bəccu	'young of bird'
15	byan	'description' (l.w.)
16	brəʃ	'brush' (l.w.)
17	bhəkʃ	'kill' (by wild animal)
18	cyəvən	'an ancient sage'
19	cvi	'philosophical term'
20	chyaʃi	'eighty-six'
21	cərc	'church' (l.w.)
22	cəncəɭ	'active'
23	cəppu	'knife'
24	chəggo	'sixer'
25	dyabhai	'proper name of a boy'
26	drakʃ	'grapes'
27	dvar	'doors'

28	dril	'drill' (l.w.)
29	dyu	'due' (l.w.)
30	dhyan	'attention'
31	dhvəni	'sound'
32	dhrasko	'stupefied'
33	dərp	'vanity'
34	ɖhəbbu	'old paisa'
35	e	'that'
36	ek	'one'
37	gyɑ̃	'gone'
38	gram	'measurement' (l.w.)
39	glani	'unhappiness'
40	gvaliyər	/name of a city/
41	gɲan	'knowledge'
42	gɲati	'caste'
43	ghraɳ	'sense of flavour'
44	həst	'hand'
45	iʃk	'love' (l.w.)
46	istri	'pressing iron'
47	jyare	'when'
48	jvər	'fever'
49	jəkki	'obstinate'
50	ke	'or'
51	kyɑ̃	'where'
52	krəm	'serial number'
53	kleʃ	'unhappiness'
54	kvəcit	'perhaps'
55	kap	'cut'
56	khyal	'idea'
57	kərj	'debt'

58	kənth	'husband'
59	kəmp	'thrill'
60	kaṇṭh	'throat'
61	khəmma	'bless you'
62	kaṣṭh	'wood'
63	lyo	'take' (Imp.)
64	liṇg	'gender'
65	liṇk	'to join'
66	mrut	'dead'
67	mərm	'deep'
68	myan	'case for sword'
69	mlan	'sad'
70	mərd	'male'
71	məllə	'heavy weight wrestler'
72	nyat	'caste'
73	nrup	'king'
74	nərs	'nurse' (l.w.)
75	pyalo	'drinking glass'
76	prit	'love'
77	plan	'plan' (l.w.)
78	phlu	'flu' (l.w.)
79	pərv	'festival'
80	pəkv	'ripe'
81	stri	'woman'
82	syadvad	'philosophical term'
83	srot	'flow'
84	slav	'czech'
85	svari	'procession'
86	ʃyam	'Lord Krishna'
87	ʃri	'wealth'

88 ʃlok 'verse'

89 ʃvas 'breathing'

90 spruʃy 'touchable'

91 spərʃ 'touch'

92 sʈeʃən 'station' (l.w.)

93 skru 'screw' (l.w.)

94 stər 'level'

95 smruti 'rememberance'

96 snan 'bath'

97 spring 'spring' (l.w.)

98 spruʃʈ 'touched'

99 ʃərʈ 'shirt' (l.w.)

100 sərg 'canto'

101 sətta 'power'

102 tri 'three'

103 ʈyuʃən 'tuition' (l.w.)

104 ʈren 'train' (l.w.)

105 tyare 'then'

106 trəɳ 'three'

107 tvəca 'skin'

108 uŋgh 'sleep'

109 ujjəɖ 'barren'

110 vyapti 'wideness'

111 vrutti 'nature'

112 vənd 'greet' (Imp.)

113 vəsti 'population'

APPENDIX D - To Section II Phonology

Chapter VI Words which are taken as simple, complex, compound and reduplicative forms, and also 'clear phonation type' and 'breathy phonation type':-

a	Simple Words	(by simple words here is meant: without any affixes)
1	ərp	'give'
2	ba	'mother'
3	din	'day'
4	diin	'poor'
5	poi	'a kind of creeper'
6	sap	'snake'
7	ughaɖ	'open' (Imp.)
8	ugaɖ	'saw' (Imp.)
9	umer	'add' (Imp.)
10	sacəv	'take care' (Imp.)
11	sətkar	'greetings'
12	pururva	'a historical character'
13	pay	'give drink'
14	bhoi	'a caste'
15	saykəl	'bike'
16	muʈh	'fist'
17	muuɭ	'root'
18	paɳi	'water'
19	həva	'air'
20	təlvar	'sword'
21	kəsərəɸ	'exercise'
22	məsələt	'conspiracy'
23	kəməɭ	'water lily'
24	rəmət	'play'

25	khetər	'farm'
26	vetər	'cutting cloth'
27	məkan	'building'
28	pəkav	'cook' (Imp.)
29	cərca	'discussion'
30	pərco	'glimpse'
31	cevəḍo	'kind of snack'

b Complex Words (with suffixes)

1	pərmeʃvər	'God'
2	devadhidev	'more than God'
3	əgnanavərəṇ	'illiteracy'
4	ghusəṇiyo	'pushy natured'
5	ṭabəriyo	'lad-or-a-boy'
6	naṇavəṭi	'jewellers'
7	pəropkari	'kind person'
8	əkəʃaməṇ	'confused'
9	əkəvitai	'unpoetic'
10	ənədhikar	'rightless'
11	əbhinə̃dən	'congratulation'
12	binrojəgar	'unemployed'
13	paṛi	'young she buffalo'
14	lenar	'one who takes'
15	kacbo	'tortoise'
16	bavṛu	'hands' (colloquial)
17	kevṛo	'how much?'
18	avṛi	'this much?'
19	cɔro	'meeting place in village'
20	biḍi	'Indian cigarette'
21	vəḍi	'main'

22	kəɖi	'ring'
23	karvəɳ	'placename'
24	jaɭvəɳ	'carefulness'
25	dharaɭo	'farmer'
26	chogaɭi	'beautiful girl'

c Compound Words: (meaning two different words which occur together and form one meaning)

1	məhapuruʃ	'great man'
2	karbhar	'management'
3	sarvar	'nursing'
4	kaɭjhaɭ	'very angry'
5	səɾtaj	'head'
6	hathpəg	'hands and feet'
7	akaʃpataɭ	'sky and subterranean'
8	uthəlpathəl	'havoc'

d Reduplicative Forms:

1	ghoɖobodo	'horse and something'
2	vatobato	'tale, etc.'
3	adoʃipadoʃi	'neighbours and others'
4	vasəɳkusəɳ	'pans and other things'
5	hãphəɭũphãphəɭũ	'breathless'
6	kapakapi	'massacre'
7	doɖadoɖ	'hurriedly running'

e 'Clear Phonation Types':

1	gagər	'pot'
2	doɖo	'run'
3	kagəɭ	'papers'
4	katər	'scissors'

f 'Breathy Phonation Types': Whispery-voice as syllable nucleus

1	ba̤r	'outside'
2	pa̤ɽ	'mountain'
3	a̤ɽ	'bone'
4	dɛ̤rũ	'small temple'
5	pɛ̤lo	'first'
6	kə̤yũ	'said'

Whispery-voice as syllable initial/final:

7	gha̤	'wound'
8	bha̤r	'burden'
9	koḍ̤h	'leprosy'
10	labh	'advantage'

Whispery-voice occurring twice (rare):

11	jə̤̃jə̤r	'anklets'
12	gha̤ghə̤ro	'petticoat'
13	dhə̤̃dho	'job or business'
14	ḍhə̤̃ḍ̤hero	'proclamation'

Onomatopoeic words:

15	bhə̤̃bhə̤rvũ	'noise made by cows'
16	ghughə̤rɣi	'tinkling of little bells'
17	ghə̤mghə̤m	'noise of big bells'
18	jhə̤ṇ̤jhə̤ṇ̤aṭ̤	'a kind of noise'

Aspiration as syllable initial/final:

19	kha	'eat'
20	phor	'blossom'

21	sukh	'happiness'
22	kukh	'waist'

Aspiration occurring twice (fairly rare):

23	khəkhəɖdhəj	'half broken'
24	kh̃ãkh̃ãkhoɭã̃	'looking hard for something'
25	khakhakhikhi	'giggling'
26	khakhəro	'dry chapati'
27	chichərũ̃	'shallow'
28	ʈhaʈhəʈi	'coffin'
29	thothəvay	'stammered'
30	khokhũ̃	'box'
31	khokho	'name of a game'

Combination of whispery voice and aspiration (very rare):

32	bhukh	'hunger'
33	j̃ãkhu	'dim'
34	dhokho	'regret'
35	bhikhari	'beggar'
36	ɖhekhaɭo	'piece of brick'
37	bhakhəri	'thick chapati'
38	bhukhərũ̃	'discoloured'
39	khadhũ̃	'ate'
40	khadh	'loss'
41	kh̃əbhoɭəj	'name of a village in Gujarat'
42	thobho	'stop'
43	th̃ãbhəlo	'pillar'
44	kh̃ãbha	'name of a village in Kathiawad'
45	kh̃əbhat	'name of a town'

APPENDIX E - To Chapter VII

a Syllable initial Non-H:

	$\not{H}_{V-}$	
1	a	'this'
2	e	'that'
3	aʃa	'hope'
4	iʃ	'God'
5	ɛʃ	'relaxation'
6	op	'shine'
7	ɔɭo	'shadow'

	$\not{H}_{CV-}$		$\not{H}_{PV-}$	
8	maɭa	'garland'	gaɖi	'train'
9	nari	'woman'	jaɖi	'fat'
10	lal	'red'	dadi	'grandmother'
11	sari	'good'	kaɭi	'black'
12	ʃir	'head'	coɭi	'blouse'
13	vav	'well with stairs'	tap	'heat'
14	yad	'remembrance'	pap	'sin'
15	rat	'night'		

b Syllable initial H-:

	H_{V-}		H_{PV-}	
1	hɔst	'hand'		
2	hərʃ	'joy'		
3	hoɭi	'Holi'		
4	hiro	'diamond'	kha	'eat'
5	har	'necklace'	thak	'tiredness'
6	phaṛ	'tear' (Imp.)	ṭhar	'cold'

7	chap	'impression'
8	ghoɖo	'horse'
9	jhaɭ	'flame'
10	dhak	'fear'
11	ɖhaɭ	'slap'
12	bhaɭ	'inquiry'
13	phor	'blossom'
14	chəri	'knife'
15	ʈhɔr	'kind of sweet'
16	thor	'cactus'
17	bhor	'dawn'
18	jhəri	'silver work'
19	ɖhor	'cattle'
20	dhol	'slap'

c	V, $\tilde{V}$:	
1	bhai	'brother'
2	ghɛr	'at home'
3	dhol	'drum'
4	dhol	'slap'
5	jhal	'hold'
6	phor	'blossom'
7	kha	'eat'
8	ʈhɔr	'kind of sweet'
9	thor	'cactus'
10	chal	'skin of fruit'

d Syllable-final, Non-H:

	-$V^{\#}$			-$VC^{\#}$			-$VP^{\#}$	
1	ø ma	'mother'	ø	bar	'twelve'	ø	pak	'harvest'
2	ø ke	'or'	ø	mel	'put'		kac	'glass'
3	ø oɭo	'roasted corn'	ø	meɭ	'total'		kaʈ	'rust'
4	ø mɛ̃	'me'		mɛʃ	'eyeliner'		vat	'story'
5	pi	'drink' (Imp.)		kan	'ears'		ap	'give'
6	mɔ̃	'face'		kaɲ	'mourning after death'		ag	'fire'
7	tu	'you'					ab	'water'
8	jə	'showing emphasis'		kam	'work'		yad	'remembrance'
9				paɣ	'fall'			
10				is	'bedstead'		aɖ	'other'
11				av	'come'		aj	'today'
12				boz	[a surname]			
13				jay	'going'			

e Syllable-final, H:

	-V^{H}			-VP^{H}	
1	ca^{h}	'tea'	ø	vagɦ	'tiger'
2	$kɔ^{h}$	'tell me' (respective)		dudɦ	'milk'
3	$kɛ^{h}$	'tell me' (not respective)		labɦ	'advantage'
4	bi^{h}	'scared' (fem.)		dukh	'sorrow'
5	$ũ^{h}$	'I'(1st person sing.)		koɖɦ	'leprosy'
6	$ə̃^{h}$	[answer to a call]		sə̃jɦ	'evening'
7				maph	'forgive'
8				path	'road'
9				və̃ch	'wish'
10				aʈh	'eight'

APPENDIX F

A Recorded Examples: Date: 20 March 1978

1	bhukh	(məne) bhukh lagi che	(I am) hungry
2	khakhəro	maro khakhəro	(my dry chapati)
3	ghughəro	maro ghughəro	(my rattle)

1	⌈a⌋	'this'	3	⌈iro⌋	'diamond'
2	⌈a⌋	'yes'	4	⌈hiro⌋	
5	⌈ga⌋	'sing'	7	⌈pelo⌋	'that'
6	⌈gaa⌋	'wound'	8	⌈pɛlo⌋	'first'
9	⌈bar⌋	'twelve'	12	⌈paɾ⌋	'fall'
10	⌈bar⌋	'outside'	13	⌈phaɾ⌋	'tear'
11	⌈bar⌋	'burden'			
14	⌈ca⌋	'uncle'	16	⌈vag⌋	'tiger'
15	⌈ca⌋	'tea'	17	⌈vagh⌋	'tiger'

Whisper

1	⌈kholi⌋	'small room'	5	⌈bar⌋	'twelve'
2	⌈koɭi⌋	'a tribe'	6	⌈iro⌋	'diamond'
3	⌈goɭi⌋	'water pot'	7	⌈pɛlo⌋	'first'
4	⌈bar⌋	'outside'	8	⌈pelo⌋	'that one'
				⌈khoɭi⌋	'found' (fem.)

Spoken aloud

1	⌈khoɭi⌋	'found'	4	⌈koɭi⌋	'a tribe'
2	⌈dzaɭ⌋	'flame'	5	⌈dzhaɭ⌋	'net'
3	⌈goɭi⌋	'stirred'	6	⌈tʂhal⌋	'peel' (fruit)

B Examples of mingograms and spectrograms which are included in the thesis:

	Mingograms		Spectograms	
1	koɭi	' a tribe'	ca	'uncle'
2	goɭi	'water pot'	cɑ:	'tea'
3	khoɭi	'found' (fem.)	bar	'twelve'
4	ghoɭi	'stirred'	bɑ^{h}r	'outside'
5	ba^{h} r	'outside'		
6	ba·r	'twelve'		

	Whispered		Whispered	
1	goɭi		paɖ	'fall'
2	koɭi		pa^{h}ɖ	'mountain'
3	khoɭi		bar	'twelve'
4	bar		ba^{h}r	'outside'
5	ba^{h}r			
6	vagh			

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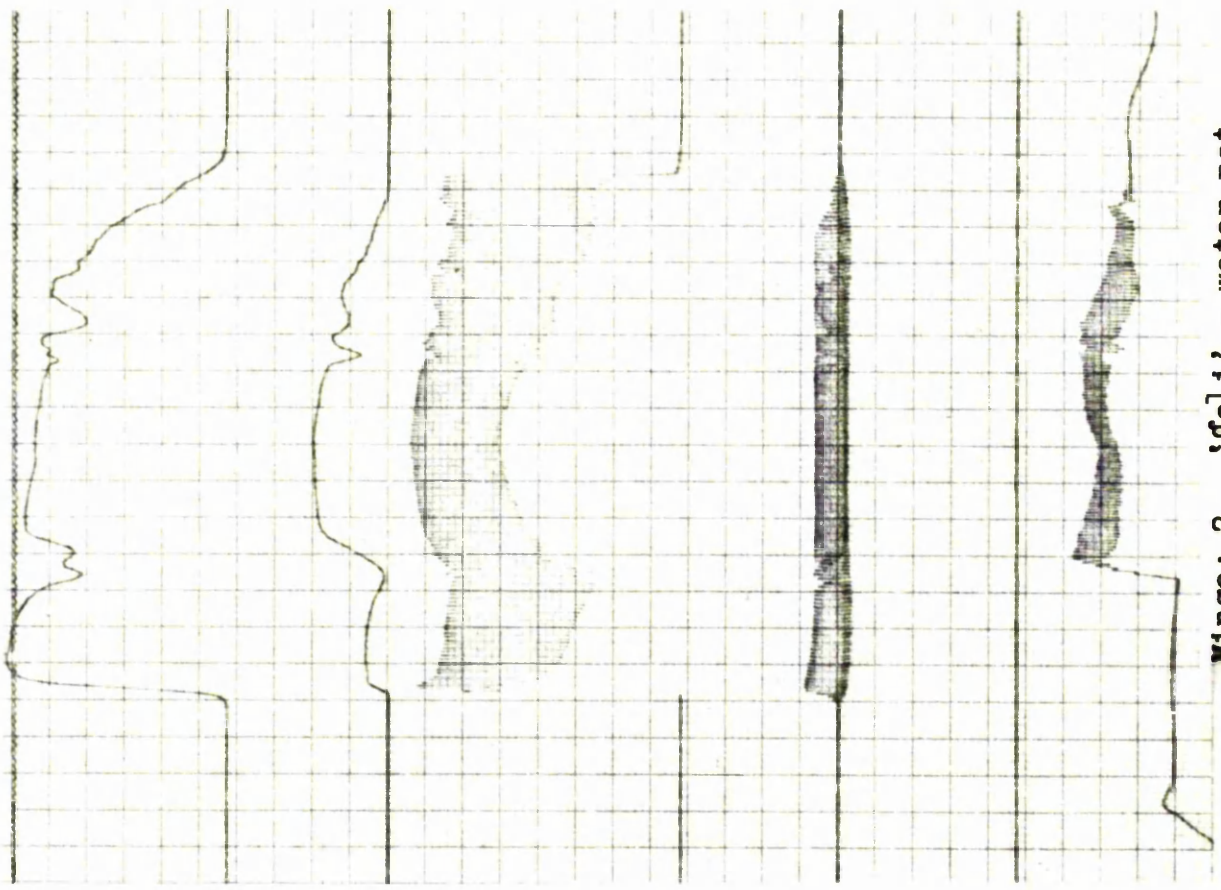
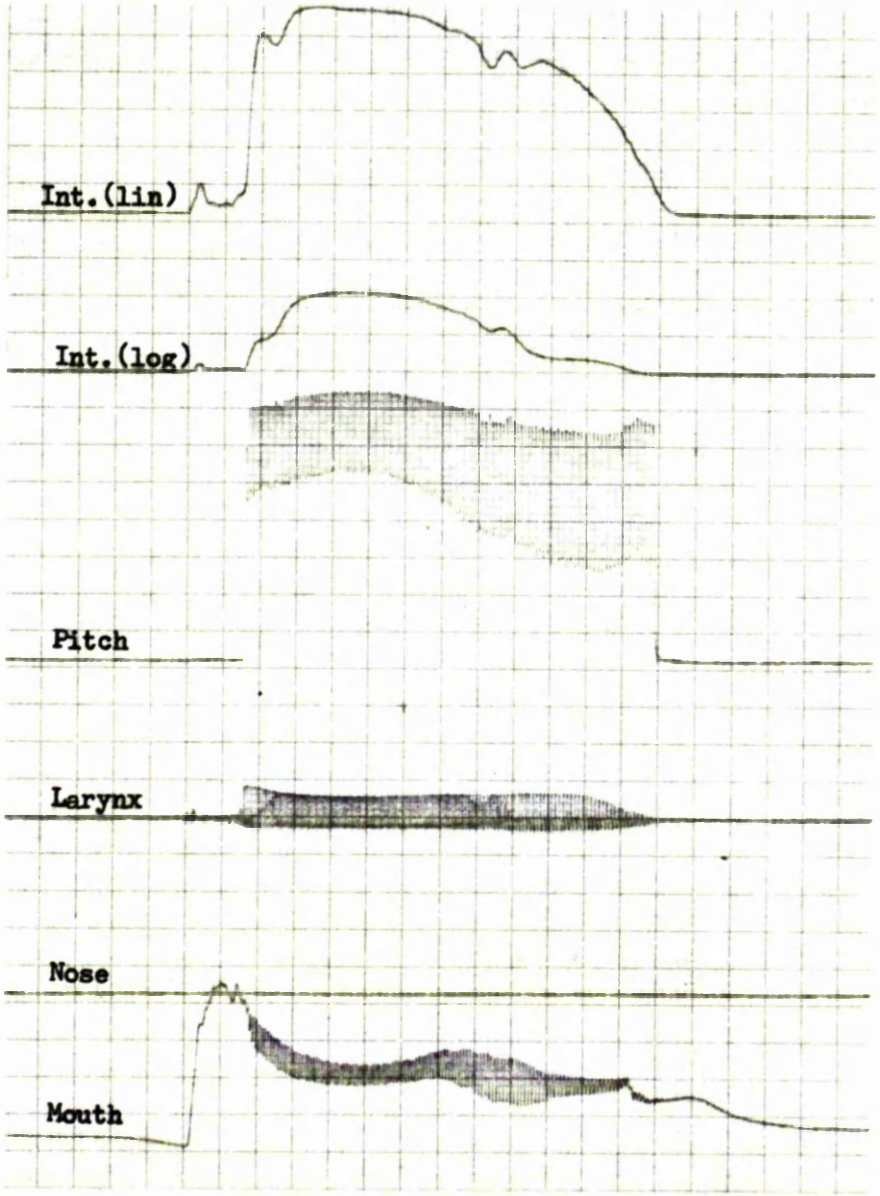
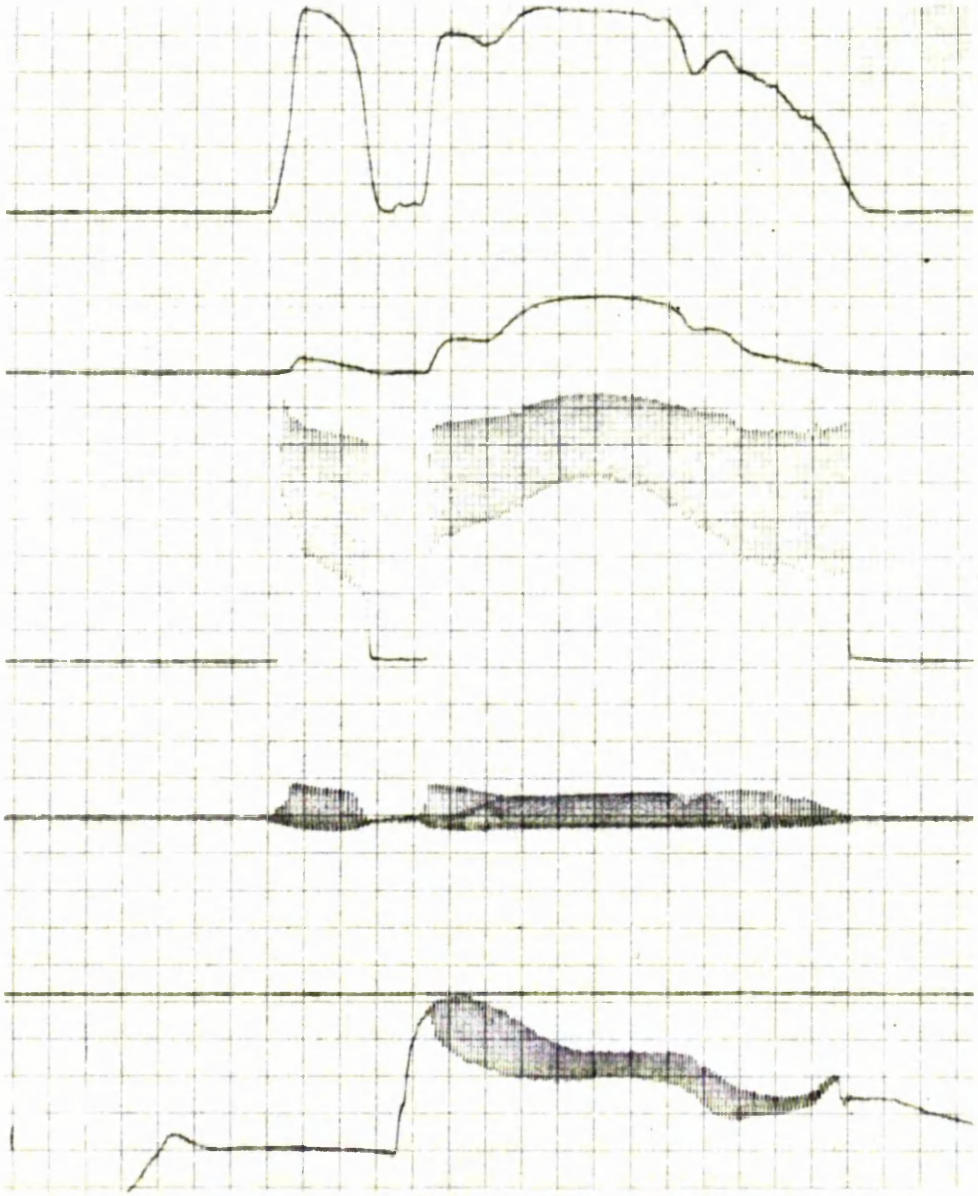


Mingo: 1. 'koli' - tribe

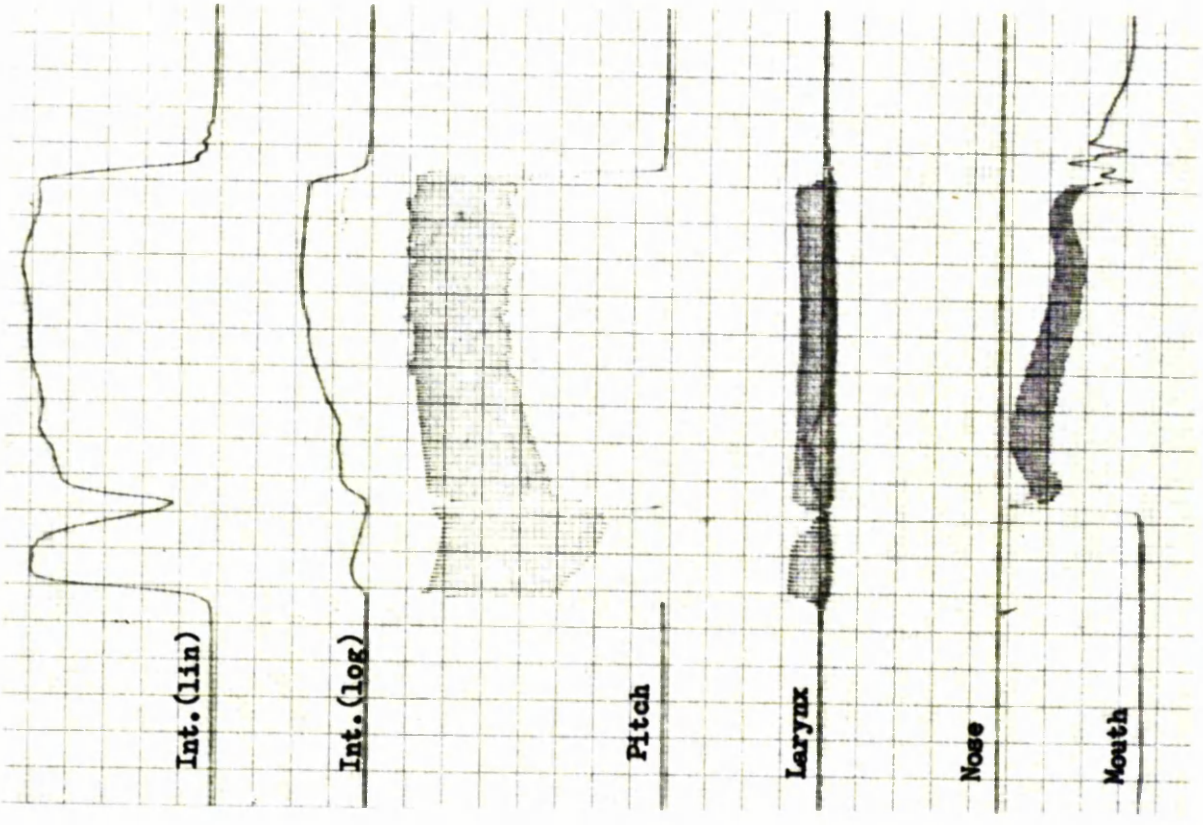
Mingo: 2. 'goli' - water pot



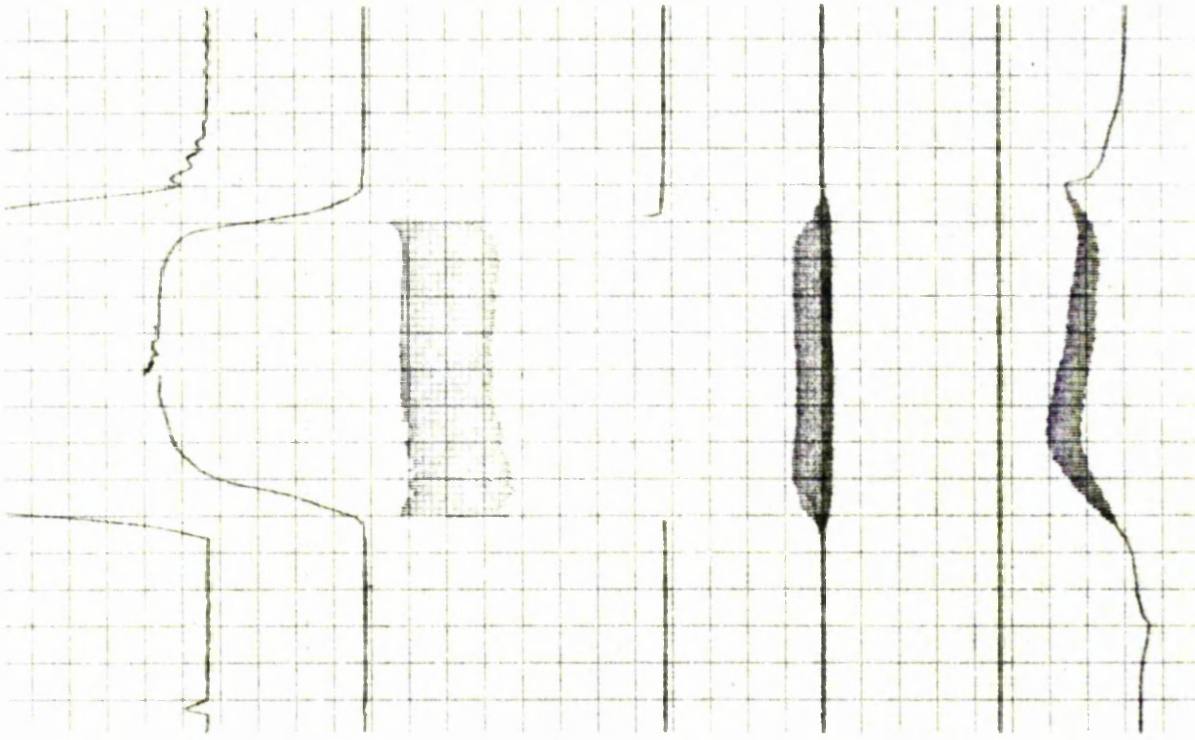
Mingo: 3. 'kholi' - found (fem.)



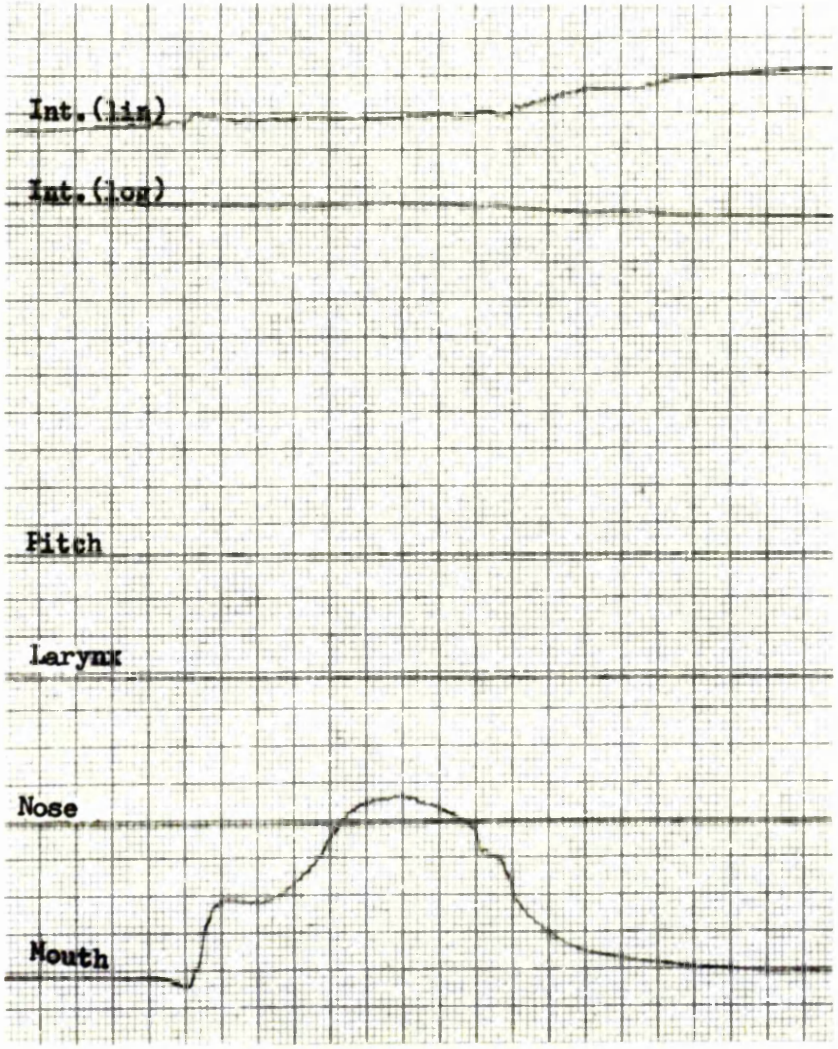
Mingo: 4. 'g̈oli' - stirred (fem.)



Mingo: 5. 'ɡɑ:r' - outside



Mingo: 6. 'ba·r' - twelve



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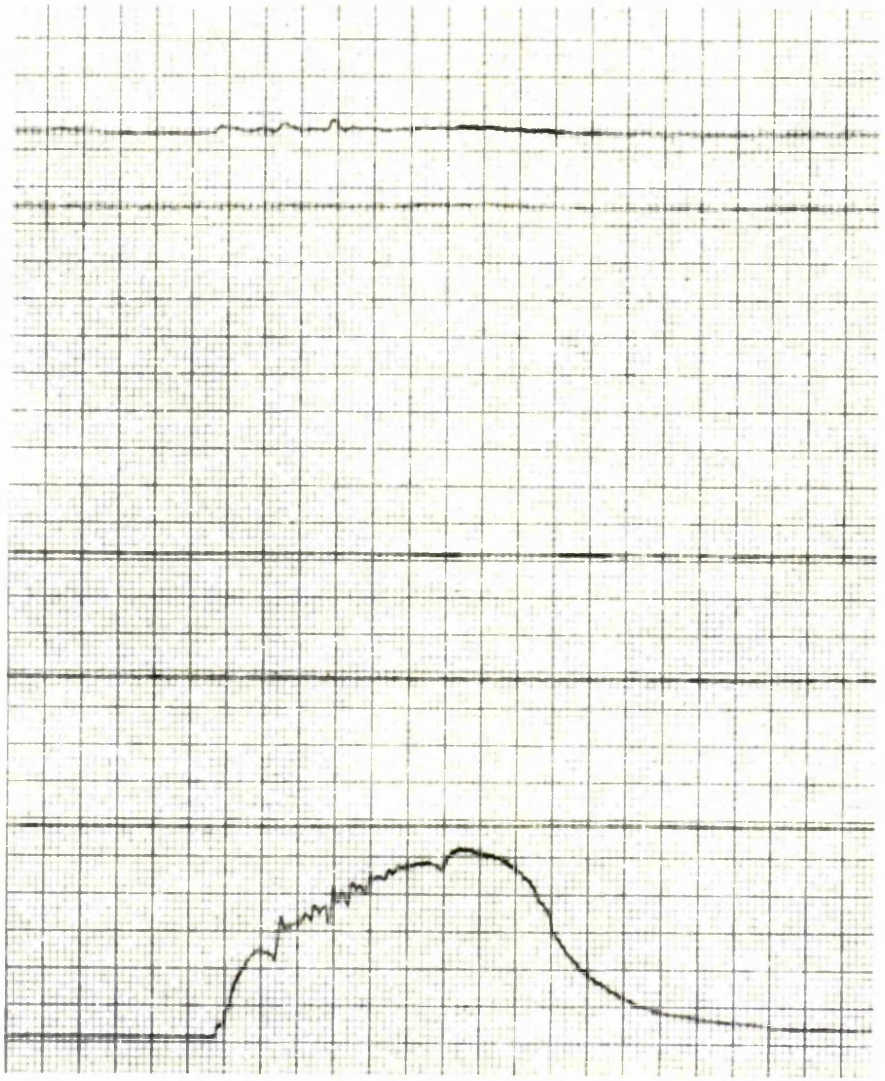
water pot



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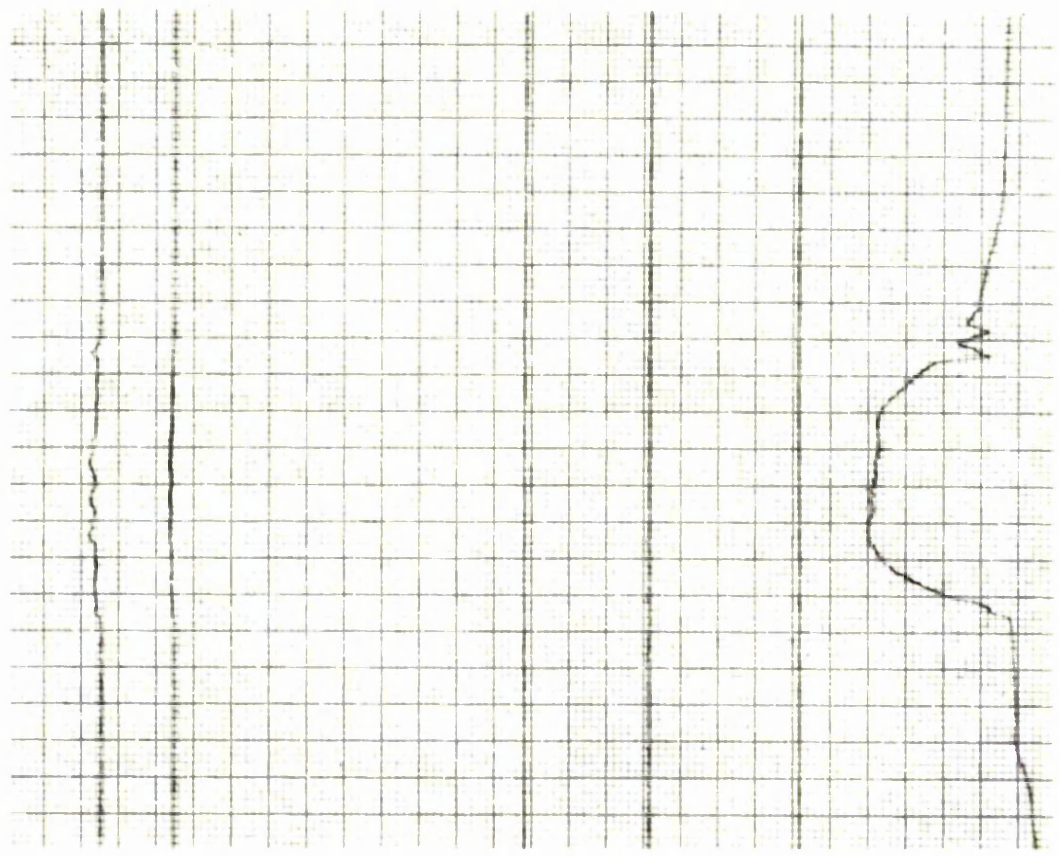
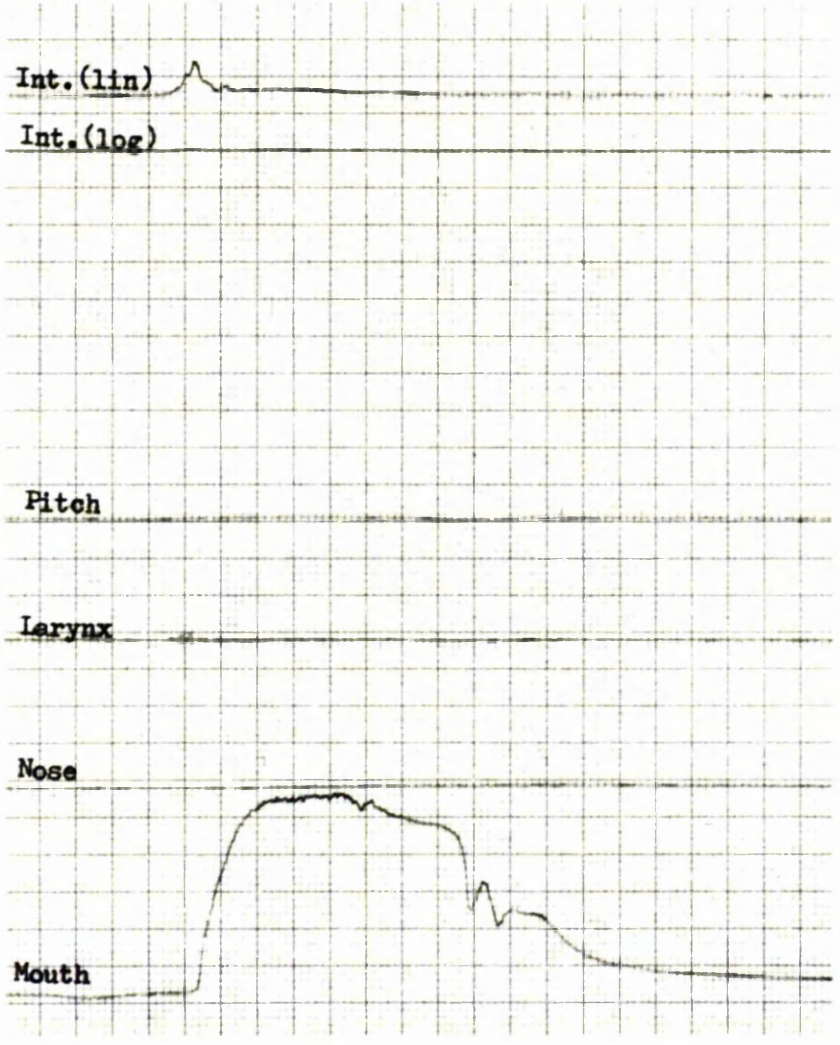
tribe name



Mingo. 9. 'kholi' - (whispered)
to find

Mingo: 10. 'ba·r' - (whispered)
twelve



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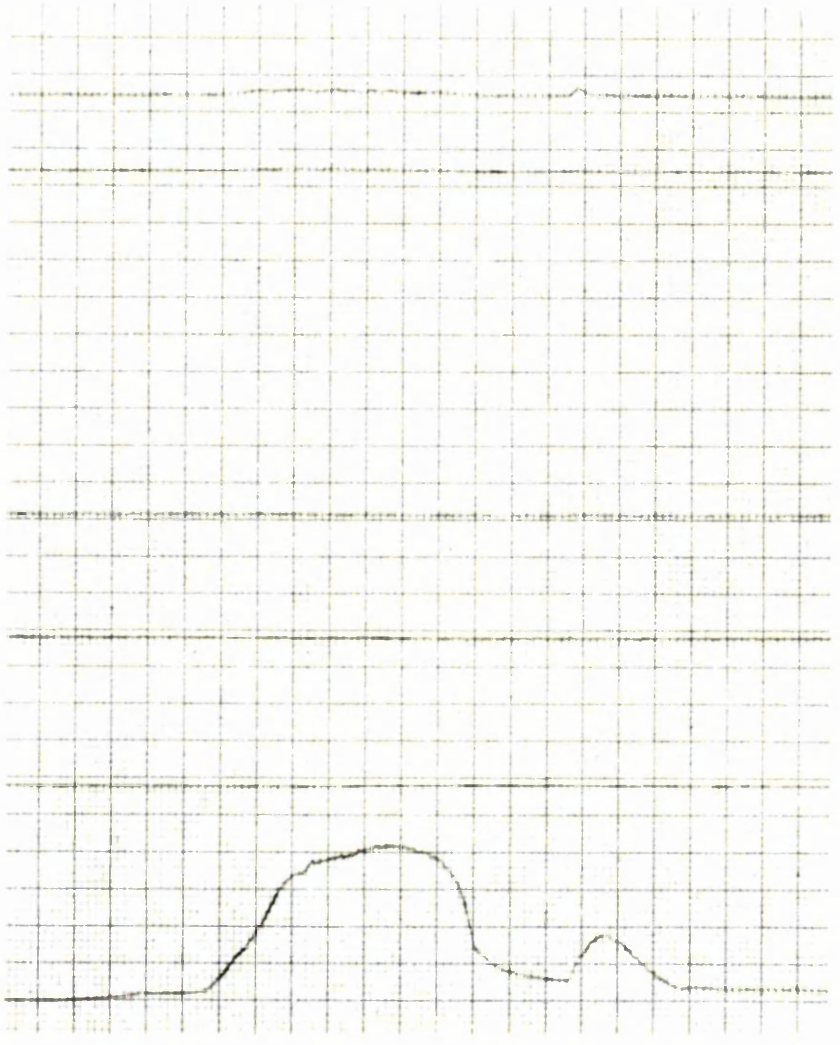
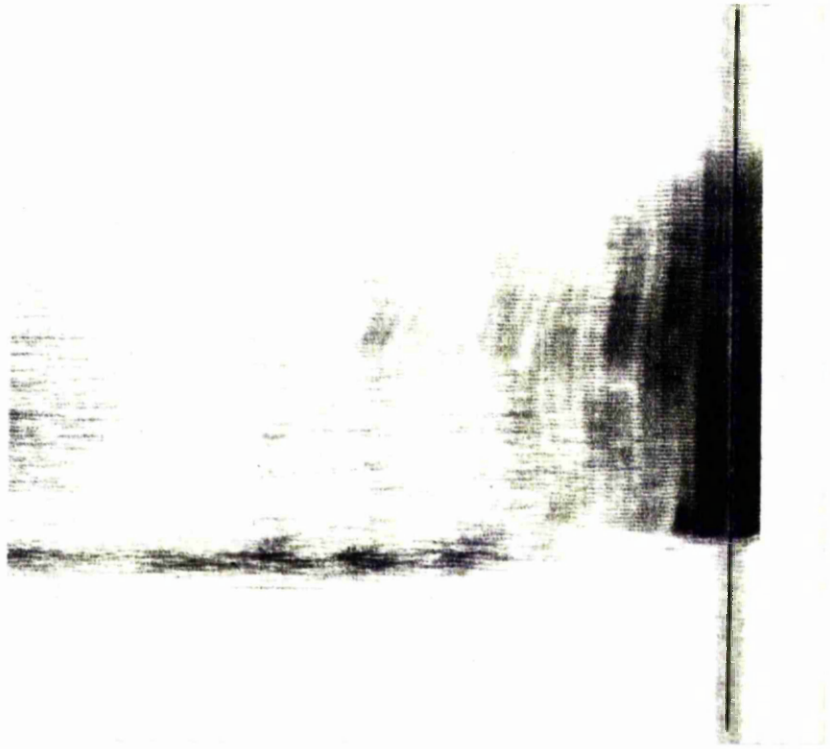


Mingo. 12. 'vɑ:gɦ' - (whispered)
tiger



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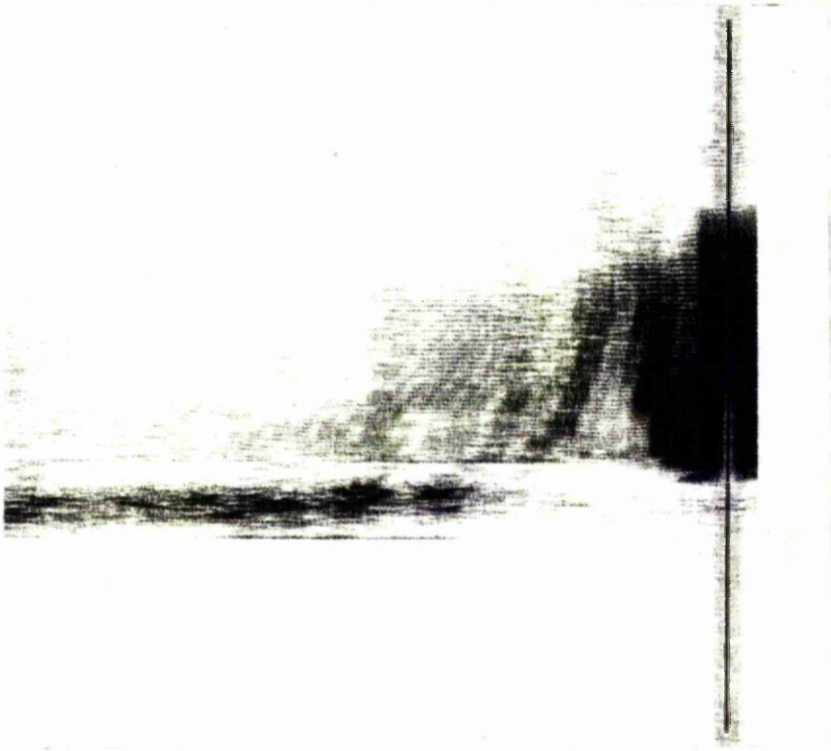
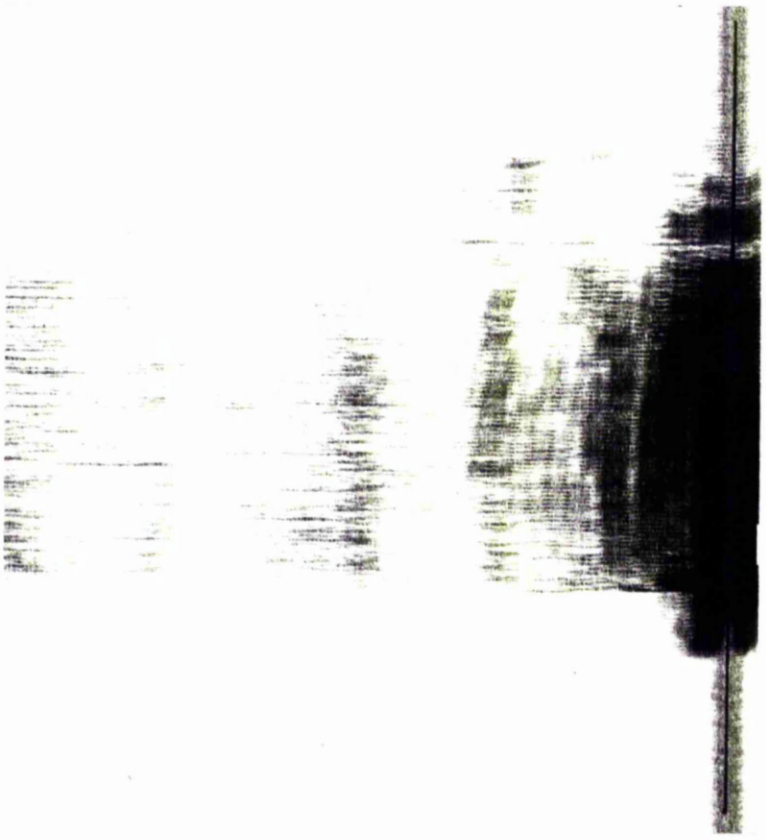
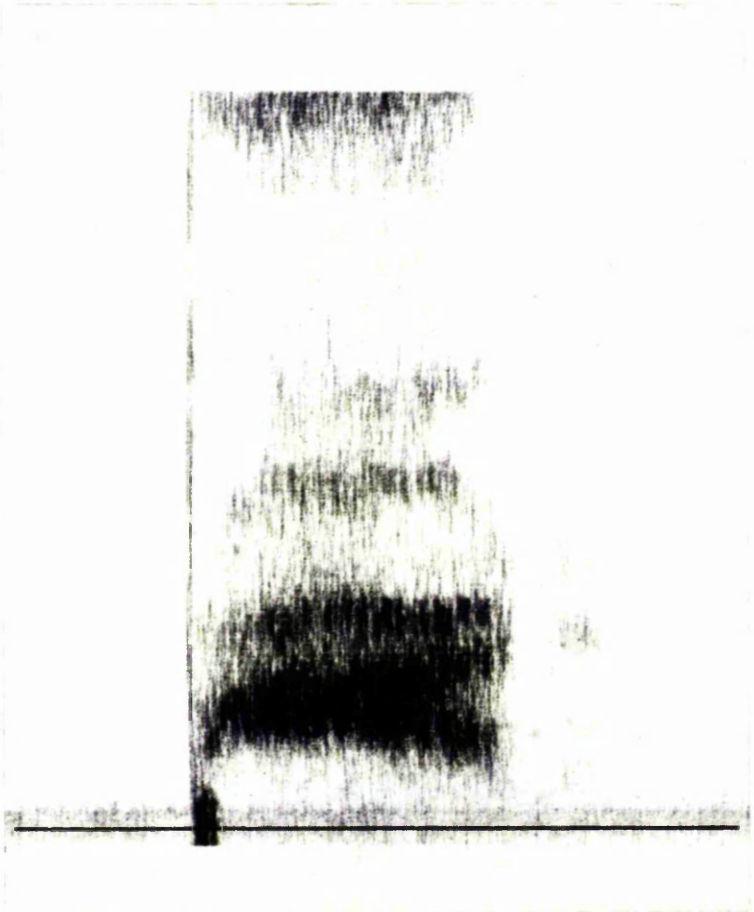


Sona. 1. [ca] 'uncle'

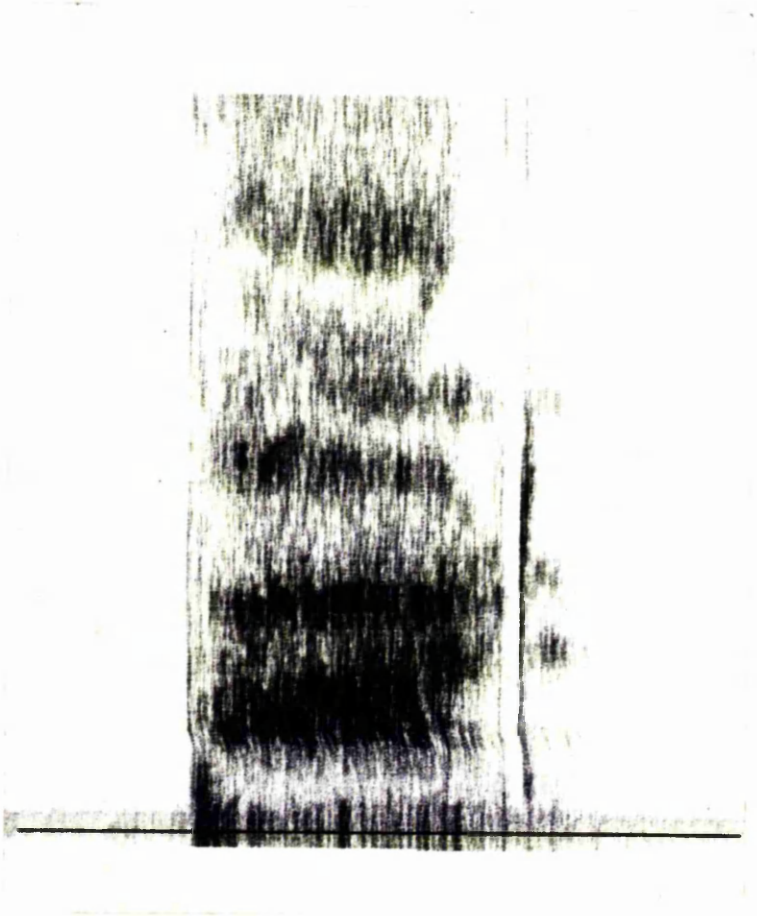


Sona. 4. [ɓa̰:r] 'outside'

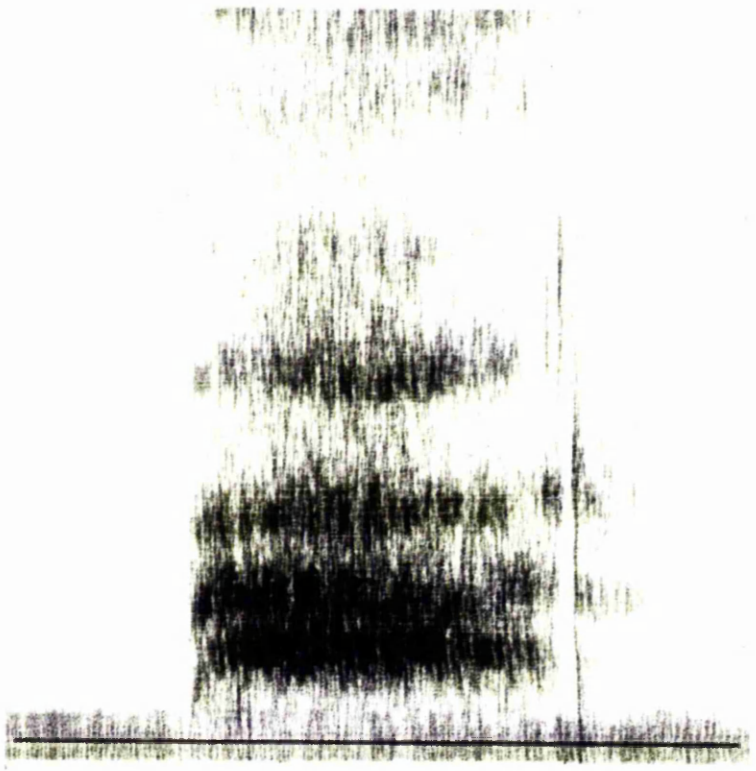
Sona. 3. [ɓar] 'twelve'



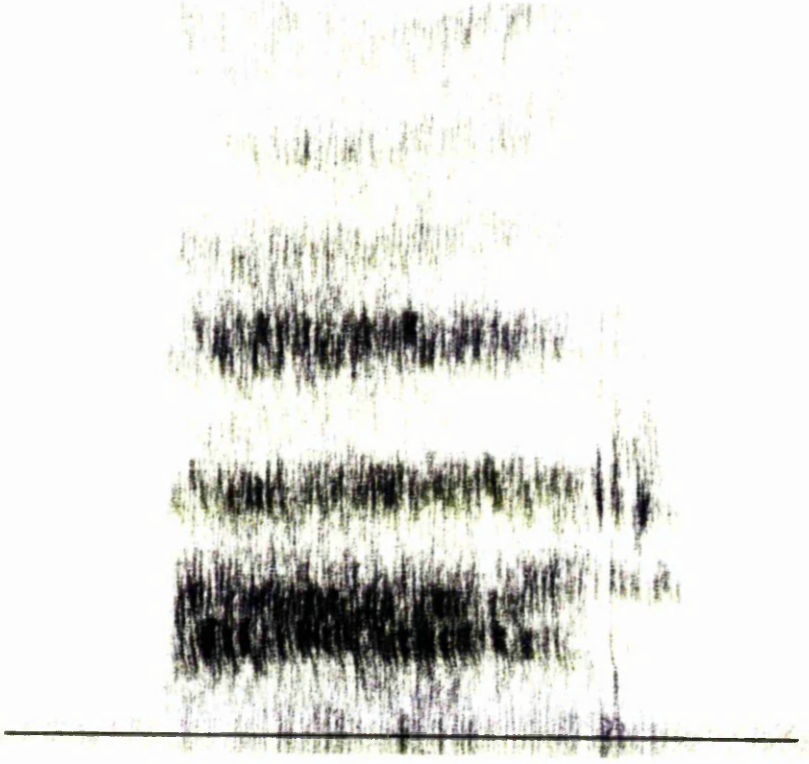
Sona. 5. [paʕ] - (whispered)
'fall' (imp.)



Sona. 6. [pa̤:ʕ] - whispered)
'mountain'



Sona. 7. [bar] - (whispered)
'twelve'



Sona. 8. [bɑ̈:r] - (whispered)
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