

A PHONETIC AND PHONOLOGICAL STUDY OF THE  
NOMINAL PIECE IN STANDARD COLLOQUIAL PERSIAN

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by

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ABSTRACT

This thesis presents a phonetic and phonological description of the nominal piece in Standard Colloquial Persian. The phonetic description is given in articulatory feature analysis as briefly outlined in paragraph 0.5. The phonological description is in prosodic terms. Intonation has been excluded from this thesis as it is primarily a sentence prosody.<sup>1</sup>

In order to achieve maximum congruence between the phonological and grammatical levels, the phonological statements are given within a grammatical framework outlined in parts at the beginning of the relevant chapters.

The introduction gives the necessary information about the data analysed, previous analyses and some justification for the choice of the theory.

A general discussion on syllable, some existing phonetic definitions, and the need for syllable is presented in Chapter 1 where a definition of syllable in Persian is suggested together with its types.

The phonetic features observed in the data are described in Chapters 2 and 3 in terms of syllable features and syllable segments.

The phonetic features observed between syllables at morpheme boundaries as well as some rules for syllable division are given in Chapter 4.

Chapter 5 provides further description of glottal, pre-glottal and long contoids.

---

1. For a description of intonation in Persian see J. Towhidi's "A Study of Intonation and Related Features of Persian ...", research for Ph.D. thesis, London University, S.O.A.S.

In Chapter 6 the phonological structure of syllable is given and the syllable prosodies are stated. In Chapter 7, different phonematic systems are set up for different places in the syllable.

The syllable structure of nominal words is set up in Chapter 8, and various prosodies of nominal words are described.

Chapter 9 deals with the description of the nominal piece and junction prosodies which express the relation between the components of nominal piece.

Chapter 10 provides a brief summary of some interesting experimental findings obtained with the help of the techniques of palatography, mingography and spectrography. Most of the descriptions based on perceptual analysis of the data are found to be supported by instrumental evidence.

ACKNOWLEDGEMENTS

I wish to express my deepest sense of gratitude to my supervisor Mrs. Natalie Waterson at the School of Oriental and African Studies whose valuable advice on various theoretical points, constant encouragement, suggestions for new solutions to several problems, and patience have made the completion of this thesis possible. I can think of no words with which to convey my thanks to her.

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Lastly I wish to thank Mrs. Williams who typed this technically difficult manuscript remarkably well.

SYSTEM OF REFERENCE

References to relevant literature are made throughout the thesis by placing a number at the appropriate place in the context which refers to a correspondingly numbered footnote at the bottom of the page. The footnote gives the author's name, the title of the work in question, the date of publication, and where possible, the page numbers. A complete bibliography is also given at the end of the thesis.

Cross references are made by giving the number of the Chapter and section, and where necessary, the number of the paragraph and sub-paragraph. These numbers are written in the left hand margin of each page. eg: (8.4.23.) is read as follows:

8	refers to	Chapter 8
4	" "	Section 4 of Chapter 8
2	" "	paragraph 2 of Section 4
3	" "	sub-paragraph 3 of paragraph 2.

ABBREVIATIONS

IPA	The Principles of the International Phonetic Association.
IJAL	International Journal of American Linguistics
T.P.S.	Transactions of Philological Society
P.U.D.P.S.	Proceedings of the University of Durham Philosophical Society.
J.L.	Journal of Linguistics.
BSOAS	Bulletin of the School of Oriental and African Studies.
BSOS	Bulletin of the School of Oriental Studies.
IRAL	International Review of Applied Linguistics.
OUP	Oxford University Press.

SYMBOLS AND NOTATIONAL CONVENTIONS<sup>1</sup>

- [ ] Encloses phonetic transcription
- { } " morpheme or morphemes in a grammatical construction.
- ( ) " parts of utterance or structure which are not relevant to the statement being made.
- ~ Free variation
- ' r Glosses
- + Plus e.g. cv + cv
- Results in ... e.g. cv + cv → cvcv

The symbols and diacritics used in the transcription of the examples are either those of the I.P.A. Chart or necessary inventions with an explanation on their first appearance. In the case of some of the I.P.A. symbols a deviation from their use in the Chart was found to be necessary as follows:

- [X] represents voiceless uvular fricative contoid (and not velar)
- [ɣ] " voiced " " " ( " " " )
- [y] when used as a segment, represents: frictionless palatal contoid in w - syllables.
- [ʏ] used as a diacritic to represent aspiration in w - syllables
- [ɣ] " " " " " " " y - syllables
- [w] " " " " " " w - features.

The invented symbols are:

- [ʔ] checked glottal trill
- [~] glottal trill, or, when used as a diacritic: the feature glottality.

Other symbols are explained where used, as mentioned above.

---

1. Two typewriters were used for the typing of this thesis because a special keyboard was needed for the examples in transcription. As a result there are a few cases where different symbols are used with the same phonetic value, viz.,

[g] and [g] , [ʏ] and [tʃ], [ɣ] and [dʒ]

Also, as the phonetic typewriter was an old one, the spacing is not always regular and the sign ~ is used to indicate that the symbols should be closer together, e.g., [batʏ y ɛ].

Symbols that were not available or did not come out clearly on the typewriter are written in by hand.

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1. [c <sup>ε</sup> a.m]	p. 302	9. [p <sup>ε</sup> i.r]	p. 303
2. [k <sup>u</sup> cm]	p. 302	10. [p <sup>u</sup> u.r]	p. 303
3. [s <sub>1</sub> i.m]	p. 302	11. [b <sub>1</sub> s:t <sup>ε</sup> ]	p. 303
4. [s <sub>2</sub> a.m]	p. 302	12. [p <sup>u</sup> us:t <sup>u</sup> ]	p. 303
5. [m <sub>1</sub> e.c <sup>ε</sup> ]	p. 302	13. [p <sup>ε</sup> e.i <sup>ε</sup> ck <sup>u</sup> ]	p. 304
6. [p <sup>u</sup> a.c <sup>u</sup> ]	p. 302	14. [p <sup>u</sup> a.kk <sup>u</sup> ]	p. 304
7. [b <sub>1</sub> i.d]	p. 303	15. [pat]t <sub>1</sub> <sup>ε</sup> ]	p. 304
8. [b <sub>2</sub> u.d]	p. 303	16. [b <sub>2</sub> at <sub>1</sub> <sup>ε</sup> ]	p. 304

## LIST OF MINGOGRAMS

1. [da <sub>2</sub> ʃ:tʃ]	p. 318	2. [nã:ʒd]	p. 318
3. [po <sup>u</sup> :t <sup>u</sup> c <sup>u</sup> ]	p. 319	4. [nã:ʒɸ]	p. 319
5. [ʃa <sub>2</sub> ʃ]	p. 320	6. [ʃa:mʔ]	p. 320
7. [dʒa <sub>2</sub> j:n]	p. 321	8. [so:bh]	p. 321
9. [sa <sup>~</sup> ?d]	p. 322	10. [ʃa:rɸ]	p. 322
11. [mo:hd]	p. 323	12. [wã.ʒ]	p. 323
13. [xu.n]	p. 324	14. [xã.m]	p. 324
15. [ʃaʃ.]	p. 325	16. [k <sup>u</sup> a.r]	p. 325
17. [p <sup>u</sup> ã]	p. 326	18. [go.l]	p. 326
19. [ʒa.b]	p. 327	20. -[gõ-lab]	p. 327
21. [da.r]	p. 328	22. [hẽr -vĩ -va.tʃ]	p. 328
23. [dar -hẽr -vĩ -va.tʃ]	p. 329	24. [dãne <sub>2</sub> .mãndãne <sub>2</sub> ]	p. 329
25. [xõdãji]	p. 330	26. [xõdã <sup>~</sup> i]	p. 330
27. [xõdãja.m]	p. 331	28. [ʃa.tʃtʃẽ]	p. 331
29. [bãtʃẽ]	p. 331	30. [nã:thɸ]	p. 332
31. [sõ.nʔ]	p. 332	32. [xã.n]	p. 333
33. [ʃa:mʔ]	p. 333	34. [ʃa.m]	p. 334
35. [tʃa <sup>~</sup> n]	p. 334	36. [dʒa <sub>2</sub> ʃ:n]	p. 335

## LIST OF SPECTROGRAMS

1. [bu.d]	p. 339	2. [pi.d]	p. 339
3. [zu.r]	p. 340	4. [zi.r]	p. 340
5. [ri.ɸ]	p. 341	6. [ri.ɸza.r]	p. 341
7. [xu.b]	p. 342	8. [xu.brũ]	p. 342
9. [jẽã.r]	p. 343	10. [jõk <sup>u</sup> .h]	p. 343
11. [nĩfi.n]	p. 344	12. [ʃik <sup>u</sup> .r]	p. 344
13. [jã.e.r]	p. 345	14. [diva.r]	p. 345

## INTRODUCTION

### O.1. A Note on Standard Colloquial Persian

The origin, development and typological characteristics of Persian have on the whole been made available through the existing literature.<sup>1</sup> Such topics, therefore, need not be discussed here. A note on the particular dialect which constitutes the subject matter of this thesis is, however, relevant.

The term Standard Colloquial Persian is used to refer to the dialect which makes it hard for an observant listener to locate exactly the geographical region of the speaker. The dialect originated in Tehran, as can be expected since Tehran is the capital of Iran. But it can no longer be regarded as the Tehrani Dialect for such reasons as follows.

During the past few decades an ever increasing number of people from various parts of the country have settled in Tehran so that the majority of the dwellers of the city are now those who are directly or immediately through their parents non-Tehrani. These new settlers have brought with themselves their regional linguistic characteristics to influence the dialect of Tehran so that what is generally referred to as the Tehrani Dialect is now in the main a conglomerate of many dialects.

On the other hand, a great number of people from Tehran have gone elsewhere to settle, or to stay for long periods of time as teachers, technicians, army officers, civil-servants, businessmen, etc. They have taken with themselves their

---

1. See, for instance: G. Lazard, *La Langue des Plus Anciens de la Prose Persane*, 1963; W. Geiger, *Grundriss Der Iranischen Philologie*, 1895-1905; and, K. Hoffmann, *Handbuch Der Orientalistik, Iranistik, Band IV*, 1958.

linguistic characteristics to influence regional dialects at official and business levels or at educational levels in schools and universities.

This latter wave is especially reinforced by the return of ever increasing numbers of graduates from the universities and colleges in Tehran, where they stay long enough (and, incidentally, are ridiculed enough in such especially dialect-conscious communities as those of Tehran colleges and universities)<sup>1</sup> to learn (or to be forced to learn) to speak the new dialect.<sup>2</sup> These graduates, indeed, help the spread of their second dialect at family and social levels.

Such factors, strengthened by mass media (which no matter where located throughout the country, most of the time, use the same dialect) have succeeded in bringing about a generation which can speak two dialects one as fluently as the other. Of the two dialects one is their native dialect, or dialects, which they use in more intimate situations, and the other is the acquired dialect which they use in speaking to people from outside their dialectal communities. The latter is what is referred to in the present thesis as Standard Colloquial

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1. The present writer himself has more than once been the target of such "friendly" remarks, particularly during his first year in Tehran, as: "He hasn't learnt the language of Man'yet!"; or, later in his home town, when he unconsciously used his non-native dialect, in close communities, was reproached by such remarks as "Stand by! He is off again!"
  2. See also, in this connection, Carleton T. Hodge's comment on the ability of his non-Tehrani informants in speaking "Tehrani" where he states "... a Kermani whose Tehrani is, nevertheless, excellent" or "... from Pahlavi and speaks Gilaki in addition to Standard Persian" "Some Aspects of Persian Style, 1957, p. 356.

Persian to include the dialect spoken in Tehran, as well as in other towns and cities, in the latter places by people who have come either from Tehran or lived there for some time. But the term is not intended to imply that the dialect is spoken by everybody throughout Iran.

In Tehran, too, alongside the Standard Colloquial Persian, there exists a more local dialect which is generally spoken by the non-educated sects of Tehran. This particular dialect is, to a large extent, distinguishable from the Standard Dialect by such features as the subjective use of the pronominal ending. {ʔe s} (see 9.6.6.) (e.g.: {gofteʃ} 'he said', which in Standard Persian has the form {goft} 'he said'), frequent use of {daʃ} 'friend, comrade' (as opposed to {kako} in Shirazi, {daʔi} in Jahromi, {babam} in Gazvini Dialects) the substitution of [j], in some words, for [h] in the syllable final place, (e.g.: [mejʃil] for [meħdil] 'Mehdi', [ʔaj e kutʃe] for [ʔah e kutʃe] 'the end of the lane') etc.

The existence of this local dialect in Tehran illustrates the fact that 'Standard Colloquial Persian' is the most suitable term for the dialect which constitutes the subject matter of this thesis.

## 0.2 Data Analysed

At the start of this work the writer thought that the dialect being described was that of Tehran. The analysis, therefore, was begun by describing a large corpus of the recorded idiolect of a native Tehrani speaker of the dialect.<sup>1</sup> This was repeatedly checked with the speech of another Tehran-born

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1. Namely Mr. Ali-Reza Assefjah.

speaker of the same dialect whose family originally came from Kashan,<sup>1</sup> but, who himself had continually lived in Tehran and was considered a representative of the 'Tehrani Dialect' (as it was called at the time). Their idiolects were, later, compared with that of the writer's own, and several others who were not also Tehrani, but had acquired the dialect during their stay in the city. Having observed similarities among all these idiolects which were too close to be regarded as examples of different dialects the conclusion was drawn that they were all representatives of the same dialect which could more correctly be referred to as Standard Colloquial Persian (rather than Tehrani Persian). It was after such scrutiny that the writer allowed himself to make more use of his own idiolect.

Some of the analysis based on the data thus obtained was furthermore presented at meetings of a Persian Seminar which were regularly held over the past two years in the School of Oriental and African Studies and appeared to be acceptable to other Persian members.

Assimilated loan words have been included with words of native Persian origin; but recent loans which are not assimilated have been excluded.

### 0.3 Some Previous Work on Persian

Persian has more than once been subject to linguistic investigation. Many grammatical and phonological descriptions of the language are available, yet no previous detailed phonetic description was found among the existing literature which was

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1. Namely Mr. Ali Ghaffari. I wish to thank Mr. Assefjah and Mr. Ghaffari for their patience and cooperation.

consulted. The phonetic descriptions available are mostly sketchy and scanty and meant to serve as an introduction to phonological or grammatical studies or to solve only one or two problems of Persian phonetics. As an example one may take Professor A.K.S. Lambton's introduction to her Persian Grammar (Cambridge, 1967). The phonetic section (pp. xiii-xx) seems primarily intended to help students with the pronunciation of the examples and with the values of the Persian script. The same may be said of V.S. Rastorgueva's phonetic account, which includes phonological remarks as well, in her "A Short Sketch of the Grammar of Persian" (I.J.A.L., 1964, pp. 1-10).

Carleton T. Hodge's article "Some Aspects of Persian Style" (1957, pp. 355-70), contains many interesting observations on the nature of glottal stop, vowels and consonants. Yet this is also far from a complete presentation of Persian Phonetics. Some of Hodge's observations correspond with those of the present writer's, but his treatment (phonemic) is widely different from the treatment (prosodic) given in this thesis. For instance he suggests the addition of an extra vowel, namely /ə/ (p. 357), to the Persian vowel system to account for such examples as /bəhar/ 'spring', /šəma/ 'you', (p. 358, transcription is his), whereas they are treated as cases of harmony by this writer (see 8.7).

P.N. Khanlari, in "Vazn e She'r e Farsi" (the Metres of Persian Poetry Tehran University, 1959, pp. 85-132), has described a number of phonetic points in a chapter which is primarily meant to give a phonological account of Persian. His phonetic remarks are mostly based on poetical data (p. 113) and not on the Colloquial Persian. An interesting observation

by Dr. Khanlari in his description is that he has, also, stated that the length of vowels is determined by the structure of syllable and notes that the so-called Short Vowels of Persian are long in long syllables and short in short ones, thus he establishes two types of syllable: long and short. But as he is concerned with poetry, and not with the colloquial form of the language, he does not establish a third type of syllable, namely, intermediate as is done in this thesis (see 2.2 and 6.4.2).

No other phonetic account has been found by the contemporary Persian linguists. Classical Persian Scholars have, also, given some rather interesting descriptions of Persian Phonetics, Abu-Ali Sina's<sup>1</sup> Book "Makharej ol-Horuf" (Points of Articulation of Sounds) is an outstanding example of such works. So is Khaje Nassir Tussi's<sup>2</sup> "Me'yar ol-'ash'ar" (The Metres of Poetry), published in Tehran (no date mentioned).

Tussi has made an interesting observation about the existence of an extra syllabic element in Persian which he does not include in the vowel system. He states that:

"But in Persian, clustering of two consonants is frequent, and it may happen that more than two consonants cluster together; and it may happen that some of them are not so much without a vowel as with a "hidden" one. But of the two consonants, as found in *Kar* <sup>3</sup> and *mard* etc., when found in poetry, the first remains without a vowel and the second with a vowel, because the second consonant corresponds to one syllable in the metre of poetry e.g. *Karegar*<sup>4</sup> weighs as

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1. 10th - 11th Century A.D.

2. 13th Century A.D.

3. Tussi, like other classical scholars regards the sound *alif* as a consonant, see F.N. Khanlari, the above mentioned book p. 89.

4. Composed of {kar} + {gar}. See 8.4.23. III.

fa?elon ." p. 18.

The "hidden" vowel, in Tussi's terms, is treated as the ə-prosody of junction in complex and compound words in the present thesis (see 8.4.23.III and 8.5.2.II).

This thesis includes a detailed phonetic description of Persian which is the most comprehensive now available as far as the writer has seen.

There are several phonological descriptions of Persian available in the existing literature. But they are all in phonemic terms. And, perhaps, because of the nature of phonemic theory, or whatever reasons, most of the descriptions fail to state or solve many very important aspects of Persian phonology, some of which will be mentioned briefly in the section below and more extensively discussed in the body of the thesis.

Some of the previous phonological descriptions are listed below together with the phoneme inventory each one suggests:

1) - Carleton T. Hodge, as above, p. 357.

Vowels: /i e æ ə u o a/

Consonants: /p t k s š c f x h ' /

/b d g z ž j v q /

/ r l m n y w /

Juncture: Phrase-internal open juncture: denoted  
by space

Phrase-final: . , ?

Phrase-final length: .

Supralinear Pitch: 1234

2) - W. Ivanow, 'Notes on Phonology of Colloquial Persian', 1930, pp. 576-95. Ivanow does not give a phoneme inventory, but suggests a method of transcription of Persian Sounds which includes such symbols as gh, kh, ch, and so on (p. 578).

3) - P.N. Khanlari, as above.

Vowels: /ī e ā a o ū ou ei /  
 Consonants: /p t k s š c f x h ?  
 /b d g z ž j v q  
 /r l m n y /

4) - Jiri Kramsky, 'A Study in the Phonology of Modern Persian', 1937, pp. 66-83.

Vowels: short: i u, long: ī ū  
 a ā  
 Consonants: /p t k s š c f x h /  
 /b d g z ž dz v y(k) /  
 /r l m n y w /

"then there are a number of sounds which have special pronounciations in Arabic, but in Persian they are used only in orthography" (sic) p. 72.

5) - V.S. Rastorgueva, as above,

Vowels: /i e æ a o u ey ow /  
 Consonants: /p t k s š c f x h /  
 /b d g z ž j v q /  
 /r l m n y /

6) - Charles T. Scott in 'Syllable Structure of Tehran Persian', 1964, pp. 27-30 adopts the phoneme inventory suggested by Gertrude E. Nye (p. 27), but extends the distribution of /?/ to initial position. The phoneme inventory is as follows:

Vowels: /i e æ u o a /  
 Consonants /p t k s š c f x h ? /  
 /b d g z ž j v q /  
 /r l m n y w /

and he states that "The suprasegmental phonemes have not been worked out in detail, although it is clear that there are at least three phonemic levels of pitch, two phonemic grades of stress, two terminal junctures (terminal fade and terminal rise) and a phoneme of phrase-terminal open juncture", p. 27.

7) - Y. Samareh, 'The Phonological Structure of Syllable and Word in Tehrani Persian', Ph.D. Thesis, University College, London University, 1968,:

Vowels: /i e a a o u eu ei /  
 Consonants: /p t k s š c f x h ? /  
 /b d g z ž j v q /  
 /r l m n y /

Other recent work by Persians is aimed more at a description of the orthography than at a phonetic or phonological description of the language (see, e.g. Dr. M.J. Mashkur, Dasturname (Book of Grammar) Tehran, 1962, pp. 6-12.

The present thesis gives a prosodic description of Persian phonology for the first time. Prosodic theory has enabled some extremely interesting sides of phonological structure of the language to be revealed which have until now been left unnoticed or unsolved.

#### 0.4 Choice of Theory

Towards the end of the academic year 1967-68, when work on this thesis first began, it was intended to base the

description on the theory of phonemic analysis as presented by K.L. Pike<sup>1</sup> and other phonemicists.<sup>2</sup> This method was adopted and work proceeded until the middle of the academic year 68-69. By then the writer had faced many problems for which no direct and satisfactory solutions could be provided by phonemic theory (see 0.4.1 - 0.4.4 below). The choice had to be made between yet another version of Persian Phonology which would have been no better than those already existing, and finding some other theory which would result in a more satisfactory description. The latter was chosen and it was decided that the prosodic approach should be adopted tentatively in the hope of better results.

Over a year had to be spent on further study of the newly chosen theory till the writer had come to some degree of sophistication in prosodic theory so as to be able to apply it to Persian. Soon after the first stages of the application satisfactory results could be seen; structures emerged and the problems were no longer insurmountable. To illustrate this point some of the problems are briefly noted here.<sup>3</sup>

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1. In 'Phonemics', 1964. Coexisting Phonemic Systems, 1949, and, Grammatical Prerequisites to Phonemic Analysis, 1947.
  2. For example, by 'Charles F. Hockett, A Manual of Phonology', 1955; Zellig S. Harris, Structural Linguistics, 1963, Chapters 3-11; Antonie Cohen, The Phonemes of English, 1965.
  3. It is felt that no attempt need be made here to outline the principles of prosodic theory. Adequate literature is available on the subject and the reader can see, for example;
    - 1) J.R. Firth "Sounds and Prosodies" 1946 "The Structure of the Chinese Monosyllable in a Huanese Dialect", 1937 and "The Techniques of Semantics", 1935, and "A Synopsis of Linguistic Theory, 1957.
    - 2) E.J.A. Henderson, 'Prosodies in Siamese' 1949 and "The Phonology of Loan Words in Some South-East Asian Language. 1951.

0.4.1. Harmony

Some vowels are observed to harmonize with the vowels following them when both vowels belong to the same word, (see 3.3.14 and 8.7.). Such vowels create special problems difficult to solve phonemically. The most illustrative case of such harmony is that observed in prefixed verbal forms, which may also be used as nominal words. The prefix {be}, which as pronounced in isolation is [bĕ], has the following forms in relation to the verbal roots:

- 1) {be} + {gu} → [bĕgũ] 'say', as in the nominal word [bĕgũ məgũ] 'dispute'.
- 2) {be} + {kof} → [bĕk<sup>4</sup>o<sub>f</sub>.] 'kill', " " " " " [bĕk<sup>4</sup>o<sub>f</sub>.bĕk<sup>4</sup>o<sub>f</sub>.] 'massacre'
- 3) {be} + {xab} → [bĕxa.b] 'sleep', " " " " [bĕxo.r bĕxa.b] 'eat + sleep'
- 4) {be} + {bar} → [bĕba.r] 'take', " " " " [bĕbo.r bĕba.r] 'cut + take'
- 5) {be} + {deh} → [bĕde.h] 'give', " " " " [bĕde.h] 'debt'
- 6) {be} + {bin} → [bĕi<sup>h</sup>i.n] 'see', " " " " [bĕi<sup>h</sup>ya bĕi<sup>h</sup>i.n] 'come + see'

Footnote 3 contd. from previous page.

3) T.F. Mitchell, "Syntagmatic Relations in Linguistic Analysis, 1958, and 'Long Consonants in Phonology and Phonetics', 1957.

4) R.H. Robins: 'Aspects of Prosodic Analysis' 1957.

5) F.R. Palmer, Introduction to 'Prosodic Analysis' 1970, and the 'Broken Plurals' of Tigrinya, 1955.

6) N. Waterson: 'Some Aspects of the Phonology of the Nominal Forms of the Turkish Word', 1956.

'Child Phonology: a prosodic view', 1971 (forthcoming)

'Some Speech Forms of an English Child' - A Phonological Study' 1970 (forthcoming).

And many other articles in the volumes of BSOAS, 'In Memory of J.R. Firth', Ed. by C.E. Bazell, J.C. Catford, M.A.K. Halliday and R.H. Robins, and in the Publications of the Philological Society.

It is possible, in phonemic terms, to say that either the phoneme /e/ has the allophones: [ä ~ ö ~ ě ~ ä ~ ě ~ ĭ] <sup>1</sup> in the above environments (which is not so desirable as the allophones are not phonetically similar), or that we are faced here with a case of vowel alternation. Neither of the two solutions are satisfactory. The first solution involves an extreme case of phonemic overlapping where a phoneme, supposed to be distinguished from others by the features frontness, unroundedness and half-closeness or openness, includes in itself such variations as rounded, back, close to open [ä ~ ö ~ ě] and unrounded front, close to open [ĭ ~ ě ~ ä] most of which function as allophones of other phonemes elsewhere.

The second solution seems to be saying the same thing as in the first case but in different terms because when we say that the phoneme /o/, for instance, alternates with the phoneme /e/ in /boxor/ and /bedeh/, we have, in fact, said that /o/ and /e/ overlap.<sup>2</sup>

A third solution would be to add to the phoneme inventory a number of extra phonemes (as C.T. Hodge has done for one case see 0.3 above), in order to account for each instance of harmony. None of the solutions were found to be satisfactory. Instead the problem was dealt with prosodically as presented in 8.7.

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1. An implication of this solution at the morphological level would be to say that the morpheme {be} has the allomorphs:

[bä ~ bö ~ ě ~ ä ~ ě ~ ĭ] which is far from economical.

2. G. Lazard in 'Grammaire du Persan Contemporain', 1957, (pp. 13-18), has listed such varieties of the Persian vowels but the way he has described them seems to imply that he regards them as cases of vowel alternation.

#### 0.4.2 Long v. Short and Stable v. Unstable Vowels

The so-called "Long vowel phonemes": /a u i/ were observed to be short in some syllable structures (e.g. in cv as in {pa} 'leg') and intermediate or long in others (e.g. intermediate in cvc as in {par} 'last year' and long in cvcc as in {pars} 'Pars'). The so-called "short vowel phonemes" /e o a/ similarly varied in accordance with syllable structure (e.g. short in cv as in {ke} 'who', intermediate in cvc as in {deh} and long in cvcc as in {kerm} 'worm'. (See 2.2 and 3.3.1). Furthermore, both long and short vowels were found to remain almost constant in their length when followed by a voiceless fricative in cvc and cvcc syllables. Thus the short and long vowels in the examples below were found to be subject to less variation than elsewhere (for details see 2.2):

{pas} 'after', {past} 'low', {das} 'brother',  
 {dast} 'had', {guf} 'ear', {gust} 'meat', {mes} 'copper',  
 {mesr} 'Egypt', {tof} 'sputum', {goft} 'said', {gis} 'plait',  
 {bist} 'twenty'. Therefore, leaving the vowels in the last examples unmarked for length we would have, in phonemic terms, the following allophonic variations for each of the vowel phonemes:

Long /i/:	[ĩ i. i: i]	Short /e/:	[ě e. e: e]
/u/:	[ũ u. u: u]	/o/:	[õ o. o: o]
/a/:	[ǎ a. a: a]	/a/:	[ǎ a. a: a]

But this is by no means the whole picture. The short allophones of the short vowels exhibit some characteristics which, in Rastorgueva's terms (see 0.3) render them 'unstable'. And what Rastorgueva means by "unstable" is, in fact the phenomenon explained in 0.4.1 above, as harmony among the

syllables. For example the phoneme /e/ in the word /Xane/ 'house', would have the following further allophonic variations:

- [ě<sub>r</sub>] in [Xǎn<sup>̃</sup>ě<sub>r</sub>] 'house'  
 [ĭ] in [Xǎnĭfĭ] 'domestic'  
 [ǐ] in [Xǎn<sup>̃</sup>ǐhǒ] 'houses'

Thus these latter variations would have to be included among the allophones of /e/ as follows:

/e/: [ě<sub>r</sub> ĭ ǐ ě e. e: e]

And if the allophonic variations of /e/ observed in 0.4.1 above in relation to the prefix {be} are added to the list, the complete list would look something as follows:

/e/: [ě<sub>r</sub> ĭ ǐ ě e. e: e ě ǒ ǎ].

Similar lists would have to be provided for /a/ and /o/ as they too exhibit the same characteristics as /e/, i.e. 'instability' (Rastorgueva, pp. 3-4).

This treatment is, of course, far from economical or simple and could hardly be considered acceptable. Prosodic analysis provides, on the other hand, a solution more economical, simple and, in the writer's view, acceptable, as follows:

1) The variations in the length of vowels are abstracted at syllable level as syllable prosodies on the ground that they are tied to syllable structures thus:

Short	:	CV	and V,	or generalized as (C)V
Intermediate:		CVC	" VC, "	" (C)VC
Long	:	CVCC	" VCC, "	" (C)VCC

(for details see 6.4.2).

2) The variations observed in the quality of vowels are abstracted as harmony at word level and regarded as word prosodies on the ground that they mark the structure of words

and distinguish them from comparable sequences of syllables which do not belong to one word (see for details 8.7) thus marking these prosodies as I (exponent : closeness), E (exponents : mid close or mid open) and A (exponents : openness) the phenomenon may be stated as: (using the same examples as in 0.4.1).

$I_{C\bar{e}CI}$	$C\bar{e}^Y_{CI}(C)$ : [p̣ịp̣ị.ŋ] and [(x̣ä) p̣ịf̣ị] $C\bar{e}^W_{CI}$ : [ḅäg̣ü]
$E_{C\bar{e}CEC}$	$C\bar{e}^Y_{CEC}$ : [ḅẹdẹ.ḥ] $C\bar{e}^W_{CEC}$ : [ḅöḳụọf̣.]
$A_{C\bar{e}CAC}$	$C\bar{e}^Y_{CAC}$ : [p̣äp̣ạ.ṛ] $C\bar{e}^Y_{CV}(C)$ : [ḅẹx̣ạ.ḅ] and [(x̣ä) ṇḥä]

### 0.4.3 Junction Prosodies

Persian grammarians are generally aware of the existence in the language of a number of non-phonematic (or, in phonemic terms, non-phonemic) consonantal elements whose functions are to link two grammatical units together. They usually refer to such elements as "ja je molajjen" 'euphonic j', "hamze je molajjen" 'euphonic ?', and "vav e molajjen" "euphonic v".<sup>1</sup> But there is much disagreement among them as to where each one should be used.<sup>2</sup> The confusion arises partly from the fact that most of such elements are grammatically conditioned (rather than phonologically). Thus: word + the suffix {?i} is marked

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1. See, for example, Dr. Mohammed Mo'in, *Izafé*, Tehran, 1962, pp. 32-37.

2. Recently the educational authority in Persia have prescribed that the 'euphonic j' should be used everywhere! And this has caused so much argument that some have found it worth while to travel as far as London to obtain experimental support against this decision.

by  $j$  (e.g.  $\{dara\} + \{?i\} \longrightarrow \{dara'ji\}$  wealth) and word + the particle  $\{?i\}$  is marked by  $?$  (e.g.  $\{dara\} + \{?i\} \longrightarrow \{dara?i\}$  'a rich man', see 8.4.23.II and 9.6.1).

While Persian traditional grammarians are to that extent aware of the non-phonematic (or non-phenemic) status of such euphonic elements, no phonemicist seems to have made this distinction, (perhaps on the basis of "once a phoneme always a phoneme"), i.e. they seem to have included them in their phoneme inventories and treated them as examples of the phonemes  $/?/$ ,  $/y/$  and  $/v/$  etc., or, they seem not to have found it functionally necessary to examine them at all. None of the previous studies listed in 0.3 include any remark on these elements in their phonological descriptions. Yet at the grammatical level some of the same linguists have stated, for example, that at such and such place "the inserted consonant  $y$  appears".<sup>1</sup> And one does not know why it appears, and why of all the euphonic elements,  $y$  should appear and not, say,  $?$ ; or, why the  $y$  in, e.g:  $\{?a'sana'jan\}$  'acquaintances', should be regarded as a consonant when it does not commute with any other consonant at this place in the structure, and when its only function is to mark the relation between the stem  $\{?a'sana\}$  and the plural suffix  $\{-?an\}$ .

The solution available through the prosodic theory seems to answer almost all such questions. That is, the use of the so-called euphonic elements is explained with reference to the grammatical constructions in which they appear. They are treated as prosodies of junction between stem and suffix (see 8.4.23), the components of compound word, (see 8.5.2), and

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1. See: V.S. Rastogueva, 1964, p. 18.

word and particle (see 9.6.1 - 9.6.11)

#### 0.4.4 Gemination

Gemination which does not appear to have been noted in Colloquial Persian, (except in Arabic loans), was observed in the data (see 5.3). No satisfactory solution was found for this phenomenon in phonemic terms, whereas prosodic analysis provides adequate means for describing this aspect of Persian phonology.

In addition to the problems above prosodic analysis was found to solve, with more satisfactory results, such questions as the distinction at the phonological level between particles and suffixes (see 9.6.1 - 9.6.11), the euphonic vowels in terms of ə-prosody (see 8.4.23.III and 8.5.2) etc.

#### 0.5 Phonetic Description: Articulatory Feature Analysis

The phonetic description presented in Part I is based on the method developed by N. Waterson and first used by her in her recent article "Child Phonology, a Prosodic View (forthcoming). The method is referred to by her as "Articulatory Feature Analysis" (p.1) and the principles underlying the method, as I understand them, are:

1. Each articulatory feature (e.g. frontness, plo-siveness, glottality, friction, etc.) is considered as a separate phonetic entity which should be described independently of segments; the method is, therefore, primarily non-segmental.

2. The features are, in her own words "those that arise from the material under investigation, they are not the distinctive features of Generative Phonology and are not intended to be considered universal", (p.1.).

3. Some features relate to syllable (e.g. length see 2.2) or word (e.g. prominence see 8.6), others to places within syllable (e.g. plosiveness, bilabiality etc. see 3.4.1).

4. Co-occurring features are grouped together, with reference to the larger units (syllable, or word).

5. The larger units are included in the method to serve as vehicles for the phonetic features that are exponents of syntagmatic relations at the phonetic level.

In relation to Prosodic Phonology articulatory feature analysis has one great advantage over segmental phonetics: it brings the phonetic description closer to the phonological statement, and makes it easier to establish relations between the elements of the structures and their phonetic exponents.

In reading previous prosodic accounts of languages, it is not always easy to find out, for instance, where y- or w- prosodies have come from because the exponents of the prosodies at the phonetic level are cut up to pieces and each piece is allotted to one segment in the syllable, and at the phonological level the already segmented features are once again put together to constitute the exponents of not the segments but the prosodic elements. For example the word [kʰʊ] 'where', is described phonetically as having two segments = [kʰ] described as:

VOICELESS, velar, plosive, ASPIRATED, TENSE, and associated with LIP-ROUNDING and LIP-PROTRUSION, and having more BACK ARTICULATION than [cʰ] in [cʰi] 'who'; and [ʊ] described as close, BACK, ROUNDED, and SHORT. And at the phonological level the features: lip-rounding and lip-protrusion as well as the back articulation of [kʰ] are brought together with the features backness and roundedness of [ʊ] to make the exponents of w-

prosody. This is, of course, confusing - one might ask if such features have different status from the remaining segmental features, why should they not be described differently. And this is what (articulatory) feature analysis does. For instance it describes the example above as consisting of:

1. The features: backness, rounding, lip-protrusion throughout the syllable. They are referred to as w- features
2. The features voicelessness, aspiration and tenseness found at the syllable onset. They are referred to as h- features.
3. Short articulation of the vocoid as compared with that in [k<sup>u</sup>.r] 'blind'.
4. Velarity and plosiveness in the first place referred to as one segment.
5. Closeness and Voicing in the second place referred to as another segment.

It can be seen that the latter method brings the phonetic features much closer to the prosodic phonological elements, yet the description is not phonological as no reference is made to the function of the features in describing them phonetically. Instead they are given purely in articulatory terms. And it may happen (as in 8.8 and 6.4.5) that the segmental elements are phonologically treated as prosodies according to their functions, or that the non-segmental phonetic features are treated as the exponents of segmental elements if their functions so require.

#### 0.6 Problems of Transcription

The symbols available for transcription are generally

geared to segmental phonetics. And it is difficult, if not impossible, to represent a non-segmental description such as feature analysis in terms of segments.<sup>1</sup> An ideal system of symbolization would be one which provides separate symbols for segmental and non-segmental features.

In the absence of such systems no other choice is left but to use the existing symbols and mark the features with diacritics. This is the method used in the phonetic part of this thesis. In tabular representation of the segments the non-segmental features are always included in order to indicate that the symbols together with the diacritics represent both the segmental and non-segmental features.

In the phonological part, however, a broader reading transcription is used merely in order to represent the examples and not to imply phonemic values. Diacritics and narrower phonetic transcription are used only when necessary for comparison (as in 8.7). In such cases the narrow transcription is enclosed in [ ], while the broader transcription is either not enclosed in any brackets, or in { }

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1. "A number of theoretical difficulties in phonetics are due to the fact that the analysis of the living voice does not necessarily correspond to the letters of the Roman alphabet serially employed to represent it. Philologists of the older school have often been charged with studying letters and typography, not language. And precisely the same charge may be brought against some phoneticians. Only the letters and types are different".

"It is a mistake to suppose that the stream of speech is just a string of separate Roman letters. The letters usually represent an articulation, possibly with one or two correlations, such as breath - voice nasality ...."

J.R. Firth, *The Technique of Semantics*, 1935, p. 22  
Oxford Press, 1964, p. 22.

PART 1

PHONETICS

PART I  
PHONETICS  
CHAPTER 1  
SYLLABLE

1.1. The Need for the Phonetic Syllable

A number of phonetic features cannot satisfactorily be described purely in terms of segments. They seem to have a different nature from that of the segments; for instance, some of the features extend over a larger stretch of utterance than a segment. Stress and pitch variation are the classical examples of such features. Length in Persian is of this category (see 2.2.). Palatality, associated, generally, with lip-spreading and advanced articulation of segments, is also another example of this group of features. All these features seem to run through a number of segments unifying them into a larger unit than the segments themselves.

Some other features extend over a part of an utterance which may or may not be larger than a segment. They too appear separately from the segments and mark the segments for that specific place in the utterance. Voicing, associated usually, with laxness and, sometimes with lack of aspiration, is of this category (see 2.4.).

Such features are best described with reference to that stretch of utterance over which they extend. The domain of reference of such features is generally the syllable or part of the syllable. The need for establishing syllable as a phonetic unit arises from the non-segmental

nature of this group of features and the non-segmental description that they require.

### 1.2. Features and Segments

In an utterance like [P<sup>u</sup>.l] 'money', certain phonetic features are observed only in one place, e.g. plosiveness and bilabiality are found at the beginning of the example. Certain other phonetic features are observed throughout the utterance, and not in one place only, e.g. labiality, associated with lip-protrusion and rounding, is found throughout the example. In addition to the two types of features given above, a third class of features is found: features which are observed, not throughout the utterance, but in some part of it, yet, they do not constitute components of the segments appearing in that part, rather they mark them for that place in the utterance, e.g. lack of voicing observed in the final part of the utterance [P<sup>u</sup>.l] is not a component of the segment at that place because the same segment is found elsewhere without the feature, e.g. in [l<sub>1</sub>.b] 'lip', where [l] is voiced.

The features that are observed at a place in the utterance constitute Syllable Segments, or simply Segments. Segments, therefore, occupy places in syllable.

The features that are observed throughout the utterance, or in some part of it are referred to as Syllable Features, or simply, Features. Features do not occupy places in syllable.

### 1.3. The Independence of Features from Segments

In dealing with pitch variation at word and sentence level, most linguists have adopted a phonetic method different from segmentation as used in the description of contours and vowels. Stress, too, has generally been treated non-segmentally. Hence the terms 'Prosodic features'<sup>1</sup>, 'Suprasegmental units'<sup>2</sup> and so on. The reasons given for the non-segmental treatment of such elements are generally as follows:

1) They do not occupy a place in the sound continuum, instead they are co-articulated with other elements (i.e. with segments).

2) They are functional and contrastive as a whole at the phonological level; therefore, they cannot be divided at the phonetic level into smaller parts and attributed to individual segments over which they fall (as aspiration can for instance).

This implies that segmentation falls far short of handling all the phonetic data; therefore, it has to be amended and supplemented by other methods as the phonetic analysis goes on.

For the same reasons that justify treating pitch non-segmentally other features may, also, be treated non-segmentally. For example, in the mono-syllabic word

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1. A.C. Gimson, 'An Introduction to the Pronunciation of English', 1966, pp. 55-6; and Bloch and Trager 'Outline of Linguistic Analysis', 1942, pp. 34-6.

2. Harris, 'Structural linguistics', 1963, pp. 49-51; Hockett, 'A Manual of Phonology', 1955, pp. 74 and 43-71.

[P<sup>ɸ</sup>i.ɪ] 'elephant', the segments [P<sup>ɸ</sup>], [i.] and [ɪ] have all the feature palatality. Palatality is, therefore, co-articulated with all the segments in the syllable.

It does not occupy a place in the continuum. It cannot, therefore, be attributed to one of the segments or the other, and is best treated non-segmentally, as a feature of the syllable as a whole thus:

$$\left[ \begin{array}{c} \text{Palatality} \\ \hline \text{P}^{\text{ɸ}}\text{i.}\underset{\cdot}{\text{ɪ}} \end{array} \right]$$

Equally, in the mono-syllabic word [P<sup>ɸ</sup>u.ɪ] 'money' the segments [P<sup>ɸ</sup>], [u.] and [ɪ] have all the feature labiality. Labiality is spread over all the segments in the syllable. It does not occupy a place in the continuum and cannot be allotted to any of the segments. It is best described, therefore, as the feature of the syllable as a whole thus:

$$\left[ \begin{array}{c} \text{Labiality} \\ \hline \text{P}^{\text{ɸ}}\text{u.}\underset{\cdot}{\text{ɪ}} \end{array} \right]$$

Further support is found for this treatment in the fact that, for instance, no so-called "palatalized, bilabial, voiceless, plosive", i.e. [P<sup>ɸ</sup>] is found in non-palatalized syllables. Thus \*[P<sup>ɸ</sup>u.ɪ] is not possible.

By treating palatality and labiality and all other phonetic features that co-occur with them (see 2.3.) in a non-segmental way the remaining parts of both [P<sup>ɸ</sup>i.ɪ] and [P<sup>ɸ</sup>u.ɪ] are rendered exactly the same. That is to say, both examples begin with a bilabial, voiceless, plosive segment which has neither labiality nor palatality. Let us symbolize this new segment as P. Both examples also contain a syllabic segment which has neither labiality

nor palatality, but it has voicing and close tongue position and similar length. This new segment is symbolized as I. Finally, both examples end in a non-palatalized and non-labialized voiceless denti-alveolar lateral, this is also symbolized as L. In addition to these segmental elements, two new elements have been obtained, one from [P<sup>i</sup>i.l], and one from [P<sup>u</sup>u.l], and they are symbolized as y (palatality) and w (labiality). The two examples can now be presented as:

$$y_{PIL}$$

$$w_{PIL}$$

or in one formula as

$$y/w_{PIL}$$

It seems apparent from the examples above that the reasons (1) and (2) (p.3) can equally be held to justify the non-segmental treatment of such features as palatality, labiality, etc. They may, therefore, be best treated non-segmentally for the same reasons as stated for pitch and stress, i.e. labiality and palatality are functional as syllable features.

It is worth reporting, here, on an experiment carried out in relation to the syllabic validity of such features as labiality and palatality:

A number of mono-syllabic words were selected including: [P<sup>u</sup>u.l] 'money', [z<sup>u</sup>u.r] 'force', [P<sup>i</sup>i.l] 'elephant' and [z<sup>i</sup>i.r] 'beneath'. They were read out to a native Persian not familiar with linguistics. They were all interpreted by him as consisting of one syllable each.

The same words were read to the same informant once again, but this time, an attempt was made to replace the initial segments of the syllables marked with labiality by the segments marked with palatality. Similarly the initial segments of palatalized syllables were replaced by segments marked with labiality, so that the forms he was hearing were:

\*[P<sup>f</sup>u.ɿ], \*[zu.r], \*[P<sup>ɥ</sup>i.ɿ] and \*[zi.r].

He almost consistently perceived the forms as disyllabic utterances; that is he interpreted and reproduced:

\*[P<sup>f</sup>u.ɿ] as \*[P<sup>f</sup>i̇ yu.ɿ]  
 \*[zu.r] as \*[zi̇ yu.r]  
 \*[P<sup>ɥ</sup>i.ɿ] as \*[P<sup>ɥ</sup>u̇wi.ɿ]  
 \*[zi.r] as \*[żu̇wi.r]<sup>1</sup>

The experiment supports the view that, as far as Persian is concerned, such features as labiality and palatality are not segmental features. They stretch over the whole syllable and it is not accurate to describe them in terms of the syllabic, the initial or the final segments of the syllable, rather they seem best described independently from the segments in terms of the syllable as a whole alongside pitch, stress, etc.

#### 1.4. Syntagmatic and Paradigmatic Considerations

Although linguists appear mostly to have agreed

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1. The writer himself is, despite his phonetic and phonological awareness of the structure of such English words as "view" and "swear", still inclined to perceive and produce them as
- [vi̇yu] and [ṡu̇we:].

that two entirely different types of relation exist between linguistic elements at all levels, namely syntagmatic and paradigmatic relations, yet, aside from the advocates of the Firthian School of Linguistics,<sup>1</sup> hardly anyone seems to have brought into consideration this fundamental principle at the phonetic level and seldom at the phonological level. Phoneticians<sup>2</sup> seem to have been mainly concerned with cutting up the sound continuum into segments and assigning nearly all the features that they have observed at a certain point in the continuum, to the segment which appears at that point. Even in the case of stress and pitch variation, where phoneticians have actually avoided using the method of segmentation, the result of their treatment is the same; that is, they have arrived at units which apart from being different from the segments in their phonetic nature, nevertheless have the same status as segments and have no syntagmatic significance. Thus the sound continuum is cut up into units, which are either segmental or supra-segmental, and no phonetic relation is stated to exist between them. Hence "syllable

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1. J.R. Firth, 'A Synopsis of Linguistic theory', 1957, pp. 168-205; E.J.A. Henderson, 'A Phonetic Study of Western Ossetic', 1949.

T.F. Mitchell, 'Syntagmatic Relations in Linguistic Analysis', T.P.S., 1958, pp. 101-118; R.H. Robins, 'The Phonology of Nasalized Verbal Forms in Sudanese, 1953, pp. 138-45; N. Waterson, 'Child Phonology, a prosodic view (Forthcoming), 1971.

2. See, for instance, Pike's 'Phonetics', 1966, especially Part II.

... (is a) ... unit of stress or tone" placement,<sup>1</sup> as if the stress or tone did not belong to the syllable and they were merely added to it. These segmental and supra-segmental elements are, then, said to have this property of combining with each other in order to make an utterance. Their combination is later stated to have certain patterns and to be subject to certain restrictions in every language. The result of such a method is obvious: obtaining a description which puts great emphasis on the paradigmatic relation and has little consideration for the other dimension, namely the syntagmatic.

The effect of the inadequate consideration of syntagmatic relations at the phonetic level is especially felt in the attempts which have been made to define the syllable phonetically. In most of the available phonetic definitions, one feels that syllable has been taken as an indivisible unit, a unit which is not made of smaller parts, so that it should be defined in terms of one articulatory movement. It seems that it is just by coincidence that most examples of this unit begin and/or end in consonantal elements, or have stress or pitch. An examination of some of the phonetic definitions of syllable is illustrative:

"A syllable is a single unit of movement of the lung initiator ... which includes but one crest of speed ... Physiologically syllables may also be called chest pulses." 2 (Underlining is mine)

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1. A.C. Gimson, 'An Introduction to the Pronunciation of English', 1966, p.52.
  2. Pike, 'Phonetics', 1966, p.116.

The important points in this definition are:

- a) A single unit of movement of lung initiator.
- b) Includes but one crest of speed<sup>1</sup>.

Before testing the definition on some Persian data, a further quotation from Pike is given below. This appears two paragraphs after the definition (p.117):

"Every close stricture within a continuum tends to prevent the egress of the air stream initiated by the pulmonic movement, and air pressure is built up behind these complete or partial strictures. The pressure accentuated in this way tends to slow down the movement of the initiator or to stop it entirely. When the strictures are released the pressure is lessened, and the speed of the initiator movement increases. These alterations of initiator movements constitute the syllable pulse."

According to the syllable definition given above, some of the examples following should comprise two syllables each, and some even three; whereas any native speaker of the language would consider all the examples as mono-syllabic:

[P<sup>y</sup>o:t<sup>y</sup>c<sup>y</sup>] 'hammer'

In terms of Pike's definition of syllable, this utterance consists of three syllables because there are three strictures in this word: [P], [t] and [c] each preventing the "egress of the air stream" and causing "air pressure" to be "built up behind" it; and each is followed by a "release" which lessens the air pressure. The releases are: [y<sup>o</sup>:], [y] and another [y] after [P], [t] and [c] respectively. Each one of these releases increases "the speed of the initiator movement". Thus each one of [P<sup>y</sup>o:] [t<sup>y</sup>] and [c<sup>y</sup>] is:

- a) A single unit of movement of lung initiator,

b) Includes but one crest of speed.

In other words they are separate syllables. On the basis of the same argument each of the following examples should be considered as consisting of more than one syllable:

[ ha:st <sup>ε</sup> c <sup>ε</sup> ]	'breakage'	3 syllables :	[ ha:st <sup>ε</sup> -c <sup>ε</sup> ]
[ so:ɸh ]	'morning'	2 syllables:	[ so:-ɸh ]
[ dʒa:ɸn ]	'celebration'	2 syllables:	[ dʒa - ɸn ]
[ sa:ɸ ]	'patience'	2 syllables:	[ sa:-ɸ ]

This conclusion which seems to be the only logical one on the basis of the definition above, is not congruous with:

- 1) the native speaker's intuitive feeling about his language, whereas it has been stated that "syllable would appear to be an intuitively recognizable unit even for primitive people."<sup>1</sup>
- 2) It is not congruous with the phonological syllable structure (6.4.1.) or with:
- 3) The relation between the syllable types and the syllable length (2.2.) or with the relation between the syllable features and segmental modifications (3.4.).

The incongruities stem from the fact that this definition of syllable upon which the description is based, does not consider the syllable as a complex unit composed of several different elements. Rather it defines the syllable as the product of a single movement, and thus it attempts to safeguard the unity of syllable. Whereas the

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1. Abercrombie, 'Elements of General Phonetics', 1967, p.34.

unity of syllable may, perhaps, be best safeguarded in terms of the features that unify the segments into a syllable, i.e. the features that mark the syntagmatic relations between the segments within a syllable. This has, of course, not been included in the definition above. Instead all such features are allotted to the segments. The segments are, then, merely put together in syllable without being related to each other. Hence both Pike's segments and his syllables do not have clear-cut borders and he has to admit (in his own words) that:

"A segment is a sound (or lack of sound) having indefinite borders but with a center." 1

One is inclined to ask whether these "indefinite borders" were not, in fact, syllable features wrongly allotted to segments. And whether, if these indefinite borders were abstracted separately and described as syllable features, one would still need to leave the borders of the segments so obscure and indefinite.

Actually Pike, himself, later implies in his discussion of "glides" (pp.110-112) that these borders (now referred to as glides) are features that occur in between the segments, otherwise:

"An isolated sound may have no glide at all and still be a level segment." (p.110).

But he does not attempt to account for these segmental borders (or glides) in terms of syllable features, i.e. as features that mark the syntagmatic relations between the segments of

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1. Pike, 'Phonetics', 1966, p.107.

a syllable whereas if these 'glides' occur in between the segments, they must have some syntagmatic significance.

The definition above, furthermore, does not provide adequate means for syllable division, and Pike has to state in this respect that,

"It is not always possible to determine where the trough of initiating movement which separates two syllables occurs." (p.117).

The question is why syllable division should be based on the "trough of initiating movement", while, it seems that, if the so-called "glides" (as well as other features which mark the unity of syllable) which occur in between the segments, are described in terms of the features of syllable it is almost always found easy to decide where a syllable ends and another begins. For instance, in the examples given in page 10 above the following points are observed:

1) All the utterances have the same length.

The length is either associated with the syllabic segments or the segments immediately following the syllabics. But they all differ in length from such examples as [P<sup>h</sup>o.c<sup>h</sup>] 'puff', [s<sub>o</sub>.r] 'slippery' and [s<sub>a</sub>.r] 'head'.

2) All the examples end in absence of voice.

3) All the segments in each of the utterances have either advanced articulation, or retracted articulation, the former accompanied with lip spreading and the latter with lip-protrusion and rounding.

4) All the examples are produced with one type of pitch level.

By regarding these features as those of the syllable it seems possible to conclude that the examples on page 10 are of the same basic syllable type because of the sameness of their

syllabic features. Their syllable type may now be given in terms of segments (symbolized as c and v) and features (length is symbolized as :, absence of voice as h, advanced articulation as y, retracted articulation as w, and pitch as '):

[p <sup>h</sup> o:t <sup>h</sup> c <sup>h</sup> ]:	cvcc,	cv:cc,	cv <sup>h</sup> cc,	w <sup>h</sup> cvcc	'cvcc
[so:ph]:	"	"	"	"	"
[d <sub>1</sub> a <sub>2</sub> f <sub>3</sub> :n]:	"	cvc:c	"	y <sup>h</sup> cvcc	"
[sa:ba]:	"	cv:cc	"	"	"

As is shown above, certain features unify the segments into one syllable. The boundaries of the syllable lie, therefore, where the features begin and end. Apart from the clear-cut boundaries thus obtained (see 4.1.), the segments have also no indefinite borders because the borders have now been given independent status from the segments and no longer constitute a part of the definition of the segments. Furthermore this treatment, unlike that based on the definition on page 8, is completely congruous with

- 1) The native's intuitive feeling of the language.
- 2) The phonological syllable structure.
- 3) The relation between the syllable type and syllable length, or the syllable features and segmental modifications.

Abercrombie's definition of syllable is also, to a large extent, open to the same criticism as stated above in relation to that of Pike. Abercrombie's definition is:

"The essential basis of a syllable, therefore, is a chest pulse." 1

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1. 'Elements of General Phonetics', 1967, p.37.

But Abercrombie's chest pulse is different from Pike's "movement of lung initiator" in that the former is an involuntary act, beyond one's control (p.35), while the latter is caused by air pressure produced by strictures voluntarily made somewhere in the cavity bringing the egress of the air stream to a complete or partial stoppage.<sup>1</sup> This difference, however, may lead one to analyse such an utterance as [P<sup>4</sup>o:t<sup>4</sup>c<sup>4</sup>] as monosyllabic, but [s<sub>o</sub>:b<sub>h</sub>] and [s<sub>a</sub>:ʔ<sub>ç</sub>] would have to be analysed as dissyllabic because in the last two utterances the penultimate segments [b<sub>h</sub>] and [ʔ] bring the first chest pulse in each example to an end and a second pulse is felt to be motivated in each case by the articulation of [h] and [ç].

Abercrombie, however, comes nearer than Pike to a useful definition of syllable. He states the complexity of syllable and says that:

"The pulse may - and usually will, in normal speech - have associated with it movements of the vocal cords and of the velum, and also articulatory movements ... All these movements, combined together, are super-imposed on the fundamental syllable - and stress producing processes of the pulmonic mechanism, and they are felt ... to constitute one single speech producing act. The syllable has an essential unity. It is a complex act, certainly, with numerous different organs taking part in it, but it is nevertheless an integral whole." 3

But it seems that the unity of the syllable, in Abercrombie's view too, is due to the fact that it is based on a single

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1. Pike, Phonetics, p.117.

2. My emphasis, see p. 8 , first paragraph.

3. Element of General Phonetics, p.37.

chest pulse, and not due to the syntagmatic relations that are established between the segments through the features that extend over the whole or part of the syllable. In other words, Abercrombie seems to say that a voluntary act, like speech, which can be controlled, checked, stopped, etc. at the speaker's will, is given integrity and oneness by an automatic act performed by the "respiratory muscles (which) alternately contract and relax at a rate of roughly five times per second".<sup>1</sup> Whereas, it seems, that the unity and integrity of syllable is due to those features that mark the syllable as one, and whether the syllable is fundamentally made of one chest pulse (e.g. [sɑ.r] 'head') or more (e.g. [sɑ:ɾɔ] 'attempt') is not relevant because, as a phonetician, one is not concerned with the fundamental mechanism of syllable, rather one is interested in how the different features combine in larger units and how they are related to each other.

Having stated that the notion of chest pulse is sufficient enough to guarantee the unity and integrity of syllable, Abercrombie, then, suggests the analysis of the syllable solely in terms of segments:

"However, although a syllable is in this sense one single act, it is too large and complex a unit to serve the purpose of general phonetic description adequately ... it is certainly necessary to analyse speech beyond the syllable: to divide the syllable, that is to say, into constituent SEGMENTS." 2 (his emphasis).

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1. Ibid., p.35.

2. Ibid., p.37.

The necessity of further analysis of syllable into smaller units is not questioned. What is questioned is whether it is best to analyse the syllable purely into segments or to try and find a more fruitful method of analysis which would not require unnecessary allotment of all features to the segments. Moreover, in the paragraph quoted above Abercrombie seems to discard syllable as a useless phonetic unit by saying that "it is too large and complex a unit to serve the purpose of general phonetic description". If syllable does not serve this purpose, then, why should it be included among the elements of general phonetics and defined as a phonetic unit?

This thesis proposes that syllable is indeed needed in phonetic analysis for describing features whose domain of reference is larger than a segment and mark the syntagmatic relations at the phonetic level. Syllable is also needed to serve as a means of reference for showing the differences observed in segments at syllable initial, medial and final and to give the segments found at each of these places.

#### 1.5. Definition of Syllable

In the light of the discussion in 1.2. to 1.4. above, a definition of syllable in Persian is given in terms of segments and features and their relations to one another as follows:

A syllable is a complex phonetic unit, composed of at least two and at most four segments each occupying a place within the syllable, and a

number of features. The features either run through the whole or part of the syllable marking the unity and boundaries of the unit, or mark a particular segment as the constituent of a particular syllable type.

The definition as it stands covers most loan words. But there are a few loans which are excluded; namely those composed of five segments, such as [tʰəmbɪ] 'stamp'. Such loans are very limited in number, perhaps, not exceeding ten words altogether.

The segmental elements of the syllable fall into two phonetic categories as defined in 3.2.1. and 3.2.3. below, and they are:

- 1) Vocoïd, symbolized by small v.
- 2) Contoid, symbolized by small c.

A phonetic syllable in Persian should have, at least one c which occupies the first place, and a v which occupies the second place. Thus the minimum syllable in the language is a cv: e.g. [tʰv] 'you'.

### 1.6. Syllable Types

The classification of syllables into syllable types that follows is based on the number of segments that may appear in one syllable. It is also possible to classify syllables on the basis of the types of features that are observed in them. This is done together with the description of each group of syllable features in the chapter that follows.

According to their number of segments, syllables

are of three types:

### 1) - CV

The minimum number of segments in one syllable is two, a c followed by a v, e.g.

cv = [t<sup>4</sup>o] 'you', [p<sup>4</sup>a] 'foot', [t<sup>6</sup>ä-lä] 'gold' (cv-cv),  
[sä-cä-ně<sub>4</sub>] 'inhabitant' (cv-cv-cv), [ʃ ä-nä-vä-ji]  
perception (cv-cv-cv-cv).

### 2) - CVC or CVV

A syllable may be composed of three segments, the last one being a c or a v, e.g.

cvc: [de.l] 'heart', [du.d] 'smoke', [p<sup>6</sup>i.r] 'old'  
[go.l-bö.n] 'flower plant' (cvc-cvc),  
[tä.r-c<sup>6</sup>i.b] 'composition' (cvc-cvc).

cvv: [me.i] 'wine', [d<sub>3</sub> o.u] 'barley', [me.i-d<sub>3</sub>en]  
'square' )cvv-cvc), [d<sub>3</sub> ě-lo.u] 'front' (cv-cvv).

### 3) - CVCC or CVVC

A syllable may have four segments, the third being a c or a v, e.g.

cvcc: [p<sup>4</sup>o:t<sup>4</sup>c<sup>4</sup>] 'hammer', [bax:t<sup>6</sup>] 'fortune',  
[xo ʃ .-bax:t<sup>6</sup> ] 'fortunate' (cvc-cvcc),  
[fa.r-sam<sup>6</sup>ʃ] 'mil<sup>6</sup>age' (cvc-cvcc).

cvvc: [Ge:ıd] 'obstacle', [ʔo:ud] 'return',  
[bi-ve:ıd] 'careless' (cv-cvvc).

### Loan Syllable Type

As mentioned above (1.5.), a few loan words, mostly of European origin, have five segments and a further syllable type needs to be established in order to account for them as follows:

CVCCC or CVVCC

cvccc: [n<sup>h</sup>o-v<sup>h</sup>a:m<sup>h</sup>b<sup>h</sup>i] November (cv-cvccc),  
 [t<sup>h</sup>a:i<sup>h</sup>ŋ] Thames.

1.7. Syllable Parts

In order to have a means of reference for describing those syllable features which mark part of syllable (see 1.5.), the syllable is divided into the following parts each consisting of one, or more than one place:

1) Onset

The initial place of a syllable is named onset. Onset always comprises one place and is occupied by a contoid (i.e. c). Thus the first c in cvcc is the onset, and in the word [p<sup>h</sup>o:t<sup>h</sup>c<sup>h</sup>] 'hammer', the onset is occupied by [p<sup>h</sup>].

Onsets are marked by - placed after them. Thus c<sup>-</sup> or [p<sup>h</sup>-] is read: onset.

2) Syllabic Part

The part immediately following the onset is the syllabic part. It always consists of one place and is occupied by a vocoid (i.e. v). Thus the v in cvcc is the syllabic part, and in the example above the syllabic part is occupied by [o:].

Syllabics are left unmarked. Thus v or [o:] is read: syllabic part.

3) Ending

In a syllable consisting of more than two segments, the part occupied by the third and fourth segments is named the ending. Thus, the cc in cvcc is an ending, and in the example above the ending is occupied by [t<sup>h</sup>c<sup>h</sup>].

Endings are of two types:

- a) Simple Ending, consisting of one place which may be occupied by a c (e.g. [p<sup>u</sup>o.r] 'full'), or a v, (e.g. [me.i] 'wine').
- b) Complex Ending, consisting of two places the first of which may be occupied by a c (e.g. [p<sup>u</sup>o:t<sup>u</sup>c<sup>u</sup>] 'hammer') or a v (e.g. [Ge:i<sup>u</sup>] 'obstacle') and the second is always occupied by c.

Endings are marked by - placed before them. Thus -cc or [-t<sup>u</sup>c<sup>u</sup>] is read: Ending, so are: -v, -vc and -c.

### Loans

Loan words containing syllable composed of 5 segments have the following further types of endings:

-vcc: [t<sup>u</sup>a:i<sup>u</sup>z]Thames      -ccc: [ma:rks]Marx

CHAPTER 2  
SYLLABLE FEATURES

2.1. Features of Syllable

In this chapter those features that cannot readily be attributed to one segment more than another are described in terms of features of the syllable as a whole. The reasons for regarding such features as those of the syllable are:

1) Either they run through the whole syllable and modify the articulation of all the segments in the syllable marking them as components of one larger unit (such as the features grouped under w or y in 2.3.),

2) Or they mark a segment as the component of a particular type of syllable (such as the features of length, see 2.2.),

3) Or else, they mark one or more segment for a particular position in syllable (such as the features grouped under h, see 2.4.).

As mentioned earlier (1.2. and 1.3.), syllable features do not occupy places within the syllable, rather they belong to the whole or part of it and mark its unity and boundaries.

2.2. Syllable Length

All vocoids have different lengths in different syllable types. It may, therefore, be said that each syllable type implies a certain length in the vocoids.

Consider the following examples:

cvcc:	[p <sup>u</sup> u:s:t <sup>u</sup> ] <sup>1</sup>	or	[p <sup>u</sup> u:st <sup>u</sup> ]	'skin'	cvc:	[bu:s.]	or	[bu:s]	'kiss'
"	[k <sup>u</sup> u:rd]			'knife'	"	[k <sup>u</sup> u:r]			'work'
"	[zi:s:t <sup>u</sup> ] <sup>1</sup>	or	[zi:st <sup>u</sup> ]	'existence'	"	[zi:r]			
"	[se:l <sup>u</sup> c <sup>u</sup> ]			'way'	"	[se:l]			'tuberculo- sis'
"	[t <sup>u</sup> o:nd]			'fast'	"	[t <sup>u</sup> o:n]			'ton'
"	[da:rd]			'pain'	"	[da:r]			'door'
cy:	[b <sup>u</sup> ]			'smell'	cv:	[se:r]			'three'
	[p <sup>u</sup> u]			'foot'	"	[t <sup>u</sup> o]			'you'
	[zi]			'towards'					

The examples above have the same type of prominence, and the length of the vocoids varies in relation to the type of the syllable. Thus

In syllables of cvcc type they are long: [u:, a:, i:, e:, o:, a:]

In syllables of cvc type they are intermediate [u., a., i., e., o., a.]

In syllables of cv type they are short: [ǔ, ǎ, ǐ, ǣ, ǒ, -]

It is, therefore, possible to conclude that length is dependent on the type of syllable and is thus a feature of the syllable in Persian.

A further support for syllable treatment of length is the fact that length may not be realized in the vocoids but in the syllable endings when the ending is a voiceless fricative, or, when the first c in the ending is a voiceless

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1. See below for further description of this example.

fricative other than [h]. In this case the vocoids are shorter than those observed in cvc syllables and longer and more invariable than those in cv ones. Such vocoids are represented here by symbols without diacritics. Instead the endings are marked for the relevant syllable length, e.g.

cvcc:	[cʰeːstʰ]	'sowing'	cvc:	[cʰeːf.]	'plastic'
"	[basːtʰ]	'closing, closed'	"	[basː.]	'enough'
"	[kʰoːstʰ]	'killing, killed'	"	[kʰoːf.]	'kill'
"	[rafːtʰ]	'went, going'	"	[raf.]	'shelf'

(see 10.3.1. for experimental findings).

But it is also possible for length to be realized in the vocoids in all the examples above, hence the alternatives [pʰusːtʰ], [pʰuːstʰ] and [busː], [buːs] in page 22. And it seems that in colloquial Persian the more commonly used forms are those with long endings while in more formal styles the forms with long vocoids are favoured. Thus the examples given above may also have the following forms:

[cʰeːstʰ]	[cʰeːf.]
[basːtʰ]	[basː.]
[kʰoːstʰ]	[kʰoːf.]
[rafːtʰ]	[raf.]

The fact that length may also be attributed to some contoids in the endings supports the conclusion that length is a syllable feature imposed on the syllabic segments or on some contoids at the endings.

As far as the syllable feature of length is concerned, the syllable types cvv and cvvc fall in the same

categories of syllables as cvc and cvcc. That is, cvv has the same syllable length as cvc and cvvc as cvcc, and the length is generally realized in the syllabic v, e.g.

cvvc: [m̩e:i] 'desire'      cvv: [m̩e.i] 'wine'  
 " [d̩ o:u] suppression " [d̩ o.u] barley

Syllable length is, therefore, closely tied to the syllable types. It may also be said that the length of syllable is determined by the number of segmental components of the syllable, but not by any one of them.

A basic clue to the type and boundaries of a syllable is, therefore, the length observed in it.

Three degrees of length are distinguished on the basis of the observation above. Accordingly the syllables are grouped into three classes. The three degrees of length and the classes of syllable are as follows:

- 1) Long associated with the syllable types: cvcc, cvvc
- 2) Intermediate " " " " " : cvc, cvv
- 3) Short " " " " type : cv

This description is in agreement with Abercrombie's comment on syllable quantity in Latin<sup>1</sup> which is quoted below:

"In Latin (we are lead to believe) the quantity of a syllable is a product of its phonematic structure and the syllables of the same phonematic structure have the same quantity wherever they occur in the word or the utterance."

The description above is also in agreement with the results of a series of laboratory experiments by mingograph, a brief account of which is given below:

(For further experimental findings see 10.3.1. and 10.4.4.)

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1. 'Syllable Quantity and Enclitics in English', 1964, pp. 27-8.

### 1) CV Syllable Type

The following words were recorded three times, all on the same occasion, and all at the speed of 100 cycles per second (cps).

[p<sup>ɕ</sup>i] 'fat'      [zi] 'towards'      [p<sup>u</sup>u] 'walk'

[k<sup>u</sup>u] 'where'      [t<sup>u</sup>o] 'you'

The result of each recording was measured and an average length was worked out for each recording as follows:

A = 21.14 cps      B = 20.5 cps      C = 20.71 cps

On the basis of these findings an average length was arrived at for the syllable type cv as given below:

20.6 cps

### 2) CVC and CVV Syllable Types

The same experiment was repeated in the same way for the following words:

[t<sup>ɕ</sup>ã.n] 'body', [p<sup>u</sup>u.d] 'warp', [sã.n] 'march', [p<sup>ɕ</sup>e.i] 'nerve'

[zi.r] 'beneath', [xo.l] 'idiot', [k<sup>u</sup>a.r] 'work', [k<sup>u</sup>u.d] 'fertilizer'

[p<sup>ɕ</sup>aş.] 'behind', [c<sup>ɕ</sup>e.f.] 'plastic'

The resulting average lengths were:

A = 40.8 cps,      B = 41.5 cps      C = 39.9 cps

And the average length for the syllable types cvc and cvv was:

40.7 cps

### 3) CVCC and CVVC Syllable Types

The following words were also used in the same way for the same experiment:

[ziş:t<sup>ɕ</sup>] 'existence', [fe:iş] 'blessing', [t<sup>u</sup>af:t<sup>u</sup>] 'shone'

[bax:t<sup>u</sup>] 'loss', [p<sup>u</sup>o:rs] 'ask', [fa:rs] 'hypothesis'

[biş:t<sup>ɕ</sup>] 'sieving'

The average length found for each recording was:

A = 61.4 cps      B = 61.2 cps      C = 58.4 cps

And the average length for the syllable types cvcc and cvvc was:

60.33 cps

To sum up, the three classes of the syllable types based on the feature of length have approximately the following lengths:

cv:                    20.6 cps

cvc and cvv:        40.7 cps

cvcc and cvvc:     60.33 cps

The figures given above are, by no means, intended to suggest the average length of the syllable types on all occasions. More important than the figures themselves is the relation between them. The figures may vary from one occasion to another, indeed they tend to be reduced in connected speech and in poly-syllabic words, but the relation is almost always constant, i.e. long syllables are generally <sup>times</sup> three as long as <sup>short, and</sup> intermediates; ~~the latter~~ are twice as long as short syllables, and it is this relation which is most important and not, to emphasize again, the size of the syllables on every occasion.

### 2.2.1. Stylistic Variations

Certain mono-syllabic words, as well as the last syllable in certain poly-syllabic words, are subject to stylistic variations in relation to their syllable types. Such variations are generally observed in relation to two syllable types, cv and cvc, as follows:

1) Some (but not all) words of cv syllable type or ending in cv, may, in formal or literary styles, be regarded alternatively as cv or cvv. This stylistic variation is mostly observed in native Persian words, e.g.

Formal style

cv	[p <sup>h</sup> ā]	'foot'	cv or cvv	[p <sup>h</sup> ā ~ p <sup>h</sup> ā.i]
	[k <sup>h</sup> ū]	'area'	" " "	[k <sup>h</sup> ū ~ k <sup>h</sup> ū.i]
	[sī]	'thirty'	" " "	[sī ~ sī.]
	[nā]	'no'	" " "	[nā ~ nā.h]

cvc

cvcv	[p <sup>h</sup> ārēšā]	'pious'	cvcv	[p <sup>h</sup> ārēšā ~ p <sup>h</sup> ārēšā.i]
			or	
			cvcv	[p <sup>h</sup> ārēšā.i]
cvcv	[bāzū]	'arm'	cvcv or	[bāzū ~ bāzū.i]
			cvcv	[bāzū.i]

2) Some (but not all) monosyllabic words of cvc syllable type, or polysyllabics ending in cvc, may, in colloquial styles be regarded alternatively as cvc or cv. This stylistic variation is mostly observed in Arabic loans, but also in some originally Persian words, e.g.:

Colloquial styles

cvcvc	[ʔe.ṣ.ʔa.ʔ]	'composition'	cvcv	[ʔe.ṣ.ʔa]
			or	
			cvcvc	[ʔe.ṣ.ʔa.ʔ]
cvcvc	[ʔe.mīlā.ʔ]	'dictation'	cvcv	[ʔe.mīlā]
			or	
			cvcvc	[ʔe.mīlā.ʔ]

In such stylistic variations each variant has the appropriate length for the syllable type it contains, as marked in the examples above. Thus the cv variant is short and the cvv or cvc are intermediate.

In his article named "The Problems of The Vowel

Phonemes in The Persian Language",<sup>1</sup> M. Shaki has made some observation of vowel quantity in Persian which is, to some extent, in harmony with the description above. But he does not attribute length to the syllable, rather he considers it as a property of the vowels. While agreeing that the traditional short and long dichotomy in the Persian vowel system is still valid, he states in several parts of the article that the long vowels may be short and the short ones may be long in certain positions. Although he does not give the description in terms of syllable, the places that he mentions where a short vowel is long correspond to the type of syllable in which, in view of this study, the vocoids are expected to be long. And the places that he mentions where the long vowels are short, also imply the type of syllable in which, in view of this study, the vocoids are expected to be short. A few extracts from his article are given below for comparison:

"In colloquial speech the vowel ([ā]) is generally shorter, except when followed by two mute consonants ... e.g.: ... "kārd" 'knife', "xāst" 'wanted'." 2

or:

"In colloquial speech there is a tendency to shorten all [ī]s, especially the unstressed ones in a final position, such as the indefinite -ī ... and the suffix -ī expressing unity - e.g. mardī rā dīdam." (p.49).

or:

"When followed by two mute consonants zabar ([a]) is long ... It is

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1. In Archiv Orientalni, Vol.25, 1957.

2. Ibid., p.47.

represented by [ā], e.g. āsb = horse,  
ābr = cloud." (p.51).

Shaki has not made use of the concept of syllable in his study. Instead, he gives the statement of vowel quantity separately for each vowel in terms of a series of rules each for a specific case which makes the statement scanty and uneconomical, as the rules for each vowel may not apply to other vowels.

P.N. Khanlari, in his study of Persian Phonology,<sup>1</sup> deals with the problems of length partly in terms of syllable and partly in terms of vowel. That is while maintaining the long and short dichotomy,<sup>2</sup> he states that in Persian syllables are quantitatively of two kinds, long and short, and the length of the long syllables is twice the length of the short.<sup>3</sup> But he does not make a distinction between the intermediate and the long syllables, perhaps because he is primarily interested in the syllable as a metric unit in poetry where the intermediate and long syllables are regarded as having the same metric value.

### 2.3. W- and Y- Features

The symbols w and y are general headings, and each refers to a number of phonetic features which usually co-occur in a syllable, therefore they are regarded as constituting one component of the syllable collectively.

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1. "vazn-e she'r-e Farsi", 1959, pp. 85-132.

2. Ibid., pp. 95-99.

3. Ibid., pp. 111-116.

Just as bilabiality and plosiveness together constitute one segmental component of the syllable, namely bilabial plosive contoid, so do w- features, for example, constitute one non-segmental component of the syllable.

### 2.3.1. W-Features

The phonetic features referred to by the above symbol are:

- 1) Some degree of lip-protrusion and rounding throughout the articulation of the syllable.
- 2) Backness of the vocoids, and
- 3) Retracted articulation of the contoids if they are from categories other than bilabials, labio-dentals, pre-glottals and glottals.

Consider the example [go:ɹz] 'mace', in the production of which the lips remain rounded and protruded until the last segment, [z], has been pronounced. The vocoid [o:] is produced in the back of the mouth. The contoid [g-] is retracted when compared with [ʃ-] in [ʃe:ɹd] 'round'. The contoids [-ɹz] are also retracted when compared with [ɹz] in [fe:ɹz] 'fast'.

### 2.3.2. Y-Features

The phonetic features referred to by the above symbol are:

- 1) Lip-spreading and non-rounding throughout the articulation of the syllable,
- 2) Frontness of the vocoids, and
- 3) Advanced articulation of the contoids if they are from other categories than bilabials, labio-dentals, pre-glottals and glottals.

Consider the example [ʃe:ɹd̥] 'round', in production of which the lips remain spread and unrounded (produced). The vocoid [e:] is a front one; the contoid [ʃ] is till the last segment [d̥] is/advanced compared to [g] in [go:ɹz], so are the contoids in [-ɹd̥] compared to [-ɹd̥] in [wɔ:ɹd̥] 'win'.

With regard to w and y features syllables fall into two types

1) Those marked by w-features, represented generally as:

$w_{cv}$   $w_{cvc}$   $w_{cvv}$   $w_{cvcc}$   $w_{cvvc}$ .

In the transcription of examples w is represented by the following diacritics:

- a) [<sup>u</sup>] in aspirated contoids placed over the segments e.g. [p<sup>u</sup>u.ɹ] 'money'.
- b) [w] in non-aspirated contoids placed under the segments e.g. [p<sup>u</sup>u.ɹ].
- c) No diacritic is used for segments that appear only in w- syllables such as back vowels and [g] in [go:ɹz] 'mace', and [y] in [ya.d̥] 'memory'.

2) Those marked by y-features represented generally as:

$y_{cv}$   $y_{cvc}$   $y_{cvv}$   $y_{cvcc}$   $y_{cvvc}$

In the transcription of examples y is represented by the following diacritics:

- a) [ç] in aspirated contoids placed over the segments, e.g. [p<sup>ç</sup>i.ɹ].
- b) [ç] in non-aspirated contoids placed under the segments, e.g. [p<sup>ç</sup>i.ɹ] 'elephant'.

- c) No diacritic is used for segments that appear only in y- syllables such as front vocoids and [ɸ] in [ɸe:ɹd] and [j] in [je.cʰ] 'one'.

Exx.

[t<sup>u</sup>] 'inside' [gu.l] 'lie' [d<sub>3</sub>o.u] 'barley' [sux:t<sup>u</sup>] 'fuel'  
 [p<sup>i</sup>] 'fat' [bi.l] 'spade' [me.i] 'wine' [rix:t<sup>ɸ</sup>] 'pouring'

W and y features thus extend over the whole syllable and modify the articulation of all the segments in the syllable marking them as components of one larger unit. They are the most important factors in the unity of the syllable, as illustrated in the preceding sections (see especially 1.3. and 1.4.). They are also useful for syllable division and for syllable demarcation (see 4.1.). (See 10.2.1. and 10.4.1. for experimental findings.)

#### 2.4. h and h Features

Each of the symbols above is, like w and y, used to refer to a number of phonetic features which usually co-occur in a syllable. Therefore, they are collectively regarded as one non-segmental constituent of the syllable. The features in h and h are described below.

##### 2.4.1. h-Features

The symbol h represents the following phonetic features:

- 1) Voicelessness during the articulation of the part of the syllable marked by h.
- 2) Tenseness in the organs of speech during the

articulation of the part of the syllable marked by h.

- 3) Aspiration, observed only in certain cases, i.e. when the part of the syllable marked by h, is occupied by a plosive contoid or an affricate.

In the word [c<sup>h</sup> a<sup>h</sup>:ɪ] 'deduction', the onset part [c<sup>h</sup>-] as well as the ending [-sɪ] is marked by h. In [c<sup>h</sup>-] the features voicelessness, tenseness and aspiration are observed, but in [-sɪ] all but aspiration are found.

#### 2.4.2.h-Features

The features represented by h are:

- 1) Voice during the articulation of the part of the syllable marked by h.
- 2) Laxness in the organs of speech while the part is being produced.
- 3) Lack of aspiration in the part of syllable marked by h.

In the word [go:rɪz] 'mace', the syllable onset [g-] is voiced and unaspirated and lax. Syllable onset is, therefore, marked by h. But the ending [-rɪz] is voiceless and tense, compared to [r] in [rʊ] 'face', and [z] in [zo:hɪ] 'noon' which are lax. The part [-rɪz] is, therefore, marked by h.

Unlike w and y features which extend over the whole syllable, h and h syllable features are found in onsets or in endings or in both. This difference, however, does not prevent the description of h and h as features of

the syllable because both  $h$  and  $\underline{h}$  features appear independently from the segments that occupy the parts in the syllables.<sup>1</sup> They are not a component of the segments in all places, rather a segment may or may not be marked by  $h$  or  $\underline{h}$  in accordance with the part it occupies in a syllable. Thus neither  $h$  nor  $\underline{h}$  features constitute a part of the definition of the segments. Consider the denti-alveolar nasal segment in the word [dʒ a ʃ :ŋ] 'celebration'. [ŋ] is voiceless, and it is tense compared to [ŋ] in [nə :zɔ̃] 'near'. But [ŋ] in the latter example is voiced and lax. Therefore, the denti-alveolar nasal segment may be voiceless and tense, or voiced and lax according to which parts of the syllable it occupies. Voicelessness and tenseness, or voice and laxness are not, therefore, components of the segments. They are imposed on them to mark them as components of specific parts of the syllable. In other words voicelessness and tenseness together with aspiration which may co-occur with them (i.e.  $h$ -features) are syllable features; so are voice and laxness together with lack of aspiration (i.e.  $\underline{h}$ -features).

Onsets may be marked by  $h$  and  $\underline{h}$  e.g.

$^h_{cvc}$  = [t<sup>h</sup> a . ʃ] 'wet'       $^{\underline{h}}_{cvc}$  [d a . ʃ] 'door'.

Two types of endings are distinguished for the description of  $h$  and  $\underline{h}$ :

1) Absolute final endings. They are always phonetically marked  $h$ , except when the ending contains -v

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1. See 1.3. above.

(e.g. [mei]), e.g.

$cv^h c$ : [tʰa:r] 'wet' [pʰd.cʰ] 'clean' [ri:f] 'pebble'

$cv^h cc$ : [bo:rd] 'win' [moʃ:tʰ] 'fist' [dʒa:f:n] 'feast'

2) Non-final endings. They may be marked by  $\underline{h}$  if followed by  $\underline{h}$ -onsets but not necessarily, e.g.

$cv^h c-\underline{h}cvc$  [pʰo.r-deɪ] 'brave'

$cv^h cc-\underline{h}cvc$  [bo:rd-baɪ] 'patient'

Otherwise they are marked by  $h$ , e.g.

$cv^h c-hcvc$ : [ma:zʰkʰu:r] 'mentioned'

$cv^h cc-hcvc$ : [pʰoʃ:tʰkʰa:r] 'hard-working'

$cv^h cc-\underline{h}cvc$ : [dʒaʃ:tʰ -yɑ:r] 'assistant'

(For experimental findings see 10.3.2. and 10.4.2.).

No  $h/\underline{h}$  distinction needs to be considered for the syllabic part as it is always occupied by vocoids which include in their definition the feature voicing (see 3.2.1. and 3.3.1.).

On the basis of  $h/\underline{h}$  features syllables are divided into the following types:

1)  $h$ -onset,  $h$ -ending, represented generally as:

$h_{cv}h_c$ ,  $h_{cvv}h_c$ ,  $h_{cv}h_{cc}$ .

2)  $\underline{h}$ -onset,  $h$ -ending represented generally as:

$\underline{h}_{cv}h_c$ ,  $\underline{h}_{cvv}h_c$ ,  $\underline{h}_{cv}h_{cc}$ .

3)  $h$ -onset, represented generally as:

$h_{cv}$ ,  $h_{cvv}$ .

4)  $\underline{h}$ -onset, represented generally as:

$\underline{h}_{cv}$ ,  $\underline{h}_{cvv}$ .

- 5) h-onset, h-ending restricted to word non-final positions:

$\underline{h}_{cv}\underline{h}_{cc}\underline{h}_{cvc}$  (e.g. as [b<sub>w</sub>:r<sub>w</sub>d-b<sub>w</sub>ɔ̃] above),

$\underline{h}_{cv}\underline{h}_c\underline{h}_{cvcc}$  (as [p<sub>ɔ̃</sub>r-ʃa<sub>ɔ̃</sub> :t<sup>ɕ</sup>] 'return').

- 6) h-onset, h ending, restricted to word non-final positions:

$\underline{h}_{cv}\underline{h}_c-cvc$  e.g. [ʃi.r-dɛ.ɫ] lion-heart.

In transcription h is marked by the diacritics:

- 1) [ʰ] and [ɕ] in w- and y-syllables respectively when aspiration is also observed.
- 2) [̣] placed under the segments.
- 3) Choice of I.P.A. symbols used to represent voiceless segments.

h is represented by choice of I.P.A. symbols used to represent voiced segments and unmarked by [̣].

h/h distinction does not apply to the syllabic part and to the simple or complex endings when they are occupied by a non-syllabic vocoid (see 3.3.1. and 3.3.2.).

## 2.5. N-feature

The symbol N as used here refers to the following features:

- 1) Strong nasality throughout the syllabic vocoids.
- 2) Presence of a nasal segment, other than the bilabial nasal, at the onset or the ending.

In complex endings the nasal segment occupies the first place in the part.

By strong nasality is meant that the velic closure is opened simultaneously, or almost simultaneously, with the release of the segment at the syllable onset in order to let the air-stream pass through the nasal cavity. The velic remains open throughout the production of the syllable until, in complex endings, the closure for the last component of the complex ending is about to be made when the velic is closed simultaneously with other closures required for the articulation of the last component. In an N-syllable beginning with a nasal segment the velic is open from the start of the articulation of the syllable (e.g.: [mã.ŋ] 'I').

In a non-N-syllable containing a bilabial nasal segment at its onset or at the first place in its complex ending, (e.g. [ma:ŋd] 'man' and [ʎa:ŋɪ] 'wine'), or any nasal segment at the last place in its complex ending, (e.g. [dʒ a ʃ :ŋ] 'feast', or [P<sup>ɕ</sup> a ʃ :ŋ] 'wool') there is, most likely, some degree of nasality in the vocoid of the syllable. But compared with the nasality in the vocoids of N-syllables, it is very weak and does not affect the whole syllable so as to justify considering it a syllable feature.

In fairly commonly used words generally with a denti-alveolar nasal segment at their endings, N-features may be represented phonetically by the nasality of the vocoids only, and the nasal segment may be dropped altogether, e.g.:

[ʒã.ŋ] or [ʒã.] 'woman', [ʔãhã.ŋ] or [ʔãhã.] 'iron'.

On the basis of the feature nasality syllables may be divided into two groups:

- 1) N-syllables, represented generally as:

$N_{cv}$   $N_{cvc}$   $N_{cvv}$   $N_{cvcc}$   $N_{cvvc}$

2) Non-N-syllables, left unmarked, i.e.

cv, cvc, cvv, cvcc, and cvvc.

N-syllables are in transcription marked by [˜] placed over the syllabic vocoids, e.g. [zã.ŋ] or [zã.] and [t̃ã.ŋ] or [t̃ã.] 'body'.

Only the denti-alveolar nasal segment occupies the onsets and simple endings of N-syllables, e.g.

$N_{cvcc}$ : [ŋã:h̃] 'stream',  $c^N_{vc}$ : [d̃ã.ŋ] 'soul'

But the complex endings of the N-syllables may be occupied by other nasal segments. In this case the nasal segments are homorganic with the segments following them, unless the latter are of preglottal or glottal categories in which case the nasal segment is denti-alveolar, e.g.:

$c^N_{vcc}$ : [d̃zõ:m̃b̃] 'movement'  
 " [p̃ã:nd̃] 'advice'  
 " [x̃ẽ:ŋ̃ʃ̃] 'horse'  
 " [s̃õ:ñʔ̃] 'creation'  
 " [d̃zõ:ñh̃] 'crime'

Syllables with a bilabial nasal segment at their onsets, or at their simple endings, or at the first place in their complex endings are non-N-syllables, e.g.:

cvcc [m̃a:r̃ʃ̃] 'death'      cvc [c̃̃ a.ŋ̃] 'little'  
 cvc [m̃i.z̃] 'table'      cvcc [ʔ̃a:m̃ʔ̃] 'command'

Syllables with any nasal segments at the second place in their complex endings are also non-N-syllable, e.g.:

cvcc [t̃ʃ̃ã:f̃:m̃] 'eye'  
 [d̃ʃ̃ã:f̃:ñ] 'feast'

(See 10.3.8. for experimental findings.)

## 2.6. ?-Features

The symbol above refers to the following features:

- 1) Glottality in the syllabic part, so that the syllabic element cannot be regarded as a vocoid,<sup>1</sup> rather it is a glottal trill.<sup>2</sup>
- 2) Increasing tenseness as the syllabic part is more shaded by glottality.
- 3) If the syllable ending is occupied by a glottal segment, or, in complex endings, if the first place is occupied by a glottal segment (i.e. cv? or cv?c) the trill is gradually intensified until, in cv?c syllables, it ends in a complete closure of the glottis resulting in a glottal stop which is then released before the articulation of the following contoid begins. But in cv? the glottal stop may not be completely realized.

?-features are symbolized generally by ? placed over the syllables, e.g.

?cv c?vc c?vcc

In transcription of examples ?-features are symbolized by [ʔ] if the following glottal stop is phonetically made, and by [̚] if the stop is not phonetically made, e.g.

c?vc: [su.ʔ] 'evil'  
 cv-c?vc [ɾak<sup>u</sup>.̚] 'bowing'

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1. See 3.2.1. for the definition of vocoids as used in this thesis.  
 2. As defined by K.L. Pike, 'Phonetic', 1966, pp. 125-8.

c<sup>?</sup>vcc: [ɾa: ~?d] 'thunder'  
 cv-<sup>?</sup>cvc: [ʂǎ- ~ i.d] 'fortunate'

On the basis of ?-features the syllables are divided into two groups:

1) ?-syllables, marked generally by ?. This group consists of the following types of syllable:

c<sup>?</sup>vcc: [ɾa: ~?d] 'thunder'  
 c<sup>?</sup>vc: [su. ~ ] 'evil'  
<sup>?</sup>cv: [(dǎ-nǎ)-i ] 'a knowledgeable man.'

The last type (?cv) appears only as the non-initial syllable in a word and is preceded by a v-ending syllable, otherwise the syllable is a non?-one, e.g.

cvc-cv: [ʂa.l-?é] 'fort' (see 5.1.1.).

2) Non?-syllables, left unmarked. They include all the syllable types, i.e. cv, cvc, cvv, cvcc and cvvc. (For some experimental findings see 10.3.6. and 10.3.8.)

## 2.7. Summary

The following phonetic features, observed in the data, are found best described in terms of syllable features at the phonetic level of syllable analysis:

- 1) Features of length: shortness, intermediate length and long, observed in the syllabic vocoids, or in the voiceless fricative segment at the simple endings or at the first place in the complex endings.
- 2) W-Features: Lip-rounding, lip-protrusion, back articulation of the vocoids and retracted articulation of some contoids.

- 3) Y-Features: Lip-spreading, lip-unrounding, front articulation of the vocoids and advanced articulation of some contoids.
- 4) h-Features: Voicelessness, tenseness and aspiration.
- 5) h-Features: Voice, laxness and non-aspiration.
- 6) N-Feature: Nasality in the vocoids.
- 7) ?-Features: Glottality and increasing tenseness.

The syllables are grouped into the following types on the basis of the syllable features above:

- 1) Short: cv, Intermediate: cvc, cvv, Long: cvcc, cvvc.
- 2)  $w_{cv}$ ,  $w_{cvc}$ ,  $w_{cvv}$ ,  $w_{cvcc}$ ,  $w_{cvvc}$ .
- 3)  $y_{cv}$ ,  $y_{cvc}$ ,  $y_{cvv}$ ,  $y_{cvcc}$ ,  $y_{cvvc}$ .
- 4)  $h_{cv}$ ,  $h_{cv}h_c$ ,  $h_{cvv}$ ,  $h_{cv}h_{cc}$ ,  $h_{cvv}h_c$ ,  $h_{cv}h_c-(h_c\dots)$ ,  
 $h_{cv}h_{cc}-(h_c\dots)$ ,  $h_{cvv}h_c-(h_c\dots)$
- 5)  $\underline{h}_{cv}$ ,  $\underline{h}_{cv}h_c$ ,  $\underline{h}_{cvv}$ ,  $\underline{h}_{cv}h_{cc}$ ,  $\underline{h}_{cvv}h_c$ ,  $\underline{h}_{cv}h_c-(h_c\dots)$ ,  
 $\underline{h}_{cv}h_{cc}-(h_c\dots)$ ,  $\underline{h}_{cvv}h_c-(h_c\dots)$ .
- 6)  $c^Nvc$ ,  $c^Nvcc$ , vs. cv, cvv, cvc, cvvc, cvcc.
- 7)  $?cv$ ,  $?vc$ ,  $?vcc$ , vs. cv, cvv, cvc, cvvc, cvcc.

CHAPTER 3  
SYLLABLE SEGMENTS

3.1. Segmental Features

The phonetic features listed in 2.7. were described in the preceding chapter in terms of syllable features on the basis of the fact that they are the properties of the syllable, its types, or its parts. The remaining features are, on the other hand, found best described in terms of segments because they appear only in one place in the syllable without being the features of the syllable or the part, i.e. without marking that part of the syllable for any syntagmatic relation. Compare the examples:

[ma:ꞤꞤ] 'boundary'      [pa:ꞤꞤ] 'battle'

Both examples contain, among other features, bilabiality and nasality, as well as voicelessness and some degree of tenseness. But while the latter belong to the part -cc and mark any segments appearing in this part (whether they be [ꞤꞤ] or [ꞤꞤ]), the former occupy any place irrespective of whether the place constitutes an onset or an ending or a place in a complex ending.

Segments, therefore, occupy places within the syllable and are related together by the phonetic features of the syllable. No segment occurs by itself. They are always found in a part of the syllable and in association with some syllable features. Each syllable part, as well as each syllable feature may require some modification in the segments. For example the segment 'palato-velar plosive' in the words:

[k<sup>h</sup>a.x] 'castle', and [xa.c<sup>h</sup>] 'earth',  
 is modified in the onset part into [k<sup>h</sup>-], and in the ending  
 part into [-c<sup>h</sup>] because different parts require different  
 modifications in the segments. Or, the 'palato-velar plosive  
 segment' in the words:

[k<sup>h</sup>a.r̥] 'work', and [c<sup>h</sup>a.r̥] 'deaf',  
 is modified in the w-syllable into [k<sup>h</sup>-], and in the y-  
 syllable into [c<sup>h</sup>-].

A proper description of segments is therefore best  
 given with reference to the syllable parts and syllable  
 features. In view of these facts, the segments at the  
 onset, the syllabic part, and the endings are described  
 separately with reference to the relevant syllable features.

### 3.2. Vocoids and Contoids: Definitions

The segmental components of the syllable fall into  
 two major categories: contoids (symbolized by small c) and  
 vocoids (symbolized by small v). A phonetic definition of  
 each of the two categories is given below:

#### 3.2.1. Vocoids

Bloomfield's phonetic definition of vowel<sup>1</sup> can be  
 used as the definition of what is here termed vocoid in  
 relation to Persian. The definition is:

"Vowels are modifications of voiced sounds  
 that involve no closure, friction, or  
 contact of the tongue or lips. They are  
 ordinarily voiced ..."

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1. Language, 1965, p.102.

Daniel Jones' definition of vowels<sup>1</sup> is also equally valid as the definition of Persian vocoids. So is A.G. Gimson's articulatory definition of vocoids.<sup>2</sup> But the most appropriate definition for the purpose of this study is the definition suggested by Pike<sup>3</sup> as follows:

"The sounds which as a group function most frequently as syllabics are vocoids. Phonetically they comprise the central resonant orals as already defined. Vocoids include practically all sounds which are usually called 'vowels' (whether voiced, voiceless, or whis-  
pered) except that 'fricative vowels' are excluded, while 'vowel glides' such as [r], [w] and [y] are included."

The reasons for preferring Pike's definition for this study are as follows:

- 1) Vocoids are described positively, (i.e. in terms of the features present in them), and not negatively (i.e. in terms of absent features).
- 2) Vocoids are not exclusively restricted to the syllabic place but they are 'most frequently so'. This allows the inclusion of non-syllabic vocoids in the definition (see 1.6. and 1.7. above).
- 3) The key words (central, resonant and orals) are clearly defined and their phonetic values

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1. 'An Outline of English Phonetics', 1964, p.23, paragraph 97.
  2. 'An Introduction to the Pronunciation of English', 1966, p.28.
  3. 'Phonetics', 1966, p.143. For the terminological values of the key words in the definition (i.e. 'central', 'resonant' and 'oral') see pp. 137-142 and the charts 2 and 3 in pp. 142 and 144. For 'syllabics' see p.117.

described by Pike prior to the definition (pp. 137-142).

- 4) The 'vowel glides' are included in the definition (as in the case of Persian vocoids) and the 'fricative vowels' are excluded.

All the segments that fall within the boundaries of this definition are grouped under the category of vocoid regardless of their phonological treatment and their places in the syllable whether they be syllabics (e.g. [o:] in [go:ɾz] 'mace') or non-syllabics (e.g. [-u] in [ʔo:ud] 'return').

### 3.2.2. Contoids

Having defined vocoids it is then possible to define contoids negatively, as Jones and Gimson have done in their definitions of consonants.<sup>1</sup> Thus the segments that do not comprise central resonant orals are contoids. Contoids are most frequently non-syllabic. Contoids also include some examples of 'vowel glides', namely those that do not fall within the definition of vocoids. For example [j-] in [je.cʰ] 'one', or [w] in [d̥ ɔ̥ wɔ̥f̥ḁn̥d̥o̥.m̥] 'barley and wheat' are contoids.

### 3.3. Vocoids: Description

Vocoids are found in two parts in the syllable.

- 1) In the syllabic part, i.e. the second place in the syllable after the onset. These are always syllabic.

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1. D. Jones, 'An Outline of English Phonetics', 1964, p.23, paragraph 98. A.G. Gimson, 'An Introduction to the Pronunciation of English', 1966, p.28.

- 2) In the endings, i.e. the third place in the syllable after the syllabic. In this case they either constitute a simple ending (e.g. [-u] in [d̥̥ o.u] 'barley'), or the first component of a complex ending (e.g. [-uḡ] in [ʔo:uḡ] 'return'). These are always non-syllabic.

This division is phonetically relevant as syllabic and non-syllabic vocoids show different phonetic characteristics as is shown in their descriptions below (3.3.1. and 3.3.2.).

### 3.3.1. Syllabic Vocoids

Syllabic vocoids always appear at the second place in the syllable and constitute the syllabic part. They are marked by syllable features of length and w-features, or y-features; and in some cases by N-, or ?-features. h/ḥ features are not relevant in the description of vocoids since Persian vocoids are always voiced. Thus while voice in other parts of the syllable is described as a feature of the syllable, in relation to the syllabic vocoids it is described as a feature of the segments.

Having already described the features referred to above in terms of the syllable<sup>1</sup> two more features are found in the syllabic part to be accounted for in terms of segment, namely: Voicing and Tongue Height.

Voicing remains invariable and constant in all the vocoids of Persian. No different degrees of voicing are found in vocoids according to which they could be

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1. See Chapter 2, 2.1. to 2.7.

divided into different classes.

Three degrees of tongue height are distinguished in the vocoids according to which they are grouped into three classes:

1) Close vocoid, when the tongue is raised towards the roof of the mouth during the articulation of the vocoid. The height of the tongue is somewhat close to that defined for Cardinal Vowels No. 1 and 8, (i.e. [i] and [u]).

2) Open vocoid, when the tongue lies low in the oral cavity during the articulation of the vocoid. The area involved is somewhat higher than that defined for Cardinal Vowels No. 4 and 5 (i.e. [a] and [ɑ]). (See also 3.3.14.).

3) Mid vocoid, includes varieties of tongue height ranging from mid open to mid-close. In some cases the tongue is raised so high as to nearly reach the area defined for the close vocoid and in some other cases the tongue is kept so low as to nearly reach the area defined for the open vocoid. Thus the mid vocoid has far more varieties than any of the other two classes (see 3.3.14.(1) to (3).)

All the three classes of vocoids have the feature backness in w-syllables, the feature frontness in y-syllables, the feature shortness in short syllables, intermediate length in intermediate syllables except those containing a voiceless fricative in the endings, and the feature length in long syllables except those containing a voiceless fricative in the first place in the complex ending. The vocoids may not have the features of length in syllables

containing a voiceless fricative at the first place in the ending. The preglottal fricative [h] is excluded from the voiceless fricatives as used in this chapter. Table I below summarizes the description of the syllabic vocoids as given above and the modifications imposed on them by the syllable features:

Table I: Syllabic Vocoids

Segmental Feature	Syllabic Vocoids	Features of Length	Syllable types	y-features	w-features	Examples
Voicing and tongue height	Close	long	cvcc	i:	u:	[s <sub>1</sub> i:l <sub>2</sub> c <sub>3</sub> ʰ] [p <sup>h</sup> u:d <sub>1</sub> ʰ]
		intermediate	cvc	i.	u.	[t <sup>h</sup> i.r <sub>2</sub> ] [t <sup>h</sup> u.r <sub>2</sub> ]
		short	cv	i̇	ũ	[p <sup>h</sup> i̇] [ɔ̇ũ]
		unmarked	cv <sup>h</sup> F/ cv <sup>h</sup> Fc	i	u	[ʃiʃ.] [guʃ.]
	Mid	long	cvcc/	e:	o:	[z <sub>1</sub> e:c <sub>2</sub> ʰl <sub>3</sub> ] [z <sub>1</sub> o:h <sub>2</sub> ʰ]
		intermediate	cvvc cvc/cv	e.	o.	[ʔe:ɪd] [ʔo:ud] [d <sub>1</sub> e.l <sub>2</sub> ] [p <sup>h</sup> o.r <sub>2</sub> ] [m <sub>1</sub> e.i] [ɔ̇o.u]
		short	cv	ĩē+ě	ǎ + ǒ	[nĩjĩn <sub>2</sub> ] [g <sup>h</sup> ě] [b <sup>h</sup> ěd <sub>1</sub> e.h]
		unmarked	cv <sup>h</sup> F/ cv <sup>h</sup> Fc	e	o	[ʃǎk <sup>h</sup> u.h] [m <sup>h</sup> i.n <sub>2</sub> ] [m <sub>1</sub> eʃ.] [r <sub>1</sub> os.]
	Open	long	cvcc	a:	ɑ:	[ma:r <sub>2</sub> d] [k <sup>h</sup> ɑ:r <sub>2</sub> d]
intermediate		cvc	a.	ɑ.	[c <sup>h</sup> a.r <sub>2</sub> ] [k <sup>h</sup> ɑ.r <sub>2</sub> ]	
short		cv	ě, ǎ, ǐ, ǒ	ǎ	[xǎñě+] [sǎfa.r <sub>2</sub> ] [b <sup>h</sup> ǎa.r <sub>2</sub> ] [p <sup>h</sup> ǎ]	
unmarked		cv <sup>h</sup> F/ cv <sup>h</sup> Fc	a	ɑ	[p <sup>h</sup> as.] [d <sub>1</sub> ɑʃ:t <sup>h</sup> ]	

### 3.3.11. Syllabic Vocoids Marked by N-Feature

Syllabic vocoids have strong nasality in N-syllables. As stated in 2.5. above, N-syllables are of the types <sup>N</sup>cv, <sup>N</sup>cvv or <sup>N</sup>cvc, and <sup>N</sup>cvvc or <sup>N</sup>cvcc, that is, those marked by the features: short (cv), intermediate length (cvv, cvc) and long (cvvc or cvcc). The unmarked syllabic vocoids may also be nasalized.

Table II below represents nasalized vocoids in relation to other relevant syllable features:

Table II: Syllabic Vocoids and N-Features

Segmental Feature	Syllabic Vocoids	Features Length	Syllable Types	N/y	N/w	Examples
Voicing and Tongue Height	Close	Long	cvcc	ĩ:	ũ:	[nĩ:~nɔcɛ] [t <sup>u</sup> ũ:~nɔɔ]
		Intermediate	cvc	ĩ.	ũ.	[nĩ.~ɔ] [nũ.h]
		Short	cv	ĩ	ũ	[nĩ-ya.~ɔ] [nũ-ri]
		Unmarked	cvF/cvFc	ĩ	ũ	[?ẽ-nĩɔ.] [fãũs.]
	Mid	Long	cvvc/	ẽ:	õ:	[sẽ:~ndɔ] [k <sup>u</sup> õ:~ndɔ]
			cvcc			[nẽ:~il] [nõ:~u?]
		Intermediate	cvv/cvc	ẽ.	õ.	[nẽ-i] [sãne.~?] [nõ.h]
		Short	cv	ĩ ẽ ẽ ẽ ẽ ẽ ẽ	ũ õ õ õ õ õ õ	[nĩji.~n] [nõfus.] ...
	Unmarked	cvF/cvFc	ẽ	õ	[nẽs.ba.tɛ] [nõs.ra.tɛ]	
	Open	Long	cvcc	ã:	ã:	[nã:hɔ] [j.ẽnãx:t <sup>u</sup> ]
			cvc	ã.	ã.	[nã.m] [nã.m]
		Short	cv	ã	ã	[nãfaɔ.] [nãze.m] ...
Unmarked		cvF/cvFc	ã	ã	[nãx.va.tɛ] [jẽnãs.]	

### 3.3.12. Syllabic Segments Marked by ?-Features

Syllabic segments are strongly glottalized in ?-syllables, so that they can no longer be regarded as vocoids in the sense defined in 3.2.1. above. Hence the term "syllabic segments" and not "vocoids". They are best described as glottal trill, as described by Pike.<sup>1</sup> ?-syllable includes cv, cvc and cvcc syllable types (see 2.6. above) so that the glottalized syllabic segments may be marked by the features short, intermediate and long. But it does not include the unmarked syllabic vocoids (see Table I in 3.3.1.).

Table III below summarizes the description and provides the examples of syllabic segments with the feature of glottality.

Table III Glottalized Syllabic Segments

Segmental Feature	Syllabic Vocoids	Features of Length	Syllable Types	?/y	?/w	Examples
Voicing and Tongue Height	Close	L	cv?c	ĩ:	ũ:	No examples found
		I	cv?	ĩ.	ũ.	[rě <sup>h</sup> bi <sup>h</sup> .] [su <sup>h</sup> .]
		S	?v	ĩ̃	ũ̃	[dă <sup>h</sup> t̃] [ză <sup>h</sup> ũ̃]
	Mid	L	cv?c	ē:	ō:	[fe <sup>h</sup> ? <sup>h</sup> ] [bo <sup>h</sup> d̃]
		I	cv?	ē.	ō.	[t <sup>h</sup> ă <sup>h</sup> be <sup>h</sup> .] [să <sup>h</sup> bo <sup>h</sup> .]
		S	?v	ē̃	ō̃	[să <sup>h</sup> mē <sup>h</sup> ē̃] No example

1. 'Phonetics', 1966, pp. 125-8.

Table III continued

Segmental Features	Syllabic Vocoids	Features of Length	Syllable Types	?/y	?/w	Examples
Voicing and Tongue Height	Open	L	cv?c	$\bar{a}:$	$\bar{a}:$	[ra:ɹd] no example
		I	cv?	$\bar{a}.$	$\bar{a}.$	[tʰa:ɹnɛɹ] [ʔa.tʰbɑ.]
		S	?v	$\bar{e}\bar{a}\bar{e}\bar{e}$	$\bar{e}$	[zɔ̃pmd] [ʔe.ddɛ̃ɑ̃]

(See 10.3.6. and 10.3.8. for some experimental findings.)

### 3.3.13. Inherently Long Vocoids

Apart from syllable length which is mostly realized in the syllabic vocoids (but see 2.2.), the following vocoids are inherently longer than others in comparable syllable types:

1) The close vocoid: both in y- and w-syllables, i.e. when it is marked by the feature frontness, as [i.] in [di.ɹ] 'late', and when it is marked by backness, as [u.], in [du.ɹ] 'far'.

2) The open vocoid in w-syllables only, that is when it is marked by backness, as [ɑ.] in [dɑ.ɹ] 'gallows'.

The vocoids above are longer inherently than, for instance [e.] in [de.ɹ] 'cut', [o.] in [do.ɹ] 'pearl', and [a] in [da.ɹ] 'door'.

But this does not mean, however, that [i̇] in [P<sup>ɕ</sup> i̇] 'fat', is longer than [e.] in [de.ɹ] 'cut', as the syllable length: intermediate in the second example makes [e.] longer than [i̇] which is marked by the syllable length: short.

Therefore, while some vocoids are inherently longer than others, both inherently short and long vocoids keep the same relation to syllable length, as shown in Table IV below: (See 10.4.4. for experimental findings.)

Table IV: Inherently long and short vocoids

	y	w			y	w
close	[i:, i.]	[u:, u.]	are inherently longer than	Mid	[ĩ, ě <sup>+</sup> ě,]	[ǣ, ǟ, ǫ]
	[ĩ, i]	[ũ, u]				[e, e., e:]
open		[a:, a.]		open	[ě <sup>-</sup> , ǎ ě <sup>+</sup> ě	
		[ǎ, a]			a a. a:]	

inherently long

inherently short

This observation is especially supported by the fact that the frequency of occurrence of the inherently long vocoids in long syllables is very low. In fact with a very few exceptions such as [ʔa:rd̥] 'flour', [k<sup>u</sup>a:rd̥] 'knife', and [Ga:rt̥<sup>u</sup>] 'mushroom', the occurrence of the inherently long vocoids in long syllables (i.e. cvvc and cvcc) is limited to syllables whose endings begin with voiceless fricatives, where, as was described before (2.2. and 3.3.1.), the vocoid may be unmarked for syllable length and it is the contoid that is marked instead. (See 10.4.4. for experimental findings.):

[p̥iʃ:t<sup>ɕ</sup>] 'twenty'

[P<sup>u</sup>us:t<sup>u</sup>] 'skin'

[p̥ix:t̥] 'sieved'

[k<sup>u</sup>uf:t<sup>u</sup>] 'beat'

[mas:t<sup>u</sup>] 'yogurt'

[ras:t<sup>u</sup>] 'straight'

Any long syllable containing an inherently long vocoid which is not followed by a voiceless fricative is generally a loan, e.g.

[m̃i:ŋ c <sup>h</sup> ]	'mink'	[ʃi:l c <sup>h</sup> ]	'silk'
[bã:ŋ c <sup>h</sup> ]	'bank'	[pu:d̃]	'powder'
[ʔeʃ.t <sup>h</sup> a.nda:r̃d] 'standard.'			

The distinction made between the inherently long and short vocoids is necessary for the statement of certain prosodic features such as harmony (8.7.) and ə/ə prosodies (8.4.23.III.).

### 3.3.14. Inherently Short Vocoids

Inherently short vocoids include mid vocoid both in y- and w-syllables and the open vocoid in y-syllables only. The mid vocoid as mentioned in 3.3.1. includes varieties ranging from mid open to mid close. The inherently short open vocoid is, in this respect, the same as the mid vocoid. The following is a description of the phonetic varieties of the inherently short vocoids.

1) The Inherently Short Open Vocoid appears in y-syllables only and has the following varieties:

i) In long syllables, i.e. in cvcc, it is [a:], e.g.: [ma:r̃d] 'man', except when followed by a voiceless fricative other than the pre-glottal fricative [h̃], where it is unmarked for length, and is symbolized by [a], e.g. [daʃ:t<sup>h</sup>] 'hand'.

ii) In intermediate syllables i.e. in cvc, it is [a.], e.g.: [ʃa.r̃] 'head', except when followed by a voiceless fricative as above, where it is unmarked and is symbolized by [a], e.g. [c<sup>h</sup>as.] 'person'.

In short syllables, i.e. in cv, the height of the vocoid is greatly determined by that of the vocoid in the syllable following it. The short syllable too tends to be shaded by the features marking the following syllable. This is, of course, true in colloquial speech; in careful and reading styles it is generally [ǎ]. The variations in the colloquial speech are:

iii) When the following syllable has y-features and an open vocoid, it is [ǎ] and the syllable has y-features too, e.g.

[sǎ́ha.r] 'dawn' , [xǎ́ba.r] 'news' [xǎ́nǎ́.a.m] 'my house'

iv) When the following syllable has w-features and an open vocoid, it is [ě], and the syllable has w-features too, e.g.

[bě́ha.r] 'spring' [bě́xa.r] 'vapour' [fě́a.r] 'slogan'

v) When the following syllable has y-features and a close vocoid, it is [ě́] and the syllable has y-features too, e.g.

[sě́ri.r] 'top of the table', [sě́fi.d] 'white' [zémǐ.n] 'earth'  
[géri.b] 'near'

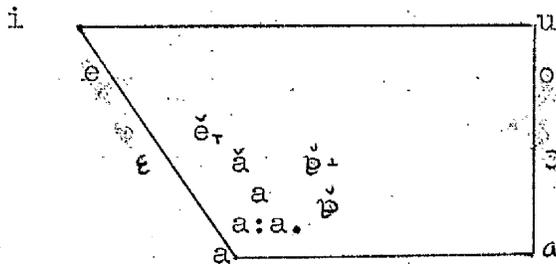
vi) When the following syllable has w-features and a close vocoid, it may be [ě́] e.g.

[gě́bu.l] 'acceptance' [hě́su.d] 'jealous'  
[rě́af.] 'kind' [fě́ru.r] 'vicious'

vii) In word final short syllables, i.e. in -cv, and in mono-syllabic words of cv-type (if any), it is [ě<sub>r</sub>] (but see also 2)iv) below), e.g.:

[xǎ nĕ<sub>r</sub>] 'house'      [nǎ ĩe<sub>r</sub>] 'letter'

A short open vocoid does not appear in syllables followed by a mid vocoid, thus such words as, say, \*[jato.r] or \*[jater] are not found. bæle The varieties of short open vocoid are represented on the Cardinal Vowel chart below. Cardinal Vowels are given on the outside of the chart:



Inherently short open vocoid

## 2) The Inherently Short Mid Vocoid in W-syllables

has the following varieties:

i) In long syllables, i.e. in cvcc and cvvc, it is [o:] e.g. [d̥o:rd̥] 'sediment', [d̥o:ur̥] 'cruelty', except when followed by a voiceless fricative other than [h] in which case it is unmarked for length and is symbolized as [o] e.g. [moʃ:tʰ] 'fist'.

ii) In intermediate syllables, i.e. in cvc and cvv, it is [o.] e.g. [pʰo.r̥] 'full' and [d̥o.u] 'barley', except when followed by a voiceless fricative as above when it is unmarked for length and symbolized as [o] e.g. [roʃ.] 'a kind of soil'.

In short syllables, i.e. in cv, the height of the

vocoid is determined by that of the vocoid in the following syllable. The short syllable too is generally shaded by the features marking the syllable which follows. This is true only in colloquial speech. In careful and reading style generally only one type of mid vocoid is found in short w-syllables viz. [ǒ]. The varieties found in colloquial speech are:

iii) When the following syllable has y-features and a close vocoid, it is [ǘ] and the syllable is shaded by the y-features too, e.g.:

[mǘi.n̄] 'support' [gǘri.z̄] 'escape' [mǘdi.r̄] 'manager'

iv) When the following syllable has w-features and a close vocoid, it may be [ǘ] e.g.

[ʃǘk<sup>u</sup>.h] 'glory' [gǘsu.r̄] 'castles' [fǘruʃ̄.] 'sale'

v) When the following syllable has w-features and a mid vocoid it is [ǒ], e.g.:

[ʃot<sup>u</sup>o.r̄] 'camel' [dǒroʃ̄:t<sup>u</sup>] 'big' [bǒzo:r̄ʃ̄] 'big'

Short mid vocoid is not found in word final

w-syllables or in mono-syllables except in a few examples which are as follows:

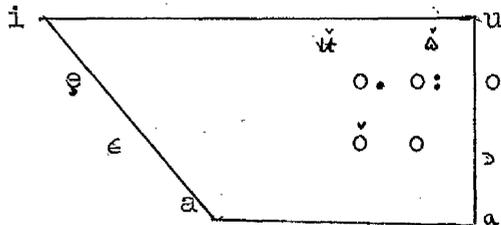
[t<sup>u</sup>ǒ] 'you' [tʃ<sup>u</sup>ǒ] 'when' [dǒ] 'two'

where the vocoid is [ǒ] as in (v) above. It is not also found in syllables preceding a y-syllable containing an

open vocoid except for one verbal form, namely [gǒ-za ʃ̄:t<sup>f</sup>]

'passed by'.

The inherently short mid vocoid has 6 varieties in short w-syllables as appear in the Cardinal Vowel Chart below. Cardinal Vowels are given on the outside of the chart:



Inherently short mid vocoid in w-syllables

3) Inherently Short Mid Vocoid in y-syllables has the following varieties:

i) In long syllables, i.e. in cvcc and cvvc, it is [e:] e.g.:

[me:h<sub>2</sub>ɪ] 'kindness' [ze:cε<sub>2</sub>ɪ] 'memory' [ge:ɪd<sub>2</sub>] 'obstacle'

Except when followed by a voiceless fricative other than [h] where it is unmarked for syllable length and symbolized by [e], e.g.:

[mes<sub>2</sub>:ɪ] 'Egypt' [cfeɪ:t<sub>2</sub>ɪ] 'sawing'

ii) In intermediate syllables, i.e. in cvc and cvv, it is [e.], e.g.:

[fe.r<sub>2</sub>] 'curl' [me.i] 'wine' [de.r<sub>2</sub>] 'cut'

Except when followed by a voiceless fricative as above where it is unmarked for length and symbolized by [e], e.g.

[meɪ.ɪ] 'copper' [hədəɪ.] 'happening'

In short syllables, i.e. in cv, the height of the vocoid is determined by that of the vocoid in the following syllable. The syllable too is shaded by the features of

the following syllable. This is true in colloquial speech; in careful reading style the short mid vocoid is [ě] everywhere. The varieties observed in colloquial speech are:

iii) In word final short syllables or in monosyllabic words of cv- type it is [ě] when the onset is occupied by a voiceless palatal contoid (see also i.vii) above), e.g.

[c<sup>h</sup>ě] 'that' [t<sup>h</sup>ě] 'what' [še.cc<sup>h</sup>ě] 'coin'

When the following syllable has y-features and a mid vocoid, it is also [ě] e.g.

[šěre<sup>h</sup>:t<sup>h</sup>] 'one's nature' [zěre<sup>h</sup>:c<sup>h</sup>] 'a kind of berry'

iv) When the following syllable has a close vocoid and y-features, it is [Ī] if both syllables belong to one word, e.g.

[nĭjĭ-n] 'stone on a ring' [xānĭjĭ] 'domestic'

Also when the following syllable begins with [j] or [y], it is [Ī], e.g.

[sĭja-r] 'stories' [šĭya-h] 'black'

v) When the following syllable does not belong to the same word, that is when the syllable is a particle, or a component of another word, it is [ě<sup>+</sup>], e.g.

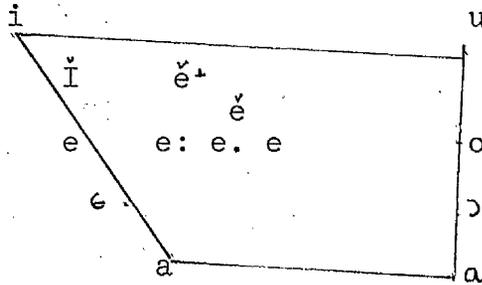
[xānĕ<sup>+</sup>-i] 'a house' [nānĕ<sup>+</sup>-i] 'a letter'

In addition to the examples in iv) above [I] is also observed in a few examples where the short syllable begins with [j] and the following syllable with [ʃ c<sup>h</sup> k<sup>h</sup>] e.g.

[šĭl<sup>o</sup>.m] 'sixth' [šĭc<sup>h</sup>a-r] 'sugar'

[šĭk<sup>u</sup> a-r] 'pray'

The inherently short mid vocoid has 6 varieties in short y-syllables as appear in the Cardinal Vowel Chart below. Cardinal vowels are given on the outside of the chart:



Inherently short mid vocoid in y-syllables

### 3.3.2 Non-Syllabic Vocoid

The non-syllabic vocoid always appears in the third place in syllables and constitutes either a simple ending, as in [d̥<sub>3</sub> o.u] 'barley', or the first place in a complex ending, as in [d̥<sub>3</sub> o:u<sub>3</sub>] 'cruelty'.

Like the syllabic vocoids it is comprised of the features voicing and tongue height, both of which are invariable in the non-syllabic vocoid.

The tongue height observed in the non-syllabic vocoid is somewhere between half close and close. Thus, there is one non-syllabic vocoid in Persian which in y-syllables is accompanied by the feature frontness, symbolized as [-i] and in w-syllables is marked by the feature backness symbolized as [-u]. The hyphen is used to distinguish the non-syllabic vocoid from the syllabic ones.

The non-syllabic vocoid is not marked by the features of length so that its length is generally constant

and is comparable to that of the unmarked vocoids (i.e. [u] and [i], see 3.3.1.).

By definition the non-syllabic vocoid cannot be marked by the features glottality and nasality as N- and ?- syllables have nasal and glottal segments in their third place respectively. Therefore a syllable whose third place is occupied by a non-syllabic vocoid cannot at the same time have ?- or N- features.

It is important to notice that the non-syllabic vocoid both in y- and w-syllables, (i.e. when it is [-i] and when it is [-u]), is mutually exclusive with the palatal frictionless, (i.e. [j] and [y]), and labio-dental fricative contoids (i.e. [ɸ] and [β]). This means that [j, y, ɸ, β] do not occupy the third place in the syllables except when, in cvc syllables, the syllable is followed by another syllable beginning with one of the contoids above e.g.

[ʔa.j-je.ŋ] 'guardian'      [ʔa.y-ya.ɸ] 'first'  
or, in cvcc syllables, when the fourth place is also occupied by similar contoid, e.g.

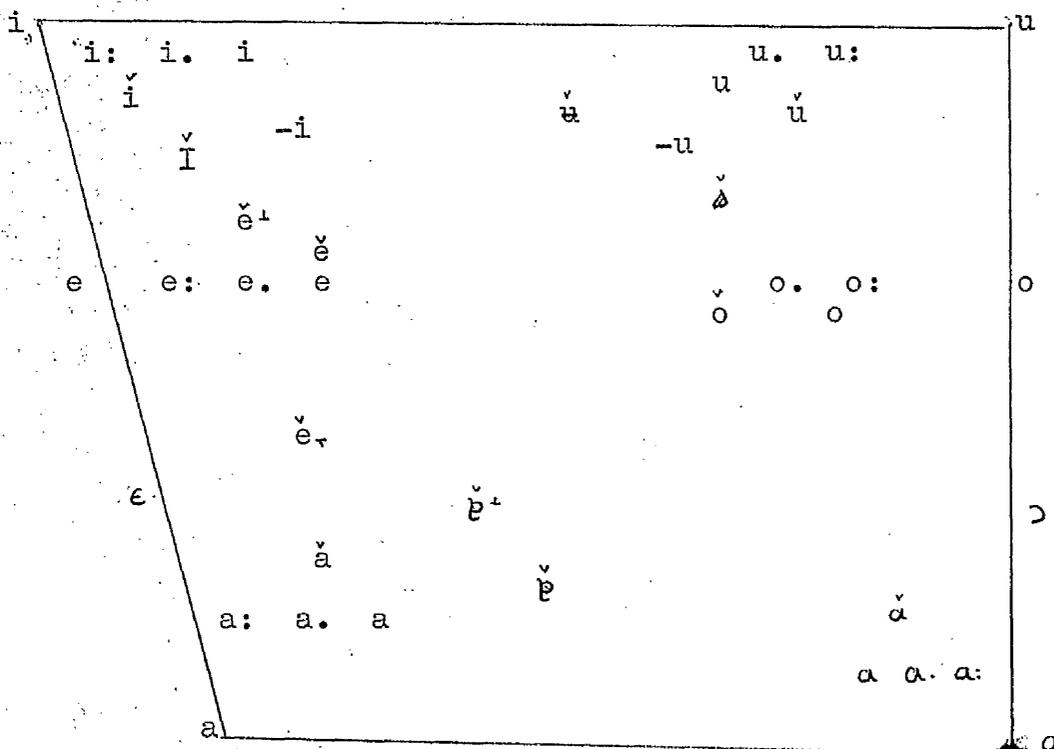
[ħa:jj] 'dive'      [dʒ\_a:yy] 'atmosphere'

In all such examples [-i] and [-u] do not appear in the third place. Thus even in such examples the non-syllabic vocoid is mutually exclusive with the contoids listed above.

There are, however, a few words, mostly archaic or specialized terms whose third place is occupied by [ɸ] or [β], but such words may be regarded as exceptions, e.g.

[nā.v̇]	warship (an army term)
[ji.v̇]	name of an ancient athlete
[ri.v̇]	dishonesty (poetical)
[xē-di.v̇]	Title for ancient Egyptian kings
[ga.v̇]	cow, also [go.u]

The Cardinal Vowel Chart below, represents all the 33 phonetic variations of Persian vocoids including the non-syllabic one. The C.V,§. are given outside the chart.



### 3.4. Contoids: Description

Contoids appear generally in the following parts of the syllable:

- 1) Onset (c-) i.e. in the first place, as  
[P<sup>u</sup>-] in: [P<sup>u</sup>ā] 'foot'.
- 2) Simple ending )-c), i.e. in the third place  
as [-ṙ] in [ḡa.ṙ] 'door'.

3) Complex ending (-cc) i.e. in the third and fourth places, as [-p̣ḍ] in [ḍa:p̣ḍ] 'pain'.

As stated above (3.1.), segments (which include contoids) are modified according to their places in the syllable as well as by the syllable features with which they appear. A proper description of the segments can, therefore, be best given with reference to the places they occupy and to the syllable features. For this reason, the following description deals with the contoids at the first, third and fourth places separately.

#### 3.4.1. Segmental Features

The features that are best described in terms of contoids fall into two general categories:

i) Those resulting from a difference in the place of articulation. They are:

- 1) bilabiality, 2) labio-dentality, 3) denti-alveolarity,
- 4) alveolarity, 5) palato-alveolarity, 6) palatality,
- 7) velarity, 8) uvularity, 9) pre-glottality,
- 10) glottality.

ii) Those resulting from a difference in the manner of articulation. They are:

- 1) plosiveness, 2) nasality, 3) affrication,
- 4) laterality, 5) roll, 6) friction, 7) frictionlessness.

Every contoid is comprised of at least two segmental features, one from each category. For instance, [ɸ] in [ɸa.ɸ] 'lip', consists of denti-alveolarity and laterality. The remaining features found in [ɸ] (i.e. voicing, laxness, advanced articulation, lip-spreading and non-rounding), have already been described in terms of syllable features (Chapter 2).

It is possible for a contoid to be comprised of more than two segmental features. For instance [t̥] in [Ga:t̥] 'murder', consists of the features denti-alveolarity, laterality and friction. The remaining features in [t̥] (i.e. voicelessness, tenseness, advanced articulation, lip-spreading and non-rounding), have already been described in terms of syllable features.

Not all the possible combinations of segmental features given above are found in Persian. Those combinations observed are given in Table V below, and since there is no system of symbolization as yet available for such segments, they are generally represented by X.

Further description of the contoids is given in relation to the places in the syllable and syllable features.

#### 3.4.2. Contoids at the Onset

In this section the combinations of the segmental features observed at the onset place are given and the modifications of contoids by the place and/or the segmental features are described.

##### 3.4.21. Plosiveness

The feature above is found at the syllable onset in combination with:

- 1) bilabiality, 2) denti-alveolarity, 3) palatality,
- 4) velarity, 5) uvularity, 6) glottality

Of such segments the glottal plosive is found only in h-onsets where it is voiceless and tense, the uvular plosive in h-onsets, and the remaining segments both in h-onsets where they are strongly aspirated, voiceless and tense, and in h-onsets where they are unaspirated, lax and fully voiced, and even at times, prevoiced (see 10.3.2. for experimental findings).

TABLE V CONTOLD

POSSIBLE COMBINATIONS OF SEGMENTAL FEATURES

	Bilabiality	labio-dentality	denti-alveol-arity	alveo-larity	palato-alveo-larity	palatality	velarity	uvularity	pre-glottality	glottality
Plosiveness	x		x			x	x	x		x
Nasality	x	x	x	x	x	x	x	x		
Affrication					x					
Laterality			x							
Roll				x						x
Friction	x	x		x		x		x	x	
Friction-lessness	x	x				x				

In y-syllables the bilabial and glottal plosives are pronounced with lips spread. The remaining segments with lips spread as well as advanced articulation when compared with the segments in w-syllables. The palatal plosive is found in y-syllables only.

In w-syllables the bilabial and glottal plosives are produced with lips protruded and rounded, the remaining with lips protruded and rounded as well as retracted articulation. The velar plosive is found in w-syllables only.

The phonetic nature of the aspiration in h/y syllables is voiceless, palatalized fricative homorganic with the contoids, and in h/w syllables it is voiceless labialized fricative homorganic with contoids.

Thus the plosive contoids have the following forms at the onset in relation to h/h and y/w features.

h/y  
c- [p<sup>h</sup> t<sup>h</sup> c<sup>h</sup> ?]

h/w  
c- [p<sup>w</sup> t<sup>w</sup> k<sup>w</sup> ?]

h/y  
c- [b d ʃ ʒ]

h/w  
c- [b d g ʒ]

Exx.

[p<sup>h</sup>i.r] 'old' [t<sup>h</sup>i.r] 'arrow' [c<sup>h</sup>i.f.] 'bag' [ʔi.d] 'festival'  
 [p<sup>w</sup>u.r] 'son' [t<sup>w</sup>u.r] 'net' [k<sup>w</sup>u.r] 'blind' [ʒu.d] 'a musical instrument'  
 [bi.d] 'willow' [di.d] 'sight' [ʃi.r] 'hair grip' [ʒi.r] 'tar'  
 [bu.d] 'existence' [du.d] 'smoke' [gu.r] 'grave' [Gu.r] 'name of a dynasty'

1. H.A. Gleason in 'Workbook in Descriptive Linguistics', March 1966, problem 13C, p.68, has represented the aspiration in relation to the contoids [c<sup>h</sup>] and [k<sup>w</sup>] by the symbol [x] and has described it as "voiceless, palatal, fricative". The description is, for the most part, correct, but the choice of symbol does not correspond with what is the I.P.A. usage for 'palatal fricatives'.

### 3.4.2. Nasality

The feature above is found at the onset in combination with:

- 1) bilabiality      2) denti-alveolarity.

Both segments thus obtained are found in h-onsets only, where they are fully voiced, even at times, prevoiced, lax, and unaspirated (see 10.3.2. for experimental findings).

Bilabial and denti-alveolar nasal contoids are found in y- and w-syllables. In y-syllables both are produced with lips spread. In addition, the denti-alveolar nasal contoid is more advanced and dental in type in y-syllables than in w-syllables. In w-syllables both are produced with lips protruded and rounded. In addition the denti-alveolar nasal is more retracted and alveolar in type than in y-syllables.

Thus the nasal segments have the following forms at the onset in relation to h and y/w features.

$\frac{h/y}{c-}$ $[m \quad n]$	$\frac{h/w}{c-}$ $[m \quad n]$
-----------------------------------	-----------------------------------

Exx.

$[me: h_{\frac{1}{2}}]$ 'affection'	$[n\tilde{a}: h_{\frac{1}{2}}]$ 'stream'
$[mo: h_{\frac{1}{2}}]$ 'seal'	$[n\tilde{u}.r]$ 'light'

### 3.4.23. Affrication

Affrication involves two features: plosiveness followed by strong friction. The plosive part is very short while the friction is long and decreasing i.e. as

the articulation of the segment goes on the passage between the tongue and the palate becomes wider and the air stream runs out without causing as much friction as in the earlier stages of the production of the sound.

Affrication, at the onsets, combines with palato-alveolarity to constitute prepalatal affricate. It appears in h-onsets where it is tense and voiceless, and in h-onsets where it is lax and voiced, and even at times pre-voiced. It is not necessary to include aspiration in the description of the contour as it is implicit in the description given above for the segment.

In y-syllables the affricate segment is more advanced than in w-syllables where it is retracted. Furthermore, it is produced with lips spread in y-syllables and lips protruded and rounded in w-syllables.

The prepalatal affricate at the onset has, therefore, the following forms in relation to h/h and y/w features:

h/y  
c- [tʃ<sup>h</sup>]

h/w  
c- [tʃ<sup>w</sup>]

h/y  
c- [dʒ<sub>1</sub>]

h/w  
c- [dʒ<sub>2</sub>]

Exx.

[tʃ<sup>h</sup>i.z] 'thing'

[tʃ<sup>w</sup>u.b] 'wood'

[dʒi.r] 'plastic'

[dʒu.r] 'kind'

#### 3.4.24. Laterality

The above feature combines at the onset with denti-alveolarity only to constitute a denti-alveolar, lateral segment. The segment appears in h-onsets only

where it is voiced, and even at times prevoiced, lax and unaspirated.

In y-syllables the segment is advanced and more dental in type than in w-syllables where it is retracted and more alveolar in type. Furthermore, in y-syllables it is pronounced with lips spread and unrounded and in w-syllables with lips protruded and rounded.

The denti-alveolar lateral segment has, thus, the following forms at the onset in relation to h and y/w features:

$$\begin{array}{c} \underline{h}/y \\ c- \\ [l] \end{array}$$

$$\begin{array}{c} \underline{h}/w \\ c- \\ [l] \end{array}$$

Exx.

[l<sub>h</sub>ɪs.] 'lick'

[l<sub>w</sub>ɔs.] 'spoilt'

### 3.4.25. Roll

The feature above is found at the onset in association with:

1) alveolarity

2) glottality

and they constitute the segments: alveolar rolled contoid, and glottal trill. Alveolar rolled contoid appears in h-onsets only where it is voiced, and, even at times, prevoiced, lax and unaspirated. Glottal trill appears in h-onsets where it is tense and as it is a glottal trill, it cannot by definition be voiced.<sup>1</sup>

In y-syllables the alveolar roll is advanced and prealveolar in type; both the glottal and alveolar segments are pronounced with lips spread.

---

1. See Pike, 'Phonetics', 1966, pp. 125-8, for the difference between voice and glottal trills.

In w-syllables the alveolar roll is retracted; both the glottal and alveolar segments are pronounced with lips protruded and rounded.

The alveolar roll and glottal trill have thus the following forms at the onset in relation to h/h̄ and y/w features:

Alveolar Roll:

$\begin{array}{c} \underline{h}/y \\ c- \\ [r] \end{array}$	$\begin{array}{c} \underline{h}/w \\ c- \\ [r] \end{array}$
---	---

Glottal trill:

$\begin{array}{c} h/y \\ c- \\ [r] \end{array}$	$\begin{array}{c} h/w \\ c- \\ [r] \end{array}$
---	---

The glottal trill is found in word non-initial onsets when the preceding syllable is of cv-type.

Exx.

[ri.z] 'small'	[ru.z] 'day'
[tʃa.ŋ-ri.b] 'approximation'	[tʃa-h-ri.r] 'writing'
[mʌ-ɪ.n] 'supporter'	[ʃɛ-a.r] 'slogan'

#### 3.4.26. Friction

The feature above is found at the onset in combination with:

- 1) bilabiality, 2) labio-dentality, 3) alveolarity,
- 4) palatality, 5) uvularity, 6) preglottality.

Of these segments the bilabial fricatives are found in h̄-onsets only. The remaining segments are found in h-onsets where they are voiceless and tense and in h̄-onsets where they are voiced, and even at times prevoiced and lax.

In y-syllables the bilabial, labio-dental and pre-glottal fricatives are produced with lips spread, the

remaining segments have advanced articulations as well as the feature lip-spreading.

In w-syllables the bilabial, labio-dental and preglottal segments are produced with lips protruded and rounded. The remaining segments have retracted articulation as well as the features lip-protrusion and rounding.

The fricative segments have, thus, the following forms at the onset in relation to h/h̥ and y/w features:

h/y	h/w
c-	c-
[f̥ s̥ ʃ̥ x̥ h̥]	[f̥ s̥ ʃ̥ x̥ h̥]
h/y	h/w
c-	c-
[β̥ v̥ z̥ ʒ̥ ɣ̥ ɦ̥]	[β̥ v̥ z̥ ʒ̥ ɣ̥ ɦ̥]

[β̥] and [β̥] are found only in word non-initial syllables when the preceding syllable is one of cv- type,

e.g.

[β̥iβ̥i] 'grandmother' [β̥äβ̥ä] 'daddy' [c̥ɣ̥β̥a.β̥] 'Kebab'

And in all cases they can be replaced by [β̥] and [β̥] respectively. Thus:

[β̥iβ̥i] , [β̥äβ̥ä] and [c̥ɣ̥β̥a.β̥]

[ɦ̥] and [ɦ̥] are also found only in word non-initial syllables when the preceding syllable is of cv- type, e.g.

[s̥äɦ̥a.r̥] 'dawn' , [β̥əɦ̥a.r̥] 'spring' [m̥əɦ̥i.β̥] 'frightening'

And in all cases they can be replaced by [ɦ̥] and [ɦ̥] respectively. Thus:

[s̥äɦ̥a.r̥] , [β̥əɦ̥a.r̥] and [m̥əɦ̥i.β̥]

[ɣ̥] and [ɣ̥] are also subject to the same restrictions and variations. But in this case they can be replaced by the plosives: [G̥] and [G̥]. Thus:

[r̥ẽ,ʎi.b] 'rival', [ʔ̥ʎa.b] 'eagle' f̥ʎã.n 'alas'

or:

[r̥ẽ,ʎi.b] [ʔ̥ʎa.b] and [f̥ʎã.n]

The remaining fricative segments are found both in word initial and non-initial syllables.

Exx.

[fe:c̥ʎ]	'thought'	[se:d̥ʎ]	'truth'	[ʃa:h̥ʎ]	'town'
[s̥ʃa-f̥ʎ]	'journey'	[h̥ʃa.s̥d̥]	'envy'	[n̥ʃi-b̥]	'slope'
[xe:i̥ʎ]	'goad'	[h̥e:z̥b̥]	'party'		
[se-x̥iʃ]	'cheap'				
[vef̥:ʎ]	'agreement'	[ze:c̥ʎ]	'memory'	[ʒa:r̥ʃ]	'deep'
[s̥ʎa.r̥]	'rider'	[n̥ẽ,ziʃ]	'clean'	[h̥ẽ,zi.r̥]	'proper name'
[f̥ʃaruʃ]	'sale'	[s̥ʃdu.r̥]	'export'	[ʃ̥ẽra.b̥]	'drink'
[n̥ʃaf̥us̥]	'popula- tion'	[k̥ʃ̥ʃuf̥]	'eclipse'	[n̥ẽʃa.t̥]	'happiness'
[xu.b̥]	'good'	[hos:ɲ]	'beauty'		
[b̥ʃxu-r̥]	'vapour'	[zu.r̥]	'force'	[ʒd̥lə]	'dew'
[v̥ʃz̥u]	'washing'	[b̥ʃzo:r̥ʃ]	'big'	[n̥ẽʒa.d̥]	'race'
[s̥ʎa.r̥]	'rider'				

### 3.4.27. Frictionlessness

The feature above is found at the onset in combination with:

- 1) bilabiality, 2) labio-dentality, 3) palatality.

The resultant segments from these combinations are:

bilabial frictionless, labio-dental frictionless and palatal frictionless contoids.

All the contoids are found in h-onsets only where they are voiced, even at times prevoiced, lax and unaspirated.

The bilabial frictionless contoid appears in w-syllables only.

The labio-dental frictionless contoid appears in y-syllables only.

The palatal frictionless contoid appears in y/w syllables. In y-syllables it is advanced and in w-syllables retracted. All the segments are pronounced with lips spread, in y-syllables and lips protruded and rounded in w-syllables.

Thus the frictionless contoids have the following forms at the onset in relation to h and y/w features:

<u>h</u> /y	<u>h</u> /w
c-	c-
[v j]	[w y]

[v] and [w] are found in word non-initial syllables only, e.g.

[dʒɛ̌lɔ̌vɛ̌da.ř] 'in front of the door'

[dʒɛ̌lɔ̌wɔ̌.ã̌ya.b̌] 'front and back'

[j] and [y] are found at the onsets of word initial and non-initial syllables equally, e.g.

[je.cɛ̌] 'one'                      [gũjã.ndě̌ř] 'speaker'

[ya.ď] 'memory'                      [siya.ȟ] 'black'

Table VI below                      [gũjã.ndě̌ř] 'speaker'                      ids that occur  
at syllable onset.                      [siya.ȟ] 'black'

### 3.4.3. Contoids at the Simple Ending

The contoids resulting from the combination of the segmental features at simple endings are given below and the modifications of the contoids by the place and/or the syllable features are described. But before this can be done the following points need to be stated:

TABLE VI

CONTOIDS AT THE SYLLABLE ONSET

	Bilabiality		Labio-dentality		Denti-alveol-arity		Alveo-arity		Palato-alveo-arity		Palatality		Velarity		Uvularity		Pre-glottality		Glotta-lity	
	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w
Plosiveness	h <sup>p</sup> b <sub>3</sub>	p <sup>y</sup> b <sub>3</sub>			t <sup>h</sup> d <sub>3</sub>	t <sup>w</sup> d <sub>3</sub>														
Nasality	m <sub>3</sub>	m <sub>3</sub>			n <sub>3</sub>	n <sub>3</sub>														
Affricate (plosiveness + friction)	h								h <sup>y</sup> h <sub>3</sub>	h <sup>w</sup> h <sub>3</sub>										
Laterality	h				l <sub>3</sub>	l <sub>3</sub>														
Roll	h						r <sub>3</sub>	r <sub>3</sub>												
Friction	h	β <sub>3</sub>	f <sub>3</sub>	f <sub>3</sub>			s <sub>3</sub>	s <sub>3</sub>			j <sub>3</sub>	j <sub>3</sub>								
Friction-lessness	h	w	v <sub>3</sub>	v <sub>3</sub>			z <sub>3</sub>	z <sub>3</sub>			ɟ <sub>3</sub>	ɟ <sub>3</sub>								

### 3.4.31. Types of endings

For the purpose of a phonetic description of the contoids two types of endings are distinguished among both simple and complex endings:

1) Word final syllable ending. This type is generally marked by h-features - that is to say, the contoids appearing in this type of ending are generally voiceless, and compared with those at the onset, are tense, as well as in the case of plosives, aspirated. Nevertheless two degrees of h-features are distinguishable in word final endings:

a) When voicelessness is combined with a high degree of tenseness and, in plosives, aspiration. Contoids in such endings are represented by symbols used in I.P.A. for voiceless segments, e.g.: [da<sub>1</sub>ˈ :t<sup>h</sup> ] 'plain' (see 10.3.2. for experimental findings).

b) When partial or complete voicelessness is combined with a low degree of tenseness and in plosives, aspiration. Contoids in such endings are represented by symbols used in I.P.A. for voiced segments and marked by the diacritic [̥] to indicate that the segments are voiceless, e.g. [Ga:ɓ̥z] 'receipt' (see 10.3.2. for experimental findings).

2) Word non-final syllable ending. This type may be marked by h and h features. That is to say the contoids appearing in this type may be accompanied by the features voicelessness, tenseness and aspiration, e.g. [s̥.] in [h̥as̥.-t<sup>h</sup> i] 'existence', or by the features voicing, laxness and unaspiration, e.g. [z̥] in [ñã.z̥-di.c<sup>h</sup> ] 'near'.

The latter is symbolized by I.P.A. symbols used for voiced segments and without [◌]. Thus three types of symbols are used in describing the contoids at the endings, as follows:

- i) Symbols used for voiceless segments in I.P.A. e.g. [P,t] etc.
- ii) Symbols used for voiced segments but marked by [◌], e.g. [b̥,d̥] etc.
- iii) Symbols used for voiced segments and left unmarked, e.g. [b,d] etc.

Symbols of the type i) and ii) are used for contoids in h endings, and those of the type iii) are used for contoids in h endings.

#### 3.4.32. Plosiveness

At the simple ending the feature above combines with:

- 1) bilabiality, 2) denti-alveolarity, 3) palatality,
- 4) uvularity.

Unlike at the onset place (see 3.4.21.), plosiveness does not combine with velarity and glottality at the simple ending.

Also, unlike the contoids at the onset, all the resultant plosive contoids are found in y- and w-syllables (see 3.4.21).

In y-syllables the bilabial plosive is articulated with spread lips. The remaining plosives have advanced articulation as well as the features lip spreading.

In w-syllables the bilabial plosive is articulated with lips protruded and rounded. The remaining plosives

have retracted articulation as well as the features above.

In word final syllable endings the contoids are marked by h-features. In word non-final syllable endings the uvular plosive is always marked by h-, the remaining contoids may be marked by h- and h-features.

Thus plosives have the following forms in word final simple ending in relation to h/y and h/w features:

h/y

<sup>-c</sup>[P<sup>h</sup> b<sup>h</sup> t<sup>h</sup> d<sup>h</sup> c<sup>h</sup> ʃ<sup>h</sup> ɣ<sup>h</sup>]

h/w

<sup>-c</sup>[P<sup>h</sup> b<sup>h</sup> t<sup>h</sup> d<sup>h</sup> c<sup>h</sup> ʃ<sup>h</sup> ɣ<sup>h</sup>]

Exx.

[t<sup>h</sup>i.p<sup>h</sup>] 'an army division', [ʃi.b<sup>h</sup>] 'slope', [si.t<sup>h</sup>] 'fame', [bi.d<sup>h</sup>] 'willow'  
 [xi.c<sup>h</sup>] 'hide water vessel', [ri.ʃ<sup>h</sup>] 'cloud', [mi.ɣ<sup>h</sup>] 'cloud'  
 [t<sup>h</sup>u.p<sup>h</sup>] 'ball', [xu.b<sup>h</sup>] 'good', [ma.t<sup>h</sup>] 'puzzled', [ra.d<sup>h</sup>] 'free'  
 [p<sup>h</sup>a.c<sup>h</sup>] 'clean', [su.ʃ<sup>h</sup>] 'mourning', [ba.ɣ<sup>h</sup>] 'garden'

In word non-final simple ending the plosive contoids have the following forms in relation to h/h and y/w features:

h/y

<sup>-c</sup>[P<sup>h</sup> t<sup>h</sup> c<sup>h</sup>]

h/w

<sup>-c</sup>[P<sup>h</sup> t<sup>h</sup> c<sup>h</sup>]

h/y

<sup>-c</sup>[b<sup>h</sup> d<sup>h</sup> ʃ<sup>h</sup> ɣ<sup>h</sup>]

h/w

<sup>-c</sup>[b<sup>h</sup> d<sup>h</sup> ʃ<sup>h</sup> ɣ<sup>h</sup>]

Exx.

No example found for [P<sup>h</sup>], [Ga.t<sup>h</sup>rě] 'drop', [nē.c<sup>h</sup>ba.t<sup>h</sup>] 'misfortune', [t<sup>h</sup>a.b<sup>h</sup>da.r] 'feverish', [ba.ɣ<sup>h</sup>baɣ:t<sup>h</sup>] 'unfortunate'  
 [ri.ʃ<sup>h</sup>za.r] 'pebbled place', [ʔe.ɣ<sup>h</sup>ba.l] 'fortune'  
 [su.p<sup>h</sup>xóri] 'soup dish', [ro.t<sup>h</sup>ɣɛr] 'degree', [ʃo.c<sup>h</sup>răně] 'thanksgiving'  
 [xu.brũ] 'pretty', [Go.dra.t<sup>h</sup>] 'power', [za.ʃ<sup>h</sup>fros.] 'name of a mountain'  
 [mo.ɣ<sup>h</sup>be.l] 'fortunate'

### 3.4.33. Nasality

This feature combines with 1) bilabiality and 2) denti-alveolarity in word final simple endings, and with 1) bilabiality, 2) labio-dentality, 3) denti-alveolarity, 4) alveolarity, 5) palato-alveolarity, 6) palatality, 7) velarity, and 8) uvularity in word non-final simple endings. In word non-final simple endings the nasal contoids are followed by a homorganic contoid which occupies the onset of the following syllable. But before pre-glottal and glottal contoids the nasal segments are denti-alveolar or bilabial.

The nasal contoids at word final endings are phonetically accompanied by h-features, that is they are voiceless and, compared with the nasal contoids at the onset and word non-final endings, somewhat tense. In word non-final endings they are voiced and lax and are, therefore, considered to be associated with h-features.

In y- and w-syllables the nasal contoids are marked by the same features as mentioned earlier in relation to other contoids (see, for instance, 3.4.32. above).

The nasal contoids thus have the following forms at the word final simple endings:

h/y	h/w
-c	-c
[ <sub>̣</sub> ṃ    ṇ]	[ <sub>̣</sub> ṃ    ṇ]

Exx.

[ṣi.ṃ] 'silver'	[c̣ɛ̣i.ṇ] 'revenge'	[x̣ɑ.ṃ] 'raw'
[x̣ɑ.ṇ] 'table cloth'		

And at word non-final simple endings they have the following forms:

h/y  
-c  
[m, ɲ, n̥, n̥, ɲ, ɲ<sup>+</sup>, ɲ<sup>-</sup>, N]

h/w  
-c  
[m̥, ɲ̥, n̥̥, n̥̥, ɲ̥̥, ɲ̥<sup>+</sup>, ɲ̥<sup>-</sup>, N]

The diacritic [̥] marks [n] as dental, [+]

marks [ɲ] as palatal and [-] marks [ɲ] as velar.

Exx.

[d̥z̥ã.m̥b̥ɛ̥] 'side' [ʔã.m̥f̥ã.ɔ̥] 'charity' [ɔ̥ã.n̥d̥i.l̥] 'candle holder'  
 [ʔɛ̥.n̥s̥ã.n̥] 'human' [p̥f̥ã.n̥d̥z̥ɛ̥] 'ginger' [p̥f̥ã.n̥+c̥ɛ̥] 'electric fan'  
 [ʔɛ̥.ɲ̥-k̥ã.n̥] 'denial' [m̥ɛ̥.N̥ɔ̥.r̥] 'beak'  
 [x̥õmp̥ã.r̥ɛ̥] 'shell' [x̥ũ.n̥f̥ɛ̥f̥ã.n̥] 'blood-shedding' [ɔ̥õ.n̥d̥ã.ɔ̥] 'baby's napkin'  
 [x̥ũ.n̥s̥ã.r̥] 'name of town' [g̥õ.n̥d̥z̥ɛ̥:c̥ɛ̥] 'sparrow' [m̥õ.ɲ̥+c̥ɛ̥] 'danger'  
 [d̥z̥ã.ɲ̥-k̥ã.h̥] 'tiring' [x̥ũ.N̥x̥ã.r̥] 'bloodthirsty'

When followed by a pre-glottal or glottal contoid it is either bilabial, (e.g. [d̥z̥ o.m̥ʔ̥] 'Friday') or dental-alveolar (e.g. [s̥ã.n̥ʔ̥a.t̥] 'industry').

### 3.4.34. Affrication

As described in 3.4.23., affrication involves two segmental features: plosiveness followed by friction and is found in combination with pre-palatalty to constitute the prepalatal affricate.

In word final simple endings the affricate contoid is found with h-features only, but in word non-final endings it may be marked by h- or h-features. Apart from this the same description as given for onset place applies.

Thus the contoid has the following form in word final endings in relation to h- and y/w features:

h/y  
-c  
[t̥ʃ̥, d̥z̥]

h/w  
-c  
[t̥ʃ̥̥, d̥z̥̥]

The forms [tʃ<sup>h</sup>, tʃ<sup>w</sup>] are distinguished from the forms [dʒ<sub>2</sub>, dʒ<sub>3</sub>] by a higher degree of tenseness and aspiration as stated in 3.4.31. above.

Exx.

[ʃa.tʃ<sup>h</sup>] 'chalk'                      [ʃu.tʃ<sup>w</sup>] 'ram'  
 [ha.dʒ<sub>2</sub>] 'pilgrimage to Mecca' [ma.mzu.dʒ<sub>3</sub>] 'mixed'

In word non-final simple endings the prepalatal affricate has the following forms in relation to h/h and y/w features.

h/y -c [tʃ <sup>h</sup> ]	h/w -c [tʃ <sup>w</sup> ]
h/y -c [dʒ <sub>2</sub> ]	h/w -c [dʒ <sub>3</sub> ]

Exx.

[ʃa.tʃ<sup>h</sup>ɔ̃rɪ] 'fresco'      [mo.tʃ<sup>w</sup>pɛitʃ<sup>h</sup>] 'band'  
 [he.dʒ<sub>2</sub>dɛ̃r] 'eighteen'      [sa.dʒ<sub>3</sub>dɛ̃r] 'bowing'

### 3.4.35. Laterality

The feature above is found at simple endings in combination with denti-alveolarity in word final simple ending the denti-alveolar lateral is marked by h-features only and in word non-final simple endings it is marked by h-features. The contoid is found in y- and w-syllables and in both cases it is marked by the same features as stated for the contoid at the onset (3.4.25.).

The contoid has, therefore, the following forms at word final simple endings in relation to h- and y/w features:

h/y -c [l <sub>2</sub> ]	h/w -c [l <sub>3</sub> ]
--------------------------------	--------------------------------

Exx.

[p<sup>ɛ</sup>i l̥] 'elephant' [p<sup>u</sup>u. l̥] 'money'

and in word non-final simple endings it has the following forms in relation to h and y/w features:

$\begin{array}{c} \underline{h}/y \\ -c \\ [l̥] \end{array}$	$\begin{array}{c} \underline{h}/w \\ -c \\ [l̥] \end{array}$
--	--

Exx.

[p<sup>ɛ</sup>i. l̥bã.n̥] 'elephant keeper' [p<sup>u</sup>u. l̥da.r̥] 'rich'

### 3.4.36. Roll

This feature is found at the simple endings in combination with alveolarity and glottality; the glottal roll in word non-final simple endings may be checked, i.e. it may end in the feature plosiveness. This is symbolized by [~?]. In relation to y/w features they are the same as the contoids at the onset (see 3.4.35.).

Glottal roll is always found in h-endings, but the alveolar roll is marked by h in word final simple endings, and by h in word non-final simple endings.

Thus in word final endings the contoids, in relation to h, y and w features are as follows:

$\begin{array}{c} h/y \\ -c \\ [r̥ \sim] \end{array}$	$\begin{array}{c} h/w \\ -c \\ [r̥ \sim] \end{array}$
---	---

Exx.

[s̥i.r̥] 'full' [s̥u.r̥] 'party'

[r̥ã.bi.~] 'spring' [s̥u.~] 'vice'

In word non-final simple endings they are as follows:

$\begin{array}{c} \underline{h}/y \\ -c \\ [r̥] \end{array}$	$\begin{array}{c} \underline{h}/w \\ -c \\ [r̥] \end{array}$	$\begin{array}{c} h/y \\ -c \\ [ \sim? \sim ] \end{array}$	$\begin{array}{c} h/w \\ -c \\ [ \sim? \sim ] \end{array}$
--	--	--	--

The sign ~ indicates that the symbols preceding and following it are in free variation.

Exx.

[sa.rda.r̥] 'leader' [ma.ɹ̥.lu.m̥ ma.ɹ̥.lu.m̥] 'known'  
 [mo.rd̥e.r̥] 'dead' [mo.ɹ̥be.d̥ ~ mo.ɹ̥be.d̥] 'priest'

3.4.37. Friction

In simple endings the feature above is found in combination with

- 1) labio-dentality,
- 2) alveolarity,
- 3) palatality
- 4) uvularity,
- 5) pre-glottality.

Unlike at the onset, friction does not combine with bilabiality at the simple endings.

In relation to y and w all the fricative contoids at the ending are marked by the same features as they are at the onset (see 3.4.26.).

In word final simple endings all the fricatives are marked by h; and in word non-final simple endings the labio-dental,<sup>1</sup> uvular and glottal fricatives are generally found with h-features only (unlike at the onset where they are found with h and h features equally [see 3.4.26.]).

The remaining fricatives are found with h and h features.

Thus the fricatives in word final simple endings and in relation to h and y/w features are as follows:

h/y	h/w
-c	-c
[f̥ s̥ z̥ ʃ̥ ʒ̥ x̥ h̥]	[f̥ s̥ z̥ ʃ̥ ʒ̥ x̥ h̥]

Exx.

[c̥i.f̥.] 'bag' [ba.s̥.] 'enough' [c̥i.ʃ̥.] 'religion'  
 [ʃa.z̥] 'meter' [d̥e.ʒ̥] 'fort (archaic)'

---

1. See also 3.3.2.

[ <u>naix.</u> ] 'nail'	[ <u>me.h</u> ] 'fog'	
[ <u>bʊf.</u> ] 'owe'	[ <u>bʊs.</u> ] 'kiss'	[ <u>ʔaʃ.</u> ] 'soup'
	[ <u>su.z</u> ] 'burning'	[ <u>ʒa.ʒ</u> ] 'nonsense' (archaic)
[ <u>mox.</u> ] 'brain'	[ <u>mo.h</u> ] 'moon'	

and in word non-final simple endings they are, in relation to h/h and y/w features as follows:

h/y	h/w
-c	-c
[ <u>f</u> <u>s</u> <u>ʃ</u> <u>x</u> <u>h</u> ]	[ <u>f</u> <u>s</u> <u>ʃ</u> <u>x</u> <u>h</u> ]
<u>h/y</u>	<u>h/w</u>
-c	-c
[ <u>-</u> <u>z</u> <u>ʒ</u> <u>-</u> <u>-</u> ]	[ <u>-</u> <u>z</u> <u>ʒ</u> <u>-</u> <u>-</u> ]

Exx.

[ <u>raf.tʰa.r</u> ] 'behaviour'	[ <u>mes.ʃa.r</u> ] 'coppersmith'	[ <u>cʰaʃ.tʰi</u> ] 'ship'
	[ <u>ma.zha.b</u> ] 'religion'	[ <u>ʔa.ʒda.r</u> ] 'a weapon'
[ <u>max.ma.l</u> ] 'velvet'	[ <u>ra.hba.r</u> ] 'leader'	
[ <u>gof.tʰa.r</u> ] 'speech'	[ <u>bog.tʰa.n</u> ] 'garden'	[ <u>kʰoʃ.tʰi</u> ] 'wrestling'
	[ <u>mo.ʒdu.r</u> ] 'employee'	[ <u>mo.ʒdɛ.</u> ] 'good news'
[ <u>mox.ber</u> ] 'reporter'	[ <u>mo.hsɛ.n</u> ] 'generous'	

The frictionless contoids are not found at the simple ending except in the exceptional case which is described in 3.3.2.

Table VII below summarizes the description of the contoids at the simple ending.

#### 3.4.4. Contoids at the First Place in Complex Endings

The points which were made in 3.4.31. are, as already mentioned, applicable to the contoids at the first place in complex endings. The combinations of the segmental features found at this place are given in this section and the modifications of the contoids by the syllable features and place are described. (For some experimental findings see 10.3.2.)

TABLE VII

CONTOIDS AT THE SIMPLE ENDINGS, THE CONTOIDS APPEARING IN THE LOWER ROWS IN THE SLOTS ARE RESTRICTED TO WORD/FINAL SIMPLE ENDINGS

Segmental features	Bilabiality		labio-dentality		denti-alveo-larity		alveo-larity		palato-alveo-larity		palatality		velarity		uvularity		pre-glottality		glottality		
	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	
Plosiveness	h	p <sup>h</sup> p <sub>0</sub>			t <sup>h</sup> d <sub>0</sub>	t <sup>h</sup> d <sub>0</sub>															
	h̄	b̄			d̄	d̄															
Nasality	h	m <sub>0</sub> m̄			n̄	n̄															
	h̄	m̄			n̄	n̄															
Affrication	h																				
	h̄																				
Laterality	h																				
	h̄																				
Roll	h																				
	h̄																				
Friction	h		f	f <sub>0</sub>	s <sub>0</sub> z <sub>0</sub> s <sub>0</sub> z <sub>0</sub>	s <sub>0</sub> z <sub>0</sub> s <sub>0</sub> z <sub>0</sub>															
	h̄		f̄	f̄	s̄ z̄ s̄ z̄	s̄ z̄ s̄ z̄															



$\underline{h}/y$  -c(c) [ḅ ḍ ɣ̣]  
 $\underline{h}/w$  -c(c) [ḅ̥ ḍ̥ ɣ̣̥]

Exx. [Ga:tʰtʰga.ḥ ~ Ga:tʰl̥ga.ḥ]<sup>1</sup> 'murder place'  
 [jo:cʰgõza.ṛ ~ jo:cʰr̥gõza.ṛ] 'thankful'  
 [Ga:ḍḍḍ.ṇ ~ Ga:dr̥ḍḍ.ṇ] 'appreciative'  
 [ma:g̣ẓda.ṛ] 'brainy'

### 3.4.42. Nasality

At the first place of complex endings nasality is found in combination with

- 1) bilabiality, 2) labio-dentality, 3) denti-alveolarity,
- 4) alveolarity, 5) palato-alveolarity, 6) palatality,
- 7) uvularity.

Unlike the simple endings (see 3.4.32.) it is not found in combination with velarity at this place. In word final complex endings the nasal contoids are marked by h- and in word non-final they are marked by  $\underline{h}$ -features. In relation to y/w syllables they are subject to the same modifications as at the simple endings (see 3.4.32.).

Except for the bilabial nasal which is generally found before any contoid, the nasal contoids are homorganic with the contoids following them.

Thus in word final complex endings the nasal contoids are in relation to h and y/w syllable features as follows:

$\underline{h}/y$  -c(c) [ṃ̥ ṇ̥ ɲ̣̥ Ṇ̥]  
 $\underline{h}/w$  -c(c) [ṃ̥̥ ṇ̣̥̥ ɲ̣̣̥̥ Ṇ̣̥̥]

1. See 8.5.2.II. for the description of [ɛ̣] and [ɛ̣̥] in the second variations of the examples above.

The diacritic [ n ] is used to distinguish between the denti-alveolar [ n ] and alveolar [ n ] nasal contoids.

Exx.

[ ḍ : ɛ : ṃb ] 'beside' [ ṣɛ : ṃf ] 'cast' [ ṛɛ : ṇḍ ] 'cunning'  
 [ p̣f̣a : ṇḍẓ ] 'five' [ x̣ɛ : ŋ̣f̣ ] 'unintelligent' [ ṣɛ : ṆX ] 'type'  
 [ ḍẓɔ : ṃb ] 'motion' [ ḳʰɔ : ṇḍ ] 'slow' [ ẓɔ : ṇṣ ] 'familiarity'  
 [ ḳʰɔ : ṇḍẓ ] 'corner' [ ṭʰɔ : ŋ̣f̣ ] 'jug'

The bilabial nasal precedes any contoid and not necessarily homorganic contoids, e.g.

[ x̣o : ṃṣ ] 'a fifth' [ ḥa : ṃḍ ] 'thanksgiving' [ ẓo : ṃḍ ] 'depth'

At word non-final complex endings the nasal contoids are:

h/y  
 -c(c)  
 [ ṃ , ṃ , ṇ , ṇ , ŋ̣ , ŋ̣ , Ṇ ]

h/w  
 -c(c)  
 [ ṃ , ṃ , ṇ , ṇ , ŋ̣ , ŋ̣ , Ṇ ]

#### 3.4.43. Affrication

Affrication at the first place of complex endings is phonetically the same as that at the simple endings and combines with the same features and is subject to the same modifications in relation to h/h and y/w syllables (see 3.4.33. above).

In word final complex endings the pre-palatal affricate is found with h-features.

In word non-final complex endings it is found with h-features unlike at simple endings where it may have h or h features (see 3.4.33.).

Thus the affricate contoid in word final complex endings has the forms

$\begin{array}{c} \text{h/y} \\ -\text{c(c)} \\ [d_{\text{ɰ}}] \end{array}$	$\begin{array}{c} \text{h/w} \\ -\text{c(c)} \\ [d_{\text{ɰ}}] \end{array}$
<p>Exx. [he:d<sub>ɰ</sub>ɰ] 'being away'</p>	<p>[ho:d<sub>ɰ</sub>ɰ] 'shyness'</p>

And in word non-final complex endings it has the forms

$\begin{array}{c} \underline{\text{h/y}} \\ -\text{c(c)} \\ [d_{\text{ɰ}}] \end{array}$	$\begin{array}{c} \underline{\text{h/w}} \\ -\text{c(c)} \\ [d_{\text{ɰ}}] \end{array}$
---	---

No example found.

#### 3.4.44. Laterality

Laterality at the first place of complex endings is, in all respects, phonetically the same as that at the simple endings (see 3.4.34.).

Thus in word final complex endings it is:

$\begin{array}{c} \text{h/y} \\ -\text{c(c)} \\ [l] \end{array}$	$\begin{array}{c} \text{h/w} \\ -\text{c(c)} \\ [l] \end{array}$
<p>Exx. [d<sub>ɰ</sub>za:l<sub>ɰ</sub>d] 'fast'</p>	<p>[xo:l<sub>ɰ</sub>d] 'eternity'</p>

And in word non-final complex endings it is:

$\begin{array}{c} \underline{\text{h/y}} \\ -\text{c(c)} \\ [l] \end{array}$	$\begin{array}{c} \underline{\text{h/w}} \\ -\text{c(c)} \\ [l] \end{array}$
--	--

#### 3.4.45. Roll

Roll at the first place in complex endings is also phonetically the same as that at simple endings (see 3.4.35. above) except that here the glottal rolled contoid [ɽ] or [ɽ̥] is in free variation with the checked glottal rolled [ɽ̥] and [ɽ̥̥] in all places, unlike at word final simple endings where the unchecked glottal rolled is not found in free variation with the checked one. Thus in

word final complex endings:

$\begin{array}{c} \text{h/y} \\ -c(c) \\ [r \quad \text{ʔ} \quad \text{~} ] \\ \text{; } \end{array}$	$\begin{array}{c} \text{h/w} \\ -c(c) \\ [r \quad \text{ʔ} \quad \text{~} ] \\ \text{; } \end{array}$
---	---

Exx.

$[sa:rd] \text{ 'cold'}$	$[sa:ʔd \sim sa:d] \text{ 'luck'}$
$[bo:rd] \text{ 'win'}$	$[bo:ʔd \sim bo:d] \text{ 'distance'}$

And in word non-final complex endings:

$\begin{array}{c} \text{h/y} \\ -c(c) \\ [r] \\ \text{; } \end{array}$	$\begin{array}{c} \text{h/w} \\ -c(c) \\ [r] \\ \text{; } \end{array}$	$\begin{array}{c} \text{h/y} \\ -c(c) \\ [\text{ʔ} \quad \text{~}] \\ \text{; } \end{array}$	$\begin{array}{c} \text{h/w} \\ -c(c) \\ [\text{ʔ} \quad \text{~}] \\ \text{; } \end{array}$
--	--	--	--

Exx.

$[nã:rdbã.n \sim nã.rděbã.n]^1 \text{ 'ladder'}$
$[ra:ʔdbã:nɣ \sim ra:dbã:nɣ] \text{ 'sonorous voiced (man)'}$

### 3.4.46. Friction

Friction combines with the same features at the first place of complex endings as at the simple endings (see 3.4.36.) and in relation to h/h and y/w features, the contoids thus obtained exhibit the same modifications.

In word final complex endings they are found with h-features, and in word non-final complex endings only the alveolar fricative contoid has h/h features, and the remaining contoids of this group have h-features only. Thus in word final complex endings they are:

$\begin{array}{c} \text{h/y} \\ -c(c) \\ [f \quad s \quad z \quad ʃ \quad x \quad h] \\ \text{; } \end{array}$	$\begin{array}{c} \text{h/w} \\ -c(c) \\ [f \quad s \quad z \quad ʃ \quad x \quad h] \\ \text{; } \end{array}$
--	--

Exx.

$[sef:ɰ] \text{ 'zero'}$	$[kas:ɰ] \text{ 'castle'}$	$[pa:zɰ] \text{ 'sowing'}$	$[xe:ʃ:m] \text{ 'anger'}$
$[ma:hz] \text{ 'pure, mere'}$	$[mof:t^u] \text{ 'cheap'}$	$[p^uof:t^u] \text{ 'back'}$	

1. For the description of the extra [ě] in this variant see 8.4.23.III.

and in word non-final complex endings they are:

$\begin{array}{c} \underline{h}/y \\ -c(c) \\ [f, s, \int, x, h] \end{array}$	$\begin{array}{c} \underline{h}/y \\ -c(c) \\ [z] \end{array}$
$\begin{array}{c} \underline{h}/w \\ -c(c) \\ [f, s, \int, x, h] \end{array}$	$\begin{array}{c} \underline{h}/w \\ -c(c) \\ [z] \end{array}$

Exx.

[haf:tsa.r] 'seven headed' [pof:t<sup>u</sup> k<sup>u</sup>a.r ~ [pof.t<sup>u</sup> k<sup>u</sup>a.r]<sup>1</sup> 'dedication'  
 [ja:zdxa s:t<sup>u</sup> ~ ja.zdexas:t<sup>u</sup>] 'name of a place'

Table VIII below represents the contoids found at the first place in complex endings.

The frictionless contoids do not appear at this place except in a few exceptional cases which are explained in 3.3.2.

### 3.4.5. Contoids at the Second Place in Complex Endings

The contoids resulting from the combination of the segmental features at the second place of complex endings are given in this section together with the modifications imposed on them by the syllable features.

All the contoids are marked by h at the word final complex endings. But at word non-final complex endings some are marked by h, some by h, and some by h and h as will be seen below (see 10.3.2. and 10.4.2. for experimental findings). In relation to the y- and w-features they are subject to similar modifications to those observed at other places.

1. For the description of the [ě] in these variations see 8.5.2.II.

TABLE VIII

CONTIGS AT THE FIRST PLACE OF COMPLEX ENDINGS

THE CONTIGS MARKED BY h IN THE LOWER ROW OF THE SLOTS ARE ONLY FOUND IN WORD NON-FINAL COMPLEX ENDINGS

	Bilabiality		labio-dentality		denti-alveolality		alveolality		palato-alveolality		palatality		velarity		uvularity		pre-glottality		glottality	
	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w
Plosiveness	h		b <sub>1</sub>	b <sub>2</sub>	t <sub>1</sub> <sup>h</sup> d <sub>1</sub>	t <sub>2</sub> <sup>h</sup> d <sub>2</sub>					c <sub>1</sub>	c <sub>2</sub>	y	w	G <sub>1</sub>	G <sub>2</sub>	y	w	y	w
Nasality	h		m <sub>1</sub>	m <sub>2</sub>	n <sub>1</sub>	n <sub>2</sub>	n <sub>1</sub>	n <sub>2</sub>	ɲ <sub>1</sub>	ɲ <sub>2</sub>	ɲ <sub>1</sub>	ɲ <sub>2</sub>			N <sub>1</sub>	N <sub>2</sub>				
Affrication	h								ʧ <sub>1</sub>	ʧ <sub>2</sub>										
Laterality	h		l <sub>1</sub>	l <sub>2</sub>																
Roll	h				r <sub>1</sub>	r <sub>2</sub>														
Friction	h		f <sub>1</sub>	f <sub>2</sub>	s <sub>1</sub>	s <sub>2</sub>	ʃ <sub>1</sub>	ʃ <sub>2</sub>			ʃ <sub>1</sub>	ʃ <sub>2</sub>			x <sub>1</sub>	x <sub>2</sub>	h <sub>1</sub>	h <sub>2</sub>		

### 3.4.51. Plosiveness

This feature is found in combination with:

- 1) bilabiality, 2) denti-alveolarity, 3) palatality,
- 4) uvularity, 5) glottality.

In word non-final complex endings the bilabial and uvular plosives are always marked by h-features, the glottal plosives by h, and the denti-alveolar and palatal plosives both by h and by h features. The velar plosive does not appear at this place in a syllable. Thus in word final complex endings the plosives are:

h/y  
 -(c)c [b̥ t̥ d̥ c̥ ʔ̥ ɣ̥ ʔ̥]  
 h/w  
 -(c)c [b̥ t̥ d̥ c̥ ʔ̥ ɣ̥ ʔ̥]

Exx.

[ʔ̥as̥:b̥] 'horse' [p̥ʔ̥as̥:t̥ʔ̥] 'low' [ɣ̥as̥:d̥] 'aim' [t̥ʔ̥a:ɾc̥ʔ̥] 'leaving'  
 [b̥a:ɾʔ̥] 'leaf' [b̥a:ɾɣ̥] 'electricity' [ɣ̥a:t̥ʔ̥] 'cut'  
 [s̥o:ɾb̥] 'lead' [p̥ʔ̥o:ʔ̥:t̥ʔ̥] 'back' [ɾo:ʔ̥:d̥] 'growth' [p̥ʔ̥o:t̥ʔ̥c̥ʔ̥] 'hammer'  
 [go:ɾʔ̥] 'wolf' [ʔ̥o:uɣ̥] 'eagerness' [ɾo:b̥ʔ̥] 'quarter'

And in word non-final complex endings they are:

h/y  
 -(c)c [-t̥ c̥ ʔ̥]  
 h/w  
 -(c)c [t̥ c̥ ʔ̥]  
 h/y  
 -(c)c [b̥ d̥ ʔ̥ ɣ̥]  
 h/w  
 -(c)c [b̥ d̥ ʔ̥ ɣ̥]



by h and in word non-final complex endings by h features, thus:

h/y                      h/w                      h/y                      h/w  
 -(c)c                      -(c)c                      -(c)c                      -(c)c  
                                  [d<sub>3</sub>]                      [d<sub>3</sub>]                      [d<sub>3</sub>]                      [d<sub>3</sub>]

Exx.

[xɑ:rd<sub>3</sub>] 'expense'                      [bo:rd<sub>3</sub>] 'tower'  
 [xɑ:rd<sub>3</sub>da.r] 'expensive'

#### 3.4.54. Laterality

Laterality is found, at the second place of complex endings, in combination with denti-alveolarity together with friction to constitute the denti-alveolar fricative lateral.

In word final complex endings it is associated with h, and in word non-final ones with h features, thus:

h/y                      h/w                      h/y                      h/w  
 -(c)c                      -(c)c                      -(c)c                      -(c)c  
                                  [ɬ]                      [ɬ]                      [ɬ]                      [ɬ]

Exx.

[ɣɑ:tɬ] 'murder'                      [bo:ɬ] 'envy'  
 [ʔɑ:dɬ] 'justice'                      [ɣɑ:tɬɣɑ.h ~ ɣɑ:tɬlɛɣɑ.h] 'murder place'

#### 3.4.55. Roll

The feature roll at the second place in complex endings is found in combination with alveolarity together with friction to constitute the alveolar fricative roll. This contoid has the same relation to h/h features as the lateral contoid above, thus:

h/y                      h/w                      h/y                      h/w  
 -(c)c                      -(c)c                      -(c)c                      -(c)c  
                                  [ɽ]                      [ɽ]                      [ɽ]                      [ɽ]

Roll does not appear in combination with glottality at this place.

Exx.

[me:ʰh̥] 'affection'	[Go:tʰu̯] 'thickness'
[sa:b̥i] 'patience'	[dʒo:u̯] 'cruelty'
[ʔa:tʰɛ̯] 'perfume'	
[me:ʰh̥b̥ä:n̥ ~ me:ʰh̥r̥äb̥ä:n̥] <sup>1</sup>	'Kind, affectionate'

3.4.56. Friction

The feature above is found in combination with the following segmental features at the second place in complex endings:

- 1) labio-dentality, 2) alveolarity, 3) pre-palatality,
- 4) palatality, 5) uvularity, 5) pre-glottality.

In word non-final complex endings the resulting pre-glottal and uvular contoids are always marked by h, the post-palatal contoid is always marked by h and the remaining contoids by h and h equally. The post-palatal contoid is not found in w-syllables. Thus in word final complex endings they are:

h/y  
-(c)c  
[f̥ v̥ s̥ z̥ j̥ ʧ̥ x̥ h̥]

h/w  
-(c)c  
[f̥ v̥ s̥ z̥ j̥ x̥ h̥]

and in word non-final complex endings they are:

h/y  
-(c)c  
[f̥ s̥ j̥ x̥ h̥]

h/w  
-(c)c  
[f̥ s̥ j̥ x̥ h̥]

h/y  
-(c)c  
[v̥ z̥ j̥]

h/w  
-(c)c  
[v̥ z̥]

Exx.

[ha:ʰr̥f̥] 'speech'	[sa:ʰn̥v̥] 'pinetree'	[ʔa:c̥ɛ̯s̥] 'picture'
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1. See 4.2.4. for the description of the extra [ä] in this variation.

[ʔa:dz̥z̥] 'failure' [raʔʔç] 'vote' [so:ɸh] 'morning'  
 [sa:rv̥ga.d̥] 'tall' [so:ɸhga.h̥ ~ so.ɸh̥ga.h̥]<sup>1</sup> 'morning time'  
 [pʰo:rs̥] 'question' [go:rs̥] 'mace' [ʔo:rs̥] 'acquaintance'

No frictionless contoid is found at the second place of complex endings.

Table IX below presents the contoids at this place in relation to h/h̥ and y/w features.

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1: For the description of the extra [ě] in this variation see 4.2.4.

TABLE IX

CONTONDS AT THE SECOND PLACE OF COMPLEX ENDINGS

THE CONTONDS MARKED BY THE FEATURES h IN THE LOWER ROWS OF THE SLOTS ARE FOUND ONLY IN WORD NON-FINAL COMPLEX ENDINGS

	Bilabiality		labio-dentality		denti-alveolarity		alveolarity		palato-alveolarity		palatality		velarity		uvularity		pre-glottality		glottality		
	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	
Plosiveness	h																				
	<u>h</u>																				
Nasality	h																				
	<u>h</u>																				
Affrication	h																				
	<u>h</u>																				
Laterality	h																				
	<u>h</u>																				
Roll	h																				
	<u>h</u>																				
Friction	h																				
	<u>h</u>																				

## CHAPTER 4

### PHONETIC RELATIONS BETWEEN THE SYLLABLES

In this chapter the phonetic features that mark the relation between the syllables within a nominal word and nominal piece are described.<sup>1</sup> But before this, some rules for syllable division are given below:

#### 4.1. Syllable Division

Unlike segmental phonetics, articulatory feature analysis provides, in most cases, adequate criteria for establishing the boundaries of the syllables, and for dividing a continuum into successions of syllables. This is due to the fact that articulatory feature analysis does not attempt to describe all the features observed in the data in terms of segments. Instead it describes the features independently from the segments if they are not easily assignable to one segment more than another. Such features mark a number of segments into a larger unit, namely a syllable.

Once the syllable is thus defined, and its types, parts and the possible number of segments which a single syllable can have, are accounted for (as in 1.5., 1.6. and 1.7. above), then, syllable division can easily be worked out on the basis of the syllable types, parts and the syllable features as follows:

##### 4.1.1. Syllable Types and Syllable Parts

The syllable types observed in Persian are: cv, cvv, cvc, cvvc and cvcc. Any syllable type has at least

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1. For the definition of word and piece see 8.1. and 9.1.

two parts: onset, which always constitutes one place occupied by a contoid; and the syllabic part, which also always constitutes one place occupied by a vocoid. The syllable type cv has the onset and syllabic part only. Other syllable types have a further part, namely, the ending, which may be simple and occupied either by a non-syllabic vocoid (as in cvv) or a contoid (as in cvc). Or the ending may be complex comprising a -vc (as in cvvc) or a -cc (as in cvcc) (for the details see 1.6. and 1.7.).

On the basis of these observations the following rules are given for syllable division, the division is marked by - placed between two syllables:

i) A sequence of two vocoids is considered as belonging to one syllable i.e. they are parts of one syllable, e.g. [n̥.iz̥ã] 'flute players': cvvcvc → cvv-cvc

ii) When there is one contoid between two vocoids, the division falls before the contoid because all Persian syllables have onsets but may or may not have endings, e.g. [s̥ãc̥ãñ̥] 'inhabitant': cvcvcv → cv-cv-cv

iii) When there are two contoids between two vocoids the division falls between the contoids because the onset always constitutes one place and a complex onset is not found, e.g. [sa.r̥b̥ a.z̥] 'soldier' cvccvc → cvc-cvc

iv) When there are three contoids between two vocoids the division falls between the second and third contoids because the endings may be complex but the onsets are always simple, e.g. [b̥o:r̥db̥ a.r̥] 'patient': cvccvc → cvcc-cvc

#### 4.1.2. Syllable Length

As described in 2.2., syllables have different lengths according to their types, thus:

cv : short  
 cvv, cvc : intermediate  
 cvvc, cvcc : long

Therefore, syllable length serves as a criterion for syllable division. Consider the example:

[ʔo.rdibēheʃ:t<sup>ε</sup>ma.hda.rʃira.zbūda.m<sub>2</sub>xe.ilī xoʃ-gōzaʃ:t<sup>ε</sup>]

'I was in Shiraz in the month of Ordibehesht, I enjoyed my stay there'. In this example [o.] has intermediate length, therefore, the first syllable is of cvc type; [i] and [ě] are short therefore the second and third syllables are of cv type; [e] is longer than the preceding [ě] and is followed by a voiceless fricative which has the feature long, therefore the fourth syllable is of cvcc type; the following [a.] and [a.] are intermediate. Thus the fifth and sixth syllables are of cvc type; the following [i] is short, the seventh syllable is therefore of cv type; the [a.] following is intermediate, thus the eighth syllable is of cvc and so on. Thus the divisions in the example above should be made as follows:

[ʔo.r-di-bě-heʃ:t<sup>ε</sup>-ma.h-da.r-ʃi-ra.z-bū-da.m<sub>2</sub>-xe.i-li-xoʃ.-gō-zaʃ:t<sup>ε</sup>]

#### 4.1.3. y and w Features

The above features are also useful in syllable demarcation, but only in a restricted way. That is, when a sequence of two or more syllables are all marked by either y (e.g.: [săc<sup>ε</sup> ānē] 'inhabitants') or w (e.g. [bōzo:rʃ]) 'big'), the feature cannot be used for syllable division. But when the adjacent syllables in a sequence differ from each other in their y and w features, then the features may

be used as criteria for syllable division, because the modifications of the segments by each of the features indicate to which syllable each segment belongs. Consider the two examples below:

[p<sup>u</sup>a.kk<sup>u</sup>õ.n] 'clean (it)' [nã.zdi.ck<sup>u</sup>õ.n] 'bring (it) near'

In the first example both syllables [p<sup>u</sup> a.k-] and [-k<sup>u</sup> õ.n] are marked by w-features and it is difficult, on the basis of y/w features, to say where the syllable cut should be made. Therefore, other criteria should be used in this particular case. But in the second example the syllables [nã.zdi.c-] are marked by y-features and the last syllable [-k<sup>u</sup> õ.n] has w-features. Accordingly the plosive contoid in the ending of [-di.c-] is advanced [c] as the syllable is a y-syllable, and the plosive contoid in the onset of [k<sup>u</sup> õ.n] is retracted as the syllable is w-syllable. Therefore it is possible to say that a syllable cut falls between [c] and [k<sup>u</sup>] in the second example as they are marked by different syllable features, thus:

$${}^y\text{cvccvc}\overset{w}{\text{cvc}} \longrightarrow {}^y\text{cvccvc}-\overset{w}{\text{cvc}}$$

(See 10.2.2. for experimental findings.)

#### 4.1.4. h and h Features

Only in word final endings, h features may serve as a criterion for syllabic division since most contoids which elsewhere may have h-features are marked by h at this place. For example in [sa:rd] 'cold', the ending [-rd] has h-features, but the ending [-rd] in [sa:rdsi.r] 'occidental', has h-features, and it may even be separated by a syllabic element thus becoming [sa.r-dě-sir].<sup>1</sup> The presence of

1. See 4.2.4. for the description of the syllabic element [ě].

h-features in the former example marks the boundaries of the word and to that extent is useful in syllable demarcation (See 10.4.2. for experimental findings).

#### 4.1.5. Syllable Division and Morpheme Division

Syllable division does not always correspond with morphemic division although in some cases, both divisions may have some correspondence. For example in the nominal piece [c'ět'ábět'ǔ ...]<sup>1</sup> 'your book (obj.)', which appears in the sentence: [c'ět'ábět'ǔ v̄va.rda.m] 'I brought your book', syllabic division cuts across morphemic divisions and they have no correlations, thus:

Syllabic division:

[c'ě-tá-bě-t'ǔo...]

Morphemic division:

{c'ět'ǔa.b} {t'e.t'} {vǎ}<sup>2</sup>

But in the nominal piece: [da.r̄sa.r̄ba.zxǎnē] 'in the army camp' as appears in the sentence: [da.r̄sa.r̄ba.zxǎnē, p̄ḥda.m] 'I was in the army camp', syllabic division correlates with morphemic division, thus:

Syllabic division:

[da.r̄ - sa.r̄ - ba.z - xǎ-nē.]

Morphemic division:

{da.r̄} {sa.r̄} {ba.z} {xǎnē}

#### 4.2. Phonetic Relations Between the Syllables within a Word

Syllables are related together into a nominal word by various phonetic features as follows:

- 
1. See 9.1. for the definition of nominal piece.
  2. See 4.2.3. and 4.3.2. for the descriptions of the extra elements in the morphemic division.

#### 4.2.1. Prominence

Syllables are marked by different degrees of prominence<sup>1</sup> in accordance with their position within a nominal word. For example, in the nominal word:

[p<sup>u</sup>Δ-gǔ-heʃ.-ʒɛ-ri] 'being a researcher', the first syllable: [p<sup>u</sup>Δ-] is marked by secondary prominence for nominal word initial position, the last syllable: [-ri] is marked by primary prominence for nominal word final position, and the remaining syllables are marked by tertiary prominence for nominal word medial positions.

Prominence is not a syllable feature in the sense that, for instance, length is because the latter is associated with the types of syllable, and does not vary with the position the syllable may have in a noun or piece but the former changes in accordance with its position in the word. For example, the syllable [-heʃ.] in the example above is marked by tertiary prominence for noun medial position, but it is marked by primary prominence in the word: [p<sup>u</sup>Δ-gǔ-heʃ.] 'research', because it occupies the final position in a word.

Prominence marks the relation of syllables to the word. (See 4.4. for the description of prominence.)

#### 4.2.2. Syllabification

The term 'syllabification' is used as a phonetic term throughout this thesis, and it refers to the following factors:

- 1) The contoid occupying the onset of a syllable

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1. See 4.4. for a description of prominence.

disappears when it follows another syllable having an ending.

2) The contoid or non-syllabic vocoid originally constituting the ending of the preceding syllable occupies the onset of the syllable following.

3) The contoid thus separated from the preceding syllable is modified (if necessary) to harmonize with the features of the following syllable.

4) The preceding syllable too, modifies its syllable features in order that they suit the new type of syllable to which it now belongs. (See 10.3.3. for experimental findings.) Consider the following example:

[ba:r<sub>̄</sub>ɹ̄] 'leaf' + [h̄ä] 'plural suffix' → [ba.r̄-ḡä] 'leaves'.

In this example:

1) The contoid [h̄-] occupying the onset of the second syllable in isolation disappears when preceded by the first syllable, which has an ending: [-r̄ɹ̄].

2) The plosive contoid which was a constituent of the ending [-r̄ɹ̄] now constitutes the onset of the second syllable in place of [h̄] i.e. [ḡä].

3) The plosive contoid which was originally marked by the features y and h as a part of the ending of a y-syllable, is now marked by the features w and h as the onset of a w-syllable.

4) The syllable [ba:r̄ɹ̄] which is marked by the feature long and the features h at the ending is modified into [ba.r̄] which is marked by the feature intermediate length and the features h at the ending as it is no longer a word final syllable (see 3.4.5.).

Further examples:

[mä.n] 'I' + [ʔa.z] 'from' + [ʔä.n] 'that' + [dzä] 'place' + [ʔämädäm]  
 'I came' → [mä-nä-zä-n-dzä-ä-mä-däm] 'I came from there'

Syllabification as explained above marks the relation between the syllables at the following places in a nominal word (c = contoids, ʔ = glottal stop).

#### 4.2.21. c-ending prefixes + ʔ-beginning stems<sup>1</sup>

Exx.

[ba.r] 'prefix' + [ʔa-ya:rd] 'steme' → [bä-rä-ya:rd] 'estimate'  
 [da.r] " + [ʔä-ma.d] " → [dä-rä-ma.d] 'income'

#### 4.2.22. c-ending stems + ʔ-beginning suffixes:<sup>1</sup>

Exx.

[kʰo.f] 'stem' + [ʔa.n-dě] 'suffix' → [kʰö-ʔä.n-dě] 'fatal'  
 [bo-r] " + [ʔe.f] " → [bö-re.f] 'cut'

The relation between c-ending stems and [hǎ]  
 'plural suffix' is also marked by the feature syllabification, e.g. [ma:rd] + [hǎ] → [mä-r-dǎ] 'men'.

#### 4.2.23. c-ending components + ʔ-beginning components in compounds

Exx.

[ʒo.l] 'flower' + [ʔa.b] 'water' → [gö-lä.b] 'rose water'  
 [za.r] 'gold' + [ʔaf.ʔä.n] 'scatter' → [zä-raf.ʔä.n] 'gilded'

#### 4.2.3. Contoidal Links within Words

The term above refers to the following factors:

The suffixes which in isolation (as in dictionary entry and in grammar books), begin with [ʔ], lose their onset glottal stop and express their relations to V-ending

1. See footnote (1) in 8.4. for the definitions of prefix and stem and suffixes.

stems with other contoidal elements. The contoidal elements most commonly observed are:

1) [j] e.g.

[dʒũ]+[ʔã.ɲd̥e.] → [dʒũ-jã.ɲd̥e.] 'seeker'

[gũ]+[ʔej.] → [gũ-jej.] 'dialect'

2) [ʃ], e.g.

[pã.ɲd̥e.]+[ʔi] 'relative suffix' → [pã.ɲd̥e.ʃi] 'slavery'

[pʰox.tɕe.]+[ʔi] " " → [pʰox.tɕe.ʃi] 'maturity'

3) [g] e.g.

[bã.ɲd̥e.]+[ʔã.n] 'plural suffix' → [bã.ɲd̥e.gã.n] 'slaves'

4) [dʒ] e.g.

[sãv̥e.]+[ʔi] 'relative suffix' → [sãv̥e.ɟi] 'from Slaveh'

5) [v] in Arabic loans, e.g.

[mũsã]+[ʔi] → [mũsã.vi] 'related to Moses'

#### 4.2.4. Vocoidal Links within Words

The relation between the stems and suffixes may be expressed by an extra syllabic element which appears between the stem and the suffix if a) the suffix is a c-beginning one, and, b) the stem ends either in a complex ending, or in a simple ending preceded by an inherently long vocoid (see 8.4.23.III below) e.g.

[ʔa:rdʒ] 'value'+[nã:ɲd̥] 'suffix' → [ʔa:rdʒõnã.ɲd̥] 'valuable'

[pʰas.] 'watch'+[bã.n] → [pʰas̥ebã.n] 'police'

#### 4.2.5. Syllabic harmony

Two syllables in a word harmonize if a) the first is of cv-type and b) it contains an inherently short vowel, e.g.

[nĩʃi.n] 'precious stone' [sãkʰũ.n] 'standstill'

(For details see 3.3.14. above. See 10.4.3. for experimental findings.)

#### 4.2.6. Contoidal harmony within words

The contoids in the endings of syllables may harmonize with those at the onset of the syllables following them. The most common examples of such harmony are:

1) Nasal contoids followed by other contoids, e.g.

[mã.n] 'I'

[mã.m̥bãtõ] 'I and you'

[mã.nda.r̥...] 'I in.....'

[mã.n̥t̥.ɛ̃ã.ndru.z̥...] 'I (for) some days...'

[mã.n̥c̥ɛ̃] 'I who...'

2) [s] followed by [t] e.g.

[dãs̥:t̥] → [dãs̥.s̥õp̥čã] 'hand and foot'

[dãs̥.t̥ɛ̃] → [dãs̥.s̥ɛ̃] 'handle'

#### 4.3. Phonetic Relations Between the Syllables in a Piece<sup>1</sup>

The relations between syllables in a nominal piece are marked by the following phonetic features:

4.3.1. Syllabification, as described in 4.2.2., e.g.

[mã:r̥d̥] + [r̥ã] → [mã:r̥-d̥õ] 'the man' (object)

[k̥čã.r̥] + [ɛ̃] + [t̥čõ] → [k̥čã-r̥ɛ̃-t̥õ] 'your work'

4.3.2. Contoidal links, as described in 4.2.3., e.g.

[p̥čã] + [ɛ̃] 'ezafe' [mã.n̥] 'I' → [p̥čã-j̥ɛ̃.mã.n̥] 'my leg'

[b̥ãb̥ã] + [ɛ̃] 'definite particle' [b̥ãb̥ãɛ̃] 'the fellow'

4.3.3. Contoidal harmony as described in 4.2.6., e.g.

[dãs̥:t̥] + [r̥ã] → [dãs̥.g̥õ] 'the hand' (object')

Prominence, vocoidal links and syllable harmony mark the relations of syllables within words. They do not mark the relations of syllables at piece level.

1. See 9.1. for the definition of nominal piece.

#### 4.4. Prominence: Description

In listening to a continuum some syllables tend to stand out from the rest and catch attention more easily than others. Such syllables are here called Prominent. Prominence may be due to the presence in the syllable of one or more phonetic features. It is therefore a general term, it covers a number of factors;<sup>1</sup> and the more factors present in a syllable, the higher its degree of prominence. Prominence is, therefore, a relative term, whereas the factors underlying it are more of an absolute nature. Consider the word [ ,rɛ̃ʃɑ.ɔ̃ ] 'guidance'. In this word the second syllable: [- 'ʃɑ.ɔ̃ ] is relatively more prominent than the first one: [ ,rɛ̃- ]. Its relative prominence is due to the following factors:

- 1) It has intermediate length, whereas [ ,rɛ̃- ] is short.
- 2) It has a changing pitch (in citation a high fall) whereas [ ,rɛ̃- ] has a mid-level pitch.
- 3) [ ʃ ] is tense whereas [ r ] is lax, and [ ɑ. ] is louder than [ ɛ̃ ].
- 4) [- 'ʃɑ.ɔ̃ ] is pronounced with greater degree of breath force than [ ,rɛ̃- ].

All these factors contribute to the relatively greater prominence of the second syllable to the first.

In the following paragraphs the phonetic factors underlying prominence are described and illustrated with

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1. See in this connection, Gimson, 'An Introduction to the Pronunciation of English', 1966, pp. 23-6.

examples at word level. (See 4.2.1. above for choice of word instead of syllable. See also 4.2.1.; for experimental findings see 10.3.4.).

#### 4.4.1. A Change in the Pitch of Voice

A syllable within which the pitch of voice changes stands out as more prominent than others. The direction of the change is not important, the change itself is important. Therefore the change may be a fall from a higher to a lower level, a rise from a lower to a higher level, a fall followed by a rise or vice versa. In fact the direction of the changing pitch is largely determined by other factors such as intonation pattern, mood of the conversation, position of the syllable within the continuum, etc. In citation form the change is a fall from a higher level to a lower one. The changing pitch is symbolized by [ \ ] and is usually observed in the last syllable of a nominal word. If the word is monosyllabic, it can only have this pitch in isolation, e.g.

[g<sub>o</sub>.l] 'flower'      \      [g<sub>o</sub>l<sub>a</sub>.b] 'rosewater'      - \  
 [x<sub>o</sub>ð<sub>o</sub>j<sub>i</sub>] 'being a God'      - - \

#### 4.4.2. A difference in the levels of pitch

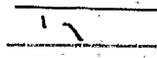
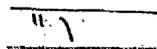
A syllable within which the pitch of voice does not change has level pitch. Two degrees of level pitch are distinguished: mid and low. And of two comparable syllables the one that has mid level pitch is more prominent. Consider the examples below (where, as in the rest of this section, mid level pitch is symbolized as [-] and low level pitch as [\_]):

[g<sub>o</sub>z<sub>a</sub>f:t<sub>ɛ</sub>] 'forgiveness'      - \  
 [b<sub>ə</sub>g<sub>o</sub>z<sub>a</sub>f:t<sub>ɛ</sub>] 'forgiving'      - - \

In the first example above the syllable [g<sup>o</sup>-] has mid-level pitch and in the second example the syllable [-g<sup>o</sup>-] has low-level pitch; the former is therefore more prominent than the latter.

#### 4.4.3. Stress

The term stress as used in this thesis refers to some degree of breath-force which may be accompanied by some degree of muscular tension and extra length in the syllable. Two syllables of comparable phonetic make up are different in their degrees of prominence when one is pronounced with greater degree of stress, e.g.

[p <sup>u</sup> a.c <sup>u</sup> ]	clean		
[p <sup>u</sup> a.c <sup>u</sup> ]	"		(with emphasis)

Both syllables are of the same phonetic type (i.e. cvc) and both have the same segmental and syllable features, but the second is pronounced with greater degree of breath force and is, therefore, more prominent than the first.

Four degrees of stress may be observed in Persian as follows:

#### 4.4.31. Emphatic Stress

Emphatic stress consists of extra breath force, extra tension in the articulatory organs during the production of the syllable as well as extra length imposed on the syllable. It also causes the pitch of the voice to rise to a higher scale, so that if the syllable has a falling pitch, the fall begins from a higher level and if it has a level pitch, it starts at a higher level.



#### 4.4.33. Secondary Stress

Secondary stress is associated with a lower degree of breath force, muscular tension and syllable length than that observed in the primary stress but it is higher than that found with tertiary stress. Secondary stress is symbolized by [,] placed under the syllable concerned.

Secondary stress generally co-occurs with mid-level pitch which marks the first syllable of polysyllabic words, e.g.

[p <sup>u</sup> o.r-k <sup>u</sup> o.r]	<table style="border-collapse: collapse;"> <tr><td style="border-top: 1px solid black; border-bottom: 1px solid black; width: 20px; height: 10px;"></td></tr> <tr><td style="border-top: 1px solid black; border-bottom: 1px solid black; width: 20px; height: 10px;"></td></tr> </table>		
[p <sup>u</sup> o.r-k <sup>u</sup> o.ri]	<table style="border-collapse: collapse;"> <tr><td style="border-top: 1px solid black; border-bottom: 1px solid black; width: 20px; height: 10px;"></td></tr> <tr><td style="border-top: 1px solid black; border-bottom: 1px solid black; width: 20px; height: 10px;"></td></tr> </table>		

#### 4.4.34. Tertiary Stress

Tertiary stress is associated with the lowest degree of breath force, muscular tension and syllable length, and generally co-occurs with low level pitch. Tertiary stress is left unmarked, e.g.

[p <sup>u</sup> o.r-k <sup>u</sup> o.ri]	<table style="border-collapse: collapse;"> <tr><td style="border-top: 1px solid black; border-bottom: 1px solid black; width: 20px; height: 10px;"></td></tr> <tr><td style="border-top: 1px solid black; border-bottom: 1px solid black; width: 20px; height: 10px;"></td></tr> </table>		

The second syllable in the example above has tertiary stress.

#### 4.4.4. Segmental Qualities

Segments differ from each other in their degree of prominence.<sup>1</sup> The presence of a segment with a high degree of prominence in a syllable also adds to the prominence of the syllable. For example compare the words

[re.z] 'vine'      [ra.z] 'secret'

the second word contains [a.] while the first one has [e.]. [a.] is more prominent than [e.] and the syllable that contains it also is more prominent.

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1. See D. Jones, 'An Outline of English Phonetics', 1964, p.24, paragraph 101.

#### 4.4.5. Segmental Quantities

Some segments are inherently longer than others. The presence of such segments in a syllable adds to the prominence of the syllable, e.g.

[tʃ<sup>ε̃</sup>ε̃.ɲd̥] 'several' [bã:ɲd̥] 'rope'

The segment [tʃ<sup>ε̃</sup>] is longer than [b-]. The monosyllabic word is, therefore, more prominent than the second.

#### 4.4.6. Long Contoid

Doubling of a contoid at syllable boundaries renders the preceding syllable more prominent than when the contoid is not doubled in the same nominal word. Thus of the two variants: [bã-rě] and [bã.r-rě] both meaning 'lamb', the second one is more prominent. Further examples:

[bãtʃ<sup>ε̃</sup>ε̃] 'child' is less prominent than [bã.tʃ<sup>ε̃</sup>tʃ<sup>ε̃</sup>ε̃]  
 [tʃ<sup>ε̃</sup>ε̃ cʃ<sup>ε̃</sup>ε̃] 'piece' " " " " [tʃ<sup>ε̃</sup>ε̃.cʃ<sup>ε̃</sup>ε̃]

#### 4.4.7. Degrees of Prominence

There are phonetically as many degrees of prominence among the syllables as trained ears can distinguish. It may be said that the degree of prominence of a syllable is determined by the type and/or the number of the relevant factors that are present in the syllable. In the word

[dʒã- lě - 'sã.tʃ<sup>ε̃</sup>]          'sessions'

the syllable [ -'sã.tʃ<sup>ε̃</sup> ] has a high degree of prominence because a large number of the relevant factors described above are observed in the syllable as follows:

- 1) [ -'sã.tʃ<sup>ε̃</sup> ] carries a changing pitch which renders it more prominent.
- 2) It also has primary stress, i.e. it is

pronounced with a high degree of breath force, muscular tension and has long duration.

- 3) The syllable is, furthermore, marked by the feature intermediate length which marks the cvc and cvv as opposed to short length of the preceding two syllables which are of the cv type.
- 4) The contour [ṣ] and the vocoid [a.] are inherently more prominent than most others because [ṣ] is qualitatively sonorous and [a.] is open, thus, also, sonorous.
- 5) [ṣ] and [a.] are also more prominent because they are inherently longer than the other segments in the word.

The syllable [ -ḷə- ] in the example above has, on the other hand, a low degree of prominence because the types of the relevant factors observed in it are those that render a syllable less prominent as follows:

- 1) [ -ḷə- ] has low level pitch which renders it less prominent.
- 2) It has also tertiary stress, i.e. it is pronounced with a low degree of breath force, muscular tension and has no extra duration.
- 3) The syllable is marked by the feature short which marks the type cv.
- 4) [ḷ] and [ə] are qualitatively less prominent than [ṣ] and [a.] in the syllable [ -ṣa.ṭ ]
- 5) [ḷ] and [ə] are quantitatively less prominent than [ṣ] and [a.].

Between these two degrees, several degrees of prominence can be established. But, for the purpose of the phonological analysis in part 2, it is convenient to distinguish four degrees of prominence and before describing the degrees, it is useful to restate that:

- i) Primary, secondary and tertiary stress co-occur with the changing pitch, mid- and low-level pitch respectively.
- ii) Emphatic stress co-occurs with the changing pitch in word final syllables and high level pitch in word non-final syllables.
- iii) Qualitative, quantitative prominence and the prominence resulting from the presence of a long contour are not tied to any one type of stress or pitch. They are irregular and may occur anywhere, therefore, they are of secondary importance in the study of prominence.

The four degrees of prominence referred to above are described below. The symbols used above for marking the stress are also used to mark prominence as they are simpler than the symbols for pitch, but this should by no means imply that the most important factor in prominence is stress.

#### 4.4.71. Primary Prominence

All degrees of prominence in which a changing pitch and a high degree of stress are observed within one syllable are grouped under the heading above. The last syllables of the examples below therefore, have primary prominence:

[se.ččě] 'coin'  
 [dǎ-rǎ-'ma.d] 'income'  
 [dǎ-něʃ.-'mā:nd] 'scientist'

#### 4.4.72. Secondary Prominence

All degrees of prominence in which a mid-level pitch and a secondary stress are found within one syllable are grouped under the heading above. The first syllables in the examples below have this prominence:

[dǎ-rǎ-'ma.d] 'income'  
 [gǒ-zǎ-rǎ.ŋ-dě-'gǎ.ŋ] 'passers by'

#### 4.4.73. Tertiary Prominence

All degrees of prominence in which a low-level pitch and tertiary stress are found in one syllable are grouped under this heading. The syllables which are left unmarked in the examples below have tertiary prominence:

[gǒ-zǎ-rǎ.ŋ-dě-'gǎ.ŋ] 'passers by'  
 [nĕ-vǎ-'ze.ʃ.] 'care and attention'

#### 4.4.74. Emphatic Prominence

All degrees of prominence in syllables with emphatic stress are grouped under the above heading. Emphatic prominence may be associated with changing pitch or with high level pitch. In the following examples it is accompanied by changing pitch:

[pʃi.ʃ.-nĕ-'ha.d] 'suggestion' (emphasized)  
 [gǒ-zǎ-'re.ʃ.] 'report' "

and in the examples below it is accompanied with high level pitch:

- [tʰox - mē - mo:rg] 'egg' contrasted with:  
 [tʰox - mö - mo:rg] 'egg and hem'  
 [ʔes - fā - hā.n] 'Isfahan' contrasted with:  
 [ʔes - pē - hā.n] 'Isfahan'

For the phonological statement of prominence and its functions see 8.6.

CHAPTER 5

GLOTTAL, PRE-GLOTTAL AND LONG CONTOIDS

5.1. 'Glottal stop'

The term 'glottal stop' is used for convenience to refer, in this chapter, to all the glottal contoids described in Chapter 3. Glottal stop is an interesting case in Persian phonetics and phonology. It is somewhat problematic too. For this reason it is given special attention here.

Linguists' views on the nature and role of glottal stop in Persian phonetics and phonology have been divergent and short of comprehensiveness.<sup>1</sup> Some linguists have included glottal stop in their phoneme inventories without giving an adequate description of the phonetic nature of the phoneme, others have excluded it without giving reasons;<sup>2</sup> others have given a correct phonetic description but have included it among the consonantal phonemes without showing its different function from that of other phonemes in the language.<sup>3</sup> In the following paragraphs the phonetic descriptions of the glottal contoids (here referred to as 'glottal

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1. See, for instance, Y. Samareh, 'The phonological structure of Syllable and Word in Tehran Persian', Ph.D. Thesis, University College London, 1968, especially pp. 34-40; and V.S. Rastorgueva, 'A Short Sketch of the Grammar of Persian', 1964, p.9.
  2. See, for instance, Jeris E. Strain, 'A Preliminary Report on Vowel Duration in Persian', IRAL, Vol.VII, 3, 1969. Jiri Kramsky, 'A Study of the Phonology of Modern Persian', 1939; and 'A Phonological Analysis of Persian Monosyllables', 1948.
  3. The only two linguists known to me who have looked more fully into the phonetic nature of glottal stop are: Charles T. Scott, 'Syllable Structure in Tehran Persian', 1964 and Carleton T. Hodge, 'Some Aspects of Persian Style', 1957.

stop' generally), are re-stated with more details; and some of the previous phonological treatments are very briefly examined. The phonological treatment suggested in this thesis is given in Part 2. (See, for instance, 7.4.11. and 8.4.11.)

### 5.1.1. Phonetic Description

It is useful to describe the phonetic nature of glottal stop in two styles in order to be able to compare the variations with each other. The styles chosen for this purpose are:

- 1) Less formal and more colloquial referred to as:

Style A.

- 2) More formal and less colloquial referred to as:

Style B.

In Style A what is generally referred to as glottal stop may phonetically be one of the following segments:

#### 5.1.11. Glottal Stop

This variation is symbolized as [ʔ]. In the formation of this variant the vocal-cords are brought tightly together in order to form a complete closure at the glottis. The closure is then released allowing the air-stream to pass through. Compared with other stops [ʔ] is very short.

- i) [ʔ] is observed at word initial syllable onset

e.g.: [ʔa:bʌ] 'cloud'    [ʔo:mɪ] 'age'

- ii) And at word medial onset when the preceding syllable has an ending, e.g.:

[ma:l-ʔʌ.n] 'cursed'    [ʔe.tʃ-ʔa.m] 'feeding'

- iii) [ʔ] is also found at the second place of complex endings, but in this case it is in free variation with glottal trills, especially in very commonly used words,

e.g.

[sa:m̩? ~ sa:m̩] 'candle' [Ga:tʃ? ~ Ga:tʃ̩] 'cut'

### 5.1.12. Glottal trill

This variation is symbolized as [ ~ ]. In the formation of this variant the upper part of the vocal-cords is brought closely together in order to form a narrowing at the upper part of the glottis. The air-stream passing through causes vibration at this place, the vibration is slower and may have a somewhat lower frequency than ordinary voicing, therefore it is referred to as trill.<sup>1</sup>

[ ~ ] is found at the following places:

i) At word non-initial onset when the preceding syllable does not have ending, e.g.

[m̩-i̩.n̩] 'supporter' [ʃ̩-ä-ü.r̩] 'intelligence'

ii) At simple endings, e.g.

[su̩] 'vice' [r̩.k̩.u̩] 'bowing' [ma̩-lu̩.m̩] 'known'

At this place the glottal trills may be very weak, or may not be produced, in the latter case the syllable feature of length distinguishes the syllable as being of cvc-type, e.g.

[su̩] 'vice' and not [sũ], the latter meaning 'direction'  
[ma̩-lu̩.m̩] 'known' and not [m̩-lu̩.m̩] the latter meaning 'blamed'

iii) At the first place of a complex ending, e.g.

[sa̩:d̩] 'fortune' [pa̩:d̩] 'after' [bo̩:d̩] 'distance'

At this place too [ ~ ] may be weakly pronounced, or may not be produced in very commonly used words, but they still have the feature of length as a cvce syllable type.

1. See Pike, 'Phonetics', 1966, pp. 125-8 for a full description of trills and their difference from voicing.

e.g.:

[<sub>3</sub>ba:d] 'after' and not [<sub>3</sub>ba.d] the latter meaning 'bad'

[<sub>3</sub>ra:d] 'thunder' " " [<sub>3</sub>ra.d] " " " 'passing'

iv) At the second place of complex ending where it is in free variation with [ʔ]. In very common words it may not be produced, but they have the feature of length as cvcc syllable type, e.g.:

[<sub>3</sub>mā:~n̄] 'prohibition' or [<sub>3</sub>mā:n̄ʔ] or [<sub>3</sub>mā:n̄] , but not

[<sub>3</sub>mā.n̄] which means 'I'.

### 5.1.13. Checked Glottal Trill

The glottal trill may be articulated in such a manner that as the articulation goes on the narrowing in the upper part of the glottis is increased until it ends in a complete glottal closure resulting in a glottal stop. This is symbolized by [ʔ̣] and is found as an alternative to [ʔ] at the following places:

(i) At simple endings, thus the examples in 5.1.1.ii) may also be pronounced as:

[<sub>3</sub>su.ʔ̣] , [<sub>3</sub>mā.ʔ̣-lu.m] etc.

(ii) At the first place of complex endings. The examples in 5.1.1.iii) may also be pronounced as:

[<sub>3</sub>ba:ʔ̣d] , [<sub>3</sub>sa:ʔ̣d] etc.

Thus in Style A, glottal stop may phonetically be:

[ ʔ̣      ʔ̣̣      ʔ̣̣̣ ]

In Style B what is here referred to as glottal stop is in fact phonetically a stop produced at the glottis at all places thus: at the syllable onset,

[<sub>3</sub>a:b̄] , [<sub>3</sub>ma.l̄-ʔ̣ū.n̄] , [<sub>3</sub>m̄ ʔ̣i.n̄]

at the simple ending:

[<sub>3</sub>su.ʔ̣] , [<sub>3</sub>mā.ʔ̣-lu.m] ,

at the first place of complex endings:

[<sub>3</sub>sa:ʔ̣d]      [<sub>3</sub>ba:ʔ̣d]

and at the second place of complex endings:

[<sub>3</sub>sa:m̄ʔ̣] , [<sub>3</sub>mā:~n̄ʔ̣]

(see 10.3.6. and 10.3.8. for instrumental findings.)

#### 5.1.14. Some characteristics of glottal stop at word and morpheme initial

Although both in Styles A and B glottal stop is, in fact, a phonetic stop: [ʔ] at word initial onset, it is left out when a c-ending word or affix is added to the word, and the c in the ending of the preceding word syllabifies with the v, e.g.:

[ʔa .b] 'water', preceded by [ba .r] 'preposition', or [go .l] 'noun 'flower' will be:

[bã-r a .b] 'on water', [gõ-l a .b] 'rose water'.

But glottal stop is not left out if the preceding word is not a c-ending one. Instead it is phonetically [~], e.g.:

[bi] + [ʔa .b] → [bi-ã a .b] 'waterless'.

(See 10.3.3. for some experimental findings.)

#### 5.1.2. Phonemic Treatments re-examined

In his article, 'Syllable Structure in Teheran Persian',<sup>1</sup> Charles T. Scott includes glottal stop as a consonant in his phoneme inventory for the language<sup>2</sup> in order to be able to reduce the seven syllable types set up by Gertrude E. Nye for Persian into four types, by including the types v, vc and vcc in cv, cvc and cvcc with the phoneme /ʔ/ at their initial places.

C.T. Scott is, in view of the writer, right to disagree with establishing syllables of v,vc and vcc structures for Persian since <sup>at the phonetic level,</sup> there is not even one example

1. See footnote 3 p 117.

2. So does Carleton T. Hodge in 'Some Aspects of Persian Style', 1957 and M. Shaki, 'The Problems of the Vowel Phonemes in the Persian Language', 1957.

available in the language for any of the structures above. In other words, any syllable in Persian begins with an onset. Even when the contoid in the onset is omitted, (as, e.g., in [go.l] + [ʔa.b] → [g<sup>o</sup>-l a.b], where [ʔ] is omitted in the resultant form), a new contoid appears in its place either through 'syllabification' (see 4.2.2.) or through what is called in this thesis 'contoidal links' (see 4.2.3.).

But it is questionable whether one can regard the contoid glottal stop at word initial syllable onsets as a phoneme, since it exhibits some characteristics which are not shared generally by any other phonemes in the language, namely it tends to disappear from the onset whenever another contoid is available to occupy the place, whereas no other phoneme shows this tendency. Consider the following examples, where, in phonemic terms, /ʔ/, /g/, /t/ and /x/ are compared at the onset place:

/ʔ a b/ water,    /t a b/ twist,    /x a b/ sleep,  
/ʔ a z/ greed,    /g a z/ gas.

On the basis of Scott's treatment of glottal stop, all the examples above are of cvc structure. And because they all have the same syllabic structure, they are expected to express their relations with the syllable preceding them in the same way. But this is not so. Instead, the forms beginning with /ʔ/ show their relations with the preceding syllable differently from other forms thus:

/p<sup>o</sup>r/cvc 'full' + /ʔ a b/cvc → /p<sup>o</sup>-r a b/: cv-cvc  
/p<sup>o</sup>r/cvc    "    + /ʔ a z/cvc → /p<sup>o</sup>-n a z/: cv-cvc

The relation between /p<sup>o</sup>r/ (cvc) and /ʔ a b/ (cvc) or /ʔ a z/

(also cvc) is expressed through syllabification after the loss of /ʔ/. This is not observed in the following cases:

/por/cvc 'full' + /x<sub>a</sub> b/ cvc → /por-x<sub>a</sub> b/ cvc-cvc

/por/cvc " + /t<sub>a</sub> b/cvc → /por-t<sub>a</sub> b/cvc-cvc

/por/cvc " + /g<sub>a</sub> z/cvc → /por-g<sub>a</sub> z/ cvc-cvc

It is therefore evident from the above examples that glottal stop does not function as a phoneme in the same terms as other segmental phonemes since, in compounding, it is left out and the resultant forms are of a different structure (i.e.: cv-cvc) from the resultant forms obtained from examples that do not have glottal stop (i.e. cvc-cvc), whereas if glottal stop were a phoneme like the rest, it would undoubtedly be retained in the resultant forms too.

The phonemic treatment of glottal stop falls short of accounting for the structural loss observed above (i.e. /cvc/ + /cvc/ → /cv-cvc/). Furthermore the treatment of glottal stop as a phoneme brings about another rather insurmountable problem. Consider the following cases (again presented in phonemic terms):

The words /ʔandɪʃ/ 'think', the suffixes /-ʔ<sup>h</sup>a t/ 'Arabic plural suffix', commonly used in Persian', and /-ʔ<sup>h</sup>a n/ 'plural suffix', are all presented in isolation with glottal stop, /ʔ/, at their onsets. But in combination with other words they all have other consonants at their onsets as follows:

1) /be/ + /ʔan-diʃ/ → /bi-jan-diʃ/ '(you) 'think'

2) /ruz-na-me/ 'newspaper' + /-ʔ<sup>h</sup>a t/ → /ruz-na-me-dʒa t/  
'newspapers'

3) /di-de/ 'eye' + /-ʔ<sup>h</sup>a n/ → /di-de-ga n/ 'eyes'.

In the examples above /ʔ/ is dropped, but /j/, /d͡ʒ/ and /g/ have appeared in their places in 1), 2) and 3) respectively. In this case, it is obviously not possible to suggest that the forms /j/, /d͡ʒ/ and /g/ are allophones of the phoneme /ʔ/, (i.e. to suggest: /ʔ/ = [ʔ ~ j ~ d͡ʒ ~ g]); and to say that they are cases of consonant alternation is to say the same thing in different words because by saying that /ʔ/ is alternated with /j/ etc., one has but said that /ʔ/ is /j/ etc. in such and such places.

For such reasons the problems of glottal stop in Persian can hardly be solved by regarding it as a phoneme.

Nor can it be solved by excluding it from among the phonemes, or totally from the phonological statement, as some linguists seem to have done,<sup>1</sup> because it seems obvious (especially by observing the application of glottal stop to new loans such as [nē-ōn] 'neon', [pō-rō-tō-ī.n] 'protein', etc.) that glottal stop does have certain structural functions which should be stated and included in the phonology of the language.

The prosodic description given in Part 2 of this thesis suggests the treatment of glottal stop as two structural entities differing from each other:

- 1) As a loan term in the consonantal phonematic systems (see for example 7.4.1.1).
- 2) As a junction prosody (see for example 8.4.1.1).

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1. See for instance V.S. Rastorgueva, 'A Short Sketch of the Grammar of Persian', 1965, p.6. Jiri Kramsky, 'A Study in the Phonology of Modern Persian', 1939, pp. 72-5, especially paragraph 25.

## 5.2. Pre-glottal contoid

The pre-glottal contoid is not, in fact, as problematic as the glottal contoids, consequently linguists have not generally found it difficult to arrive at more or less similar descriptions of this segment either at the phonetic level or at the phonological.

Nevertheless there are some points in relation to this contoid which need to be described, as follows:

The description of contoids in 4.3. includes the following varieties of pre-glottal fricative contoid: [h̥ h̄ h̄̄ h̄̄̄]. It may be added here that in rather informal and quick conversation the contoid may not be phonetically produced, or it may be so weak as to render it phonetically insignificant. This is mostly true in the case of words which are very commonly used in the language. But, except for a few cases which will be described below, there are two very important differences between the absence of the phonetic realization of the pre-glottal contoid (i.e. [h̥ h̄ h̄̄ h̄̄̄]), and that of the glottal contoids, and they are:

1) The disappearance of glottal stop leads to the appearance of either a contoidal link<sup>1</sup> (e.g. [b̄h̄] + [ʔ̄ a.ɾ̄] → [b̄i-y a.ɾ̄] 'bring'), or syllabification<sup>2</sup> (e.g.: [P̄<sup>4</sup> o.ɾ̄] + [ʔ̄ a.ɓ̄] → [P̄<sup>4</sup> ɔ̄ -ɾ̄ a.ɓ̄] 'watery'), and all the modifications required in the two syllables after syllabification.<sup>2</sup>

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1. See 4.2.3.,

2. See 4.2.2.

But the disappearance of the pre-glottal contoid does not lead to either the appearance of contoidal links or to syllabification, thus:

[d̥a.r̥] 'preposition' + [h̥e̥ - ʏ i - ʏ a.t̥] 'fact, truth' →  
[d̥a.r̥ - h̥e̥ - ʏ i - ʏ a.t̥] 'in fact'.

Even if we considered it possible that in quick style the resultant form were: [d̥a.r̥ - ẽ - ʏ i - ʏ a.t̥]<sup>1</sup>, no syllabification could be assumed because in that case the form would be: \*[d̥ă - r̥ẽ - ʏ i - ʏ a.t̥] with the [a.] changed into [ă] which does not happen and if it is pronounced thus, is unacceptable (see 10.3.3. for experimental findings). The following pairs support the description made above:

[fa.r̥ - h̥ã : ɲ̥] 'culture' or [fa.r̥ - ẽ : ɲ̥] but not [fă - r̥ã : ɲ̥]

which means 'France or Europe'.

[da.r̥ - ha.m̥] 'mixed' or [da.r̥ - a.m̥] but not [dă - ra.m̥]

which means 'Deram, name for some old coin'.

In all such cases although the pre-glottal contoid may not have phonetic realization, syllabification does not take place. Thus [h̥ h̥ h̥ h̥] are different from [ʔ ~ ʔ].

2) While the presence or absence of the glottal contoids is regular and predictable, that of the pre-glottal contoid is stylistic and irregular, e.g. the glottal contoid [ʔ] cannot be left out from: [m̥ãɲ̥] 'supporter' while it must be left out from the resultant form of: [p<sup>h</sup> o.r̥] + [ʔ a.b] → [p<sup>h</sup> ɔ̥ - r̥ a b]. But the pre-glottal contoid may be left out at any place if the speaker speaks fast enough,

1. Syllable division should fall after the contoid, for length reasons (see 4.1.2.) as in case of syllabification a regular reduction in syllable length is observed.

provided that syllabification and contoidal link are avoided, and provided that the lengths of the syllables are not changed, e.g.:

[mo.h̥.sē.n̥] or [mo.-sē.n̥] 'generous', but not [mó-sēn̥] which means 'aged'; [m̥e.h̥.ra.b̥] or [m̥e.-ra.b̥] 'pulpit', but not \* [m̥ě-ra.b̥] which is unacceptable.

Exceptions to the above description are observed with [-h̥ǎ] 'plural suffix', [-ʔǎ] 'definitive particle' and [-ʔǎ] 'persuasive'.<sup>1</sup> With [h̥ǎ] the preglottal fricative is either systematically kept (as in [p̥h̥ǎ] + [h̥ǎ] → [p̥h̥ǎ - h̥ǎ] 'legs') or omitted (as in: [s̥a.r̥] + [h̥ǎ] → [s̥ǎ-r̥ǎ]) and its omission is followed by syllabification as above.

With [-ʔe], [h̥] systematically appears as a contoidal link with the particle when the word preceding it is v-ending e.g. [n̥ǎ.m̥ě] 'letter' + [-ʔǎ] → [n̥ǎ.m̥ě-h̥ǎ] the letter. Similarly with [-ʔǎ] e.g.: [b̥ě.-r̥ǎ x̥ǎn̥ě - h̥ǎ] 'Beware! and go home'.

Only in such cases does the pre-glottal contoid resemble the glottal contoids and is, therefore, treated at the phonological level non-phonematically and as a prosody of junction (see 8.4.23.I. and 9.6.8.) while elsewhere the pre-glottal contoid is described phonematically.

### 5.3. Long Contoids

Long contoids in Persian have not, so far, been

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1. See 8.4.23.I., 9.6.8. and 9.6.9.

described,<sup>1</sup> except that in orthographical descriptions some remarks have been made, apparently in relation to the Arabic loans, about the use of the diacritic  $\text{ـ}$  'tashdid', and its implications.<sup>2</sup> Apart from this, no attempt has been made to see whether the nature and role of long contoids in words of Persian origin differ from those of long contoids in the Arabic loans.

Nevertheless the number of words of Persian origin which contain long contoids is sufficiently large and the roles of long contoids in such words are different enough from those of long contoids in the Arabic loans, to require separate description.

The following paragraphs contain a brief phonetic description of long contoids in native Persian words. No attempt is made here to describe long contoids in the Arabic loans, as to do this requires bringing in an extensive phonological and morphological description of the Arabic language.<sup>3</sup> (For some experimental findings see 10.2.3. and 10.3.5.).

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1. The only one comment found was by Charles A. Ferguson in 'Word Stress in Persian', p.127. He notes the double pp in 'beppa' 'watch out', but is at a loss as to how to account for it.
  2. See V.S. Rastorgueva: 'A Short Sketch of the Grammar of Persian', 1964, p.12; and A.K.S. Lambton, 'Persian Grammar', 1967, p.xxi.
  3. For a prosodic description of long contoids in an Arabic Dialect see: T.F. Mitchell, 'Long Consonants in Phonology and Phonetics' in 'Studies in Linguistic Analysis', Special Volume of the Philological Society, 1957, pp. 182-205.

### 5.3.1. Phonetic Features

The following features are generally observed in association with long contoids:

- i) Long duration of the contoids
- ii) Lack of release throughout the doubled contoids
- iii) Tenseness in the articulatory organs during the production of the contoids
- iv) Extra length associated with the vocoid preceding the long contoid
- v) Higher degree of prominence in the preceding syllable than that observed with comparable syllables without long contoids

e.g. [ʃe.t̪t̪̃] 'three instances of...'  
 [ʃe.v̪v̪o.m̪] 'third'  
 [d̪a.r̪r̪ẽ.] 'valley'  
 [x̪eʃ̪.ʃ̪ox̪eʃ̪.] 'making a 'khes̪h' noise'

Long contoids are generally observed in certain grammatical forms. References to these units at the phonetic level will provide the ground for the phonological statement given in 8.8.

### 5.3.2. Onomatopaeic words

Long contoids are observed at the junction of suffix or reduplicated form with onomatopaeic words ending in a contoid, e.g.

[x̪eʃ̪.] 'a 'khes̪h' noise' → [x̪eʃ̪.ʃ̪i d̪ar̪ r̪af̪:t̪ẽ] '(he) escaped making a khes̪h noise'  
 [z̪e.r̪] 'a 'zer' noise' → [z̪e.r̪r̪i x̪ā.ndi.d̪] '(He) laughed making a zer noise'  
 [x̪eʃ̪.ʃ̪ox̪eʃ̪. n̪āk̪õn̪] 'Don't keep making khes̪h noises'  
 [z̪e.r̪r̪ox̪e.r̪ x̪ā.ndi.d̪] 'He kept laughing and making zer noises'

### 5.3.3. Numerals and Numeratives,<sup>1</sup> and Ordinal Suffixes

Long contoids are also observed at the junction of vocoid ending numerals with numeratives or ordinal suffixes, e.g.:

[šě<sub>r</sub>] 'three' + [t<sup>u</sup>ä] → [se.tt<sup>u</sup>ä] 'three instances of...'

[dö] 'two' + [t<sup>u</sup>ä] → [do.tt<sup>u</sup>ä] 'two " " "

[t<sub>r</sub>ʃ<sup>h</sup>ěh<sub>l</sub>ö dö] 'forty two' + [t<sup>u</sup>ä] → [t<sub>r</sub>ʃ<sup>h</sup>ěh<sub>l</sub>ödo.tt<sup>u</sup>ä] '42 instances'  
(but not in:

[t<sub>r</sub>ʃ<sup>u</sup>a.r] 'four' + [t<sup>u</sup>ä] → [t<sub>r</sub>ʃ<sup>u</sup>a.r<sup>t</sup>uä] 'four instances...')

[šě<sub>r</sub>] + [zo.m] → [se.vyo.m] ~ [se.yyo.m] 'third'

[dö] + [zö-mi.n] → [do.vyömi.n] ~ [do.yyömi.n] 'second'

### 5.3.4. Lexical Items

Long contoids are also observed within the word, as opposed to those found at the junction of word with other units. Such words have generally other variants which do not have long contoids and they may be grouped into two classes referred to as Class A and B.

#### Class A:

This class includes words which have two variants, one with long contoids and the other without, e.g.:

[da.řřě, ~ däre.] 'valley'

[ʃe.lle, ~ ʃěle.] 'complaint'

[zo.mni.d ~ zömid] 'hope'

[ba.tʃtʃě ~ bā tʃě] 'child'

#### Class B:

This class includes words which have two forms,

1. For a definition of the term 'numerative', see Natalie Waterson, 'Numeratives in Uzbek' especially p.455.

one with long contoids and the other with sequences of different contoids, e.g.

- [<sub>h</sub>as̄.s̄ē ~ <sub>h</sub>as̄.t̄ē] 'nucleus'  
 [<sub>m</sub>a.t̄j̄t̄j̄<sup>fe</sup>.d̄ ~ <sub>m</sub>as̄.d̄zē.d̄] 'mosque'  
 [<sub>b</sub>a.t̄t̄<sup>fa</sup>.r̄ ~ <sub>b</sub>a.d̄t̄<sup>fa</sup>.r̄] 'worse'  
 [<sub>s</sub>a.t̄t̄<sup>u</sup> ~ <sub>s</sub>a.d̄t̄<sup>u</sup>] 'one hundred instances of...'

### 5.3.5. Prefix + verbal stems

Long contoids are also observed at the junction of the verbal prefixes [<sub>n</sub>ã] 'no' and [<sub>b</sub>ě] (subjunctive), with verbal stems. This is particularly common in the local dialect of Tehran, e.g.

- [<sub>b</sub>ě] + [<sub>p</sub>ū] → [<sub>b</sub>e.p̄p̄<sup>u</sup>] 'watch out!  
 [<sub>n</sub>ã] + [<sub>p</sub>ē<sup>re</sup>.r̄ē] → [<sub>n</sub>ã.p̄p̄<sup>re</sup>.r̄ē] here! here (lit. don't let it fly)  
 [<sub>b</sub>ě] + [<sub>z</sub>ã.n̄] → [<sub>b</sub>e.z̄z̄<sup>a</sup>.n̄ (b̄ĩr̄i.m̄)] 'hurry up' (~~lit.~~ 'let us go')

PART II  
PHONOLOGY

PART II  
PHONOLOGY  
CHAPTER 6  
SYLLABLE PROSODIES

In Part I the phonetic features observed in the data were described purely in articulatory phonetic terms. No reference was made to the function<sup>1</sup> of each feature, or each group of features, and the main purpose of the description was to obtain an understanding of the phonetic material present in the data. The criteria used for the description and for the classification of the features were purely phonetic. Some features were described as those of the syllable if they were found to extend over larger parts than a segment, or to appear independently from segments. Some other features were described in terms of segments because they were observed to appear within a place in the syllable and to constitute a component of the segment.

6.1. The Statement of Meaning at the Phonetic Level

In Part II the features are described in terms of their meanings or functions in the phonetic contexts where they are found. In other words, the phonetic nature of a feature does not primarily determine whether, at the phonological level, it should be treated as the feature of syllable as a whole, or as the feature of a segment.

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1. For the definition of 'function' as used here, see:  
J.R. Firth, 'The Technique of Semantics', 1935, page 20.

Rather it is the function of the feature that decides what relation it has to the syllable. Phonology is, therefore, the functional study of the phonetic material. In Firth's own words

"... I propose to split up meaning or function into a series of component functions. Each function will be defined as the use of some language form or element in relation to some context. Meaning, that is to say, is to be regarded as a complex of contextual relations, and phonetics, grammar, lexicography and semantics each handles its own components of the complex in its appropriate context." 1

On the basis of this principle it may be necessary to treat some phonetic syllable features as phonematic<sup>2</sup> elements if their functions so require, or to treat some segments as prosodic elements<sup>2</sup> in accordance with their functions. In other words, the phonological elements do not have a one-to-one correspondence with the phonetic units (i.e. with syllable, syllable features and syllable segments), although in most cases the phonetic syllable features correspond with the phonological prosodic elements, and the phonetic segments with the phonological phonematic elements. In Firth's words, therefore,

"At the Phonetic level of understanding phonetic substitution-counters will be studied in their relations to their phonetic contexts and within the phonetic structure or system." 3

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1. Ibid., page 19.

2. These terms will be defined presently, see 6.3.

3. Ibid., p.24; for the definition of 'phonetic substitution-counter' see p.20.

## 6.2. Structure and System

In the words of J.R. Firth, "Structure consists of elements in interior syntagmatic relation and these elements have their places in an order of mutual expectancy. The place and order of the categories set up are recognized in structure and find application in renewal of connection with the sources of the abstraction."<sup>1</sup>

System consists of commutable terms or units set up for a place in the structure. It states the paradigmatic relations of the elements and furnishes values for the terms.<sup>2</sup>

Structure is, in Professor R.H. Robins's words "stated as a syntagmatic entity comprising phonematic or segmental units and one or more prosodies belonging to the structure as a whole".<sup>3</sup>

In this thesis structures are stated in terms of syllable structure, word structure and piece structure (see 6.4.1., 8.3. and 9.6.1.-9.6.11.).

## 6.3. Prosodies and Phonematic Units

The two terms above are defined by Prof. R.H.

Robins as follows:

"Phonematic units refer to those features or aspects of the phonic material which are best regarded as referable to minimal segments, having serial order in relation to each other in structures. In the most general terms such units constitute

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1. 'A Synopsis of Linguistic Theory', 1930-55, p.200.
  2. Ibid., pp. 185 and 200.
  3. Aspects of Prosodic Analysis, 1957, p.4.

the consonant and vowel elements or C and V units of a phonological structure. Structures are not, however, completely stated in these terms; a great part, sometimes the greater part, of the phonic material is referable to prosodies, which are, by definition, of more than one segment in scope or domain of relevance, and may in fact belong to structures of any length, though in practice no prosodies have yet been stated as referring to structures longer than sentences. We may thus speak of syllable prosodies, prosodies of syllable groups, phrase or sentence-part prosodies, and sentence prosodies; and since grammatically defined elements may also be characterized by prosodic features we may have in addition word and morpheme prosodies."<sup>1</sup>

In this thesis the following prosodies are found necessary for the phonological statement of nominal pieces:

1. Syllable prosodies
2. Word prosodies
3. Prosodies of junction of word and piece.

#### 6.4. Syllable Prosodies

"A necessary part of the analysis is the setting up of structures in terms of the elements of structure consonant, vowel and prosodies."<sup>2</sup> "Syllabic structures are prosodic as such, and further prosodic features may be referred to them."<sup>3</sup> Thus one of <sup>the</sup> syllable prosodies to be accounted for is the syllable structure as follows:

- 
1. Ibid., pp. 3-4.
  2. N. Waterson, 'Some Aspects of the Phonology of the Nominal Forms of the Turkish Word', p.578.
  3. 'A Synopsis of Linguistic Theory', 1930-55, p.202.

### 6.4.1. Syllable Structure

In Part I (1.6.) the syllable was described as being of the following phonetic types: cv, cvv, cvc, cvvc and cvcc. At the phonological level some of the contoids at the onset are described on functional grounds in terms of the prosodies of word and bound form initial (see 8.2.), and the non-syllabic vocoids are treated functionally as consonantal elements (see 7.3.1.). As a result the phonological syllable structures do not have a one-to-one correspondence with the phonetic syllable types:

The syllable structures are as follows (capital C = consonantal, capital V = vowel elements):

V ?u<sup>1</sup> 'he',      VC ?ab 'water',      VCC ?abr 'cloud'  
 CV d<sub>3</sub>u<sup>1</sup> 'stream',      CVC xab 'sleep',      CVCC sabr 'patience'.

The structures above may be represented in generalized form as below:

(C)V(C(C))

In addition to the syllable structures above, a further structure is set up to cover loan words, namely CVCCC, e.g. t a j m z, CVCCC 'Thames'.

### 6.4.11. Syllable Parts

A phonological syllable consists of at least one phonematic element, namely a vowel, referred to as the syllabic part or vowel and symbolized as V, e.g. ?u 'he'.

The syllabic element may be preceded by another phonematic element namely a consonantal element referred to

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1. The element ? at the onset of this example and all other examples throughout the following pages is the prosody of word and bound forms initial and not a C-element; see 8.2.

as the onset part and symbolized by C-, e.g. d<sub>3</sub>u 'stream'  
syllable structure: CV.

The syllabic element may be followed by a consonantal element referred to as simple coda and symbolized as -C, e.g.: x ab 'sleep', CVC.

A syllable may also end in two consonantal elements referred to as complex coda and symbolized as -CC, e.g. ?abr, 'cloud' VCC.

A complex coda may, in loan words include three consonantal elements, e.g.. septa mbr: CVC-CVCCC: 'September'.

#### 6.4.2. Prosodies of Length

Three prosodies of length are set up and syllable structures are grouped into three classes in accordance with the particular length prosody. No symbol is used to represent the prosodies of length as the structures imply what prosody of length they have.

#### 6.4.21. Prosody of Shortness

Syllables with no coda are marked by this prosody. The structures V and CV are members of this class. The exponents of the prosody of shortness are:

- a) Short duration of the syllabic element e.g.:

V\* ?u 'he'

CV ku 'where'

CV-CV-CV d<sub>3</sub> a-la-se 'meeting', ba-h a-ne 'excuse'.

- b) When the syllable has a medial position in a nominal word or piece, the syllabic element may not be realized provided that it is not one of the inherently long vowels, e.g.:

CV-CV-CV d<sub>3</sub>a-la-se, or, d<sub>3</sub>al-se 'meeting'

CV-CV-CVC sa-re-ban, or sar-ban 'camel keeper'

" " " p a-de-~~sa~~ h, or, pa d-~~sa~~ h 'king'

CV-CV-CVC-CV-CVC-CV ha-le-tun-t<sub>f</sub> e-tow-re, or,

h al-tun-t<sub>f</sub> e-tow-re 'How are you?'

#### 6.4.22. Prosody of Intermediate Length

Syllables with simple coda are marked by this prosody. The structures VC and CVC are members of this class. The exponents of this prosody are:

- a) Long duration of the consonantal element in the coda if it is a voiceless fricative other than the pre-glottal one, and shorter duration of V. The coda is represented by F in this case, e.g.

CVF mes 'copper'

CVF(-CV) ko f -ti 'wrestling'

CVF(-CVC) pa s-ba n 'police'

- b) Intermediate length of V followed by a C other than those mentioned in a) above, e.g.

CVC d<sub>3</sub> ud 'generosity', kud 'fertilizer'

VC ?ud 'a musical instrument', ?a b 'water'

CVC-CVC sar-ba z 'soldier', mej-da n 'square'.

#### 6.4.23. Long Prosody

Syllables with complex coda are marked by this prosody. The structures VCC and CVCC are members of this class. The exponents of this prosody are:

- a) Long duration of the first consonantal element in the complex coda if the element is a voiceless fricative other than the pre-glottal one, together with short duration of V. The coda is represented by -FC in this case, e.g.

CVFC gaʃt 'walk', dast 'hand', rixt 'complexion'  
 VFC ?esm 'name', ?asb 'horse'.

- b) Long duration of V followed by a C other than those mentioned in a) above, e.g.:

CVCC gard 'dust', dard 'pain', rahm 'mercy'  
 VCC ?abɛ 'cloud', ?omr 'age'.

Thus on the basis of the prosodies of length syllable structures may be grouped into the following three classes:

Short:	V	CV
Intermediate:	VC	CVC
Long:	VCC	CVCC

(For experimental findings see 10.3.1.).

#### 6.4.3. W- and Y- Prosodies

A syllable may have either w or y prosody. Unlike the prosodies of length which are realized either in the syllabic part or, in particular cases in the coda (see 6.4.2. above), w and y prosodies run through the whole syllable marking the onset, syllabic part and coda as parts of one structure.

6.4.3.1. W-prosody has the following phonetic features as its exponents:

- i) Some degree of lip-protrusion and rounding throughout the syllable.
- ii) Back articulation of the V-elements.
- iii) Retracted articulation of the C-elements if they are from other categories than bilabial, labio-dental, pre-glottal and glottal.

In the presentation of the structures w-prosody is

marked by w placed before the structures. Once the structures are stated, the examples are not marked by the diacritics for the prosody except by the choice of symbols for back vowels, e.g.

<sup>w</sup>V ?u 'he',                      <sup>w</sup>VC ?ud 'a musical instrument',  
<sup>w</sup>VCC ?owd 'return',              <sup>w</sup>CV ɔ̄u 'stream',  
<sup>w</sup>CVC ɔ̄ow 'barley',              <sup>w</sup>CVCC suxt 'fuel'.

6.4.32. Y-prosody has the following features as its exponents:

- i) Some degree of lip-spreading and no lip protrusion throughout the syllable
- ii) Front articulation of the V elements
- iii) Advanced articulation of the consonantal elements if they are not from the categories bilabial, labio-dental, pre-glottal and glottal.

In the presentation of the structures y-prosody is marked by y placed before the structures. Once the structures are stated the examples are not marked for this prosody except by the choice of symbols for front vowels, e.g.:

<sup>y</sup>V (ne-ku-)?i 'goodness',      <sup>y</sup>VC ?in 'this',  
<sup>y</sup>VCC ?esm 'name',              <sup>y</sup>CV pi 'fat',  
<sup>y</sup>CVC din 'religion',              <sup>y</sup>CVCC xejr 'goodness'.

The statement above is generalized in the formula below:

<sup>w/y</sup>(C)V(C(C))

#### 6.4.4. h- and h-prosodies

The domains of relevance of these prosodies are onsets and/or codas. In this connection h/h prosodies are unlike y/w (see 6.4.3.) and similar to the length prosodies

(see 6.4.2.). Professor R.H. Robins<sup>1</sup> describes such different types of prosodies as follows:

"In the first case a feature may be spread or realized phonetically over a structure, such as syllable as a whole ..." p.4.

y/w prosodies are of this type, and

"In the second case may be mentioned features which are not realized phonetically over the whole or large part of a structure, but which nevertheless serve to delimit it, wholly or partly, from preceding and following structures, thus entering into syntagmatic relations with what goes before or after in the stream of speech." p.5.

h/h and prosodies of length are of this type (see 4.1.2. and 4.1.4.).

The exponents of h/h prosodies are to be found in the onset and/or coda as follows:

6.4.41. h-prosody has the following phonetic features as its exponents:

- i) Voicelessness during the articulation of the part of syllable which is marked by h
- ii) Tenseness in the organs of speech during the articulation of the part
- iii) Aspiration in cases when the part is occupied by a stop consonantal element.

6.4.42. h-prosody has the following phonetic features as its exponents:

- i) Voicing during the articulation of the part of syllable marked by h

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1. 'Aspects of Prosodic Analysis', 1957.

ii) Laxness in the organs of speech during the articulation of the part

iii) Lack of aspiration in the part of the syllable.

h-prosody in the simple and complex codas of word final syllables is phonetically indistinguishable from h-prosody.<sup>1</sup> Nevertheless the distinction should phonologically be maintained, since h/h prosodic distinction is maintained whenever the word is followed by other grammatical units (e.g. [ri.β̣] 'pebble', but [ri.β̣-zɑ.ṛ] 'pebbled place').

In the presentation of the structures h and h prosodies are marked by the same symbols placed before the onset and after the coda. Once the structures are given the examples are no longer marked with diacritics for the prosodies.

#### 6.4.43. h/h Structures

On the basis of h/h prosodies the syllable structures may be grouped in the following classes:

- i) h-onset and h-coda structure. This includes:  
 ${}^h\text{CVC}^h$  xɑk 'soil',  ${}^h\text{CVCC}^h$  pɒst 'back'
- ii) h-onset and h-coda structure. This includes:  
 ${}^h\text{CVC}^{\underline{h}}$  tab 'fever',  ${}^h\text{CVCC}^{\underline{h}}$  tard 'dismissal'
- iii) h-onset and h-coda structure. This includes:  
 ${}^{\underline{h}}\text{CVC}^h$  mes 'copper',  ${}^{\underline{h}}\text{CVCC}^h$  moʃt 'fist'
- iv) h-onset and h-coda structure. This includes:  
 ${}^{\underline{h}}\text{CVC}^{\underline{h}}$  zar 'gold',  ${}^{\underline{h}}\text{CVCC}^{\underline{h}}$  Geid 'chain'
- v) h-onset structure. This includes:  
 ${}^h\text{CV}$  pɑ 'foot'.

1. See 3.4.3., 3.4.4. and 3.4.5. above; see also, Jiri Kramsky, 'A study in the Phonology of Modern Persian', 1939, p.73, paragraphs 17-19.

vi) h-onset structure. This includes:

hCV d3u 'stream'.

vii) h-codā structure. This includes:

VC<sup>h</sup> ?os(-tαd) 'master', VCC<sup>h</sup> ?ist 'stop'

viii) h-codā structure. This includes:

VC<sup>h</sup> ?ur 'naked', VCC<sup>h</sup> ?αrd 'flour', ?ejd 'feast'.

h/h prosodies do not apply to V-syllable structure as it does not have onset and coda. The statement above may be generalized in the formula below:

h/hCV(C(C))h/h

#### 6.4.5. Non-prosodic Syllable Features

At the phonetic level of description in Part I the features nasality (N-feature see 2.5.) and glottality (?-features, see 2.6.) were described in terms of syllable features because of their phonetic nature of extending over larger parts of syllable than a segment.

At the phonological level, however, both N- and ?-features are syntagmatically insignificant and cannot be treated as prosodies. They are, therefore, treated as the exponents of terms in the phonematic units. The reasons for the non-prosodic treatment of these features are as follows:

1) N- and ?-features are not functional, that is, they do not contrast either with their absence, as h does with h, (i.e. there is no N/N correlation), or with another feature as y does with w. In fact in formal and careful styles of speech the words marked by N- or ?-features may be pronounced without the features nasality or glottality

spread over the syllable. For example [su.~] 'evil' may be pronounced as [su.ʔ] and [zã.ŋ] 'women' as [za.ŋ]. That is to say, the phonetic syllable types c<sup>N</sup>vc or c<sup>ʔ</sup>vc are in free variation with **cvc**.

2) When the nasal or glottal segments, which are generally observed in the codas of the phonetic N- and ʔ-syllables (see 2.5. and 2.6.) syllabify with the syllabic parts following them, the N- or ʔ-features disappear from the syllable. This indicates that these features are more related to the segments than to the syllables, whereas y/w features, for instance, do not disappear from the syllables after the syllabification of the final consonants.

Exx.

[zã.ŋ]	'woman'	+	[yã] <sup>1</sup>	'conjunctive particle'	→	[zã-ŋõ]	'woman and....'
[su.~]	'vice'	+	[yã]	"	→	[sũ-õ]	'vice and....'

It seems, therefore, justifiable to consider N- and ʔ-features as parts of the phonetic exponents of the terms which commute in the systems set up for the codas since they are controlled by such terms in the systems.

The non-prosodic treatment of N- and ʔ-features, is, perhaps, an instance of the major differences between Harris's componential analysis<sup>2</sup> and the prosodic analysis as described by J.R. Firth and other members of London School of Linguistics.<sup>3</sup> According to Harris's Method it seems

1. The element [y] in the examples above is a prosody of bound form initial and not a C element of the structure (see 9.6.11.).

2. 'Structural Linguistics', 1963, Chapters 6 and 10.

3. See references in footnote 3 in 0.4.

unavoidable that such features should be described as 'long components'; whereas, according to the principles of prosodic analysis they are not phonological prosodies as they do not have ~~syntagmatic~~ <sup>contrastive</sup> functions, however their phonetic reality as features of the syllable cannot be denied.

CHAPTER 7  
PHONEMATIC UNITS

7.1. Place, System, Sub-system, Term and Exponent

Phonematic units appear in places in the structure "in order of mutual expectancy" (see 6.2.). A syllable structure in Persian may consist of one to four places. The places are marked by capital C and V; e.g. CVCC means a syllable structure having four places, three occupied by C (consonantal elements) and one by V (vowel elements); the places are further classified into syllable parts as follows:

- 1) Onset (part), symbolized as: C-
- 2) Coda (part), symbolized as: -C (simple) and  
-CC (complex)
- 3) Syllabic (part), symbolized as: V

All the phonematic units that commute in one place in the structure constitute a system which furnishes values for the units and states the paradigmatic relations of the terms (see 6.2.).

For classificatory purposes each system may be divided into sub-systems each of which comprises a number of terms.

The term 'exponent' refers to the actual phonetic features allotted to the units in the systems and to the prosodies. "Renewal of connection with the language under description in experience requires that recognizable phonetic and possibly graphic shape shall be given to what have been termed the exponents of the phonological

categories."<sup>1</sup>

### 7.2. Poly-systemic Phonology

The value of a term in a system is its use in contradistinction from other terms in the system. Systems set up for different places in a structure (e.g. the C- systems set up for C- and -C in CVC structure) do not necessarily have the same number of terms. The terms in the systems, therefore, do not have the same values. Furthermore, the terms in the systems set up for comparable places in different structures (e.g. the terms in the V- systems set up for the structures CV and CVC) may also not have the same values because the system in one structure may have more terms than the system in the other, thus the values of the terms in each system differ from those of the terms in the other.

In order to account for the values of the terms, different systems are set up at different places in the structure and when necessary, different systems are given for comparable places in different structures. No attempt will be made to establish one overall system for all places, or to compare the systems or their terms with each other. This type of description is referred to as poly-systemic phonology.

### 7.3. Vowel Systems

In the phonetic part, two types of vocoid were distinguished, and described as: syllabic vocoids (3.3.1.)

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1. J.R. Firth, 'A Synopsis of Linguistic Analysis', 1930-55, p.184.

and non-syllabic vocoid (3.3.2.), the former always appearing in the syllabic part and the latter in the coda only. In this section each of the two types are described phonologically:

### 7.3.1. Non-Syllabic Vocoid = Consonantal Element

More than one phonological treatment has been suggested by different linguists for the non-syllabic vocoids [-i] and [-u]. Some linguists<sup>1</sup> have treated them as the components of the diphthongs: /ei/ and /ow/. Some other linguists<sup>2</sup> have described them as two separate phonemes namely /j/ and /w/. And finally some linguists<sup>3</sup> have suggested both ways without making definite conclusions.

No one appears to have considered the possibility of regarding [-u] as an allophonic variation of the phoneme /v/ in exactly the same way as [-i] has been regarded by some as an allophone of /j/ (see footnote 2 above); instead those linguists who have discarded the diphthong treatment (see footnote 2) have included both /v/ and /w/ in their phoneme inventory, whereas it is possible to suggest that the non-syllabic vocoid [-u] is an allophone of the phoneme /v/ thus reducing the number of phonemes in Persian by one, namely /w/ (see 3.3.2. for discussion).

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1. Including V.S. Rastorgueva, 'A Short Sketch of the Grammar of Persian', 1964, pp. 5-6. Jeris E. Strain, 'A Preliminary Report on Vowel Duration in Persian', IRAL, 1969, pp. 201-5.
  2. Including Charles T. Scott, 'Syllable Structure in Tehran Persian', Anthropological Linguistics, 1964, p.27. and Carleton T. Hodge, 'Some Aspects of Persian Style', Language, Vol.33, No.3, 1957, p.357.
  3. Including Dr P.N. Khanlari, 'Vazn-e She'r-e Farsi', Tehran University, 1959, pp. 99-102.

The treatment suggested in this thesis is that the non-syllabic vocoids may be regarded as consonantal elements on the basis of their functions in the structures. Consider the examples below:

[me.i] 'wine' + [vǎ] 'conjunctive particle' → [mǐ-yǎ] 'wine and...'  
 [dʒo.u] 'barley' + [ʔǎ] 'ezafe particle' → [dʒǎ-vǎ-ʂiyɑ.h] 'black barley'

In these examples the non-syllabic vocoids [-i] and [-u] have syllabified with the V following thus expressing their relations to the particles through syllabification which is a characteristic of the C-ending nominal words (see 4.2.2.). They are therefore, consonantal; and like other consonants they are modified (here into [y] and [ɥ]) after syllabification (see 4.2.2.).

Now compare the examples above with the following:

[ʂǎ] 'three' + [va] 'conjunctive particle' → [ʂǎ-wǎ] 'three and...'  
 [dʒú] 'stream' + [ʔǎ] 'ezafe particle' → [dʒú-jǎ] 'the stream of...'

In these examples the relation between the V-ending nominal words and the particles is expressed through contoidal links as is expected (see 4.2.3.) and the contoidal elements are [w] and [j]. Thus V-ending words express their relations to the particles differently from the words ending in non-syllabic vocoids. They are different structurally from the non-syllabic vocoids. Therefore the latter are best not regarded as the components of complex vowel elements (i.e. diphthongs).

Having thus described the non-syllabic vocoids as consonantal elements, [-i] may now be regarded as the realization of the term J (exponent = palatality) in the

sub-system L (exponent = liquid continuance) of the C-systems set up for the third places in the structures (i.e. -C and the first C in -CC). And [-u] may be regarded as the realization of the term  $f$  (exponent = labio-dentality) in the sub-system F (exponent = friction) of the systems set up for the third places in the structures (i.e. -C or the first place in -CC), (see 7.4.23.-24. and 7.4.33.-34.).

### 7.3.2. Vowel elements

The syllabic vocoids and syllabic segments (see 3.3.12.) were said to appear in the second place of the phonetic syllables (see 3.3.1.). In phonology, as a result of the prosodic treatment of glottal stop and certain other contoids at word and bound-form initial (see 8.2. and 9.6.8.-9.6.9.) it is possible to have phonological V-beginning syllables so that syllabic elements do appear at the first place of syllable structures, e.g. V, VC and VCC, as well as at the second place, e.g. CV, CVC and CVCC.

A number of the phonetic features observed at the syllabic part have already been assigned to prosodies viz. frontness, backness and degrees of length (see 6.4.2. and 6.4.3.), and a number of other features have been assigned to the consonantal terms functioning at the onset or coda, viz. nasality and glottality (see 6.4.5.). The remaining features that have not been treated prosodically are described phonematically. These features are:

- 1) Voicing,
- 2) Degrees of tongue height.

Voicing does not show functional variety which would affect the statement of vowel systems (V-systems). That is, there are no such correlations as voice, voicelessness, oral, nasal, etc. at the syllabic part according to which the V-elements would be sub-divided. Any variations in this feature are considered to be the exponents of other phonological elements (such as accent, intonation, prosodies of length, etc.) and do not have any bearing on the statement of the V-systems. Voicing is constant in all the V-elements, and is therefore, the exponent of the V in general while the degrees of tongue height are the exponents of the terms in the V-systems.

It is necessary to distinguish three degrees of openness in the tongue height as follows:

1. Close, symbolized in general structures as I
2. Mid " " " " " E
3. Open, " " " " " A

Close V (i.e. I) in y and w-syllables and open V (i.e. A) in w-syllables are inherently longer than mid V (i.e. E) in y and w-syllables and open V (i.e. A) in y-syllables which are inherently short (see 3.3.13. and 3.3.14.).

A further syllabic element,  $\varnothing$ , needs to be considered when dealing with harmony (8.7.) and certain types of junction (see, e.g., 8.4.23.III.), but  $\varnothing$  does not constitute a term in the V-systems as it does not commute with any other terms.

### 7.3.21. V-systems

Separate V-systems are set up for different syllable structures as follows:

### I. (C)V-Structure

The V-system operating in this structure consists of two terms: I and A, thus:

$$(C)V_{IA}$$

The exponent of I is close position of the tongue.

The exponent of A is open position of the tongue.

The term A functions in w-syllables only.

Openness in y-syllables is described prosodically (see 8.7. below). Examples of CI and CA are given in relation to y/w prosodies. It is not necessary to refer to the prosodies of length here as the structures imply what length prosody the syllable has.

Exx.

$$^y(C)V_I$$

$^yI(-CVC)$ , ?i-sa-r 'generosity',  $^yCI$ , pi 'fat'.

$$^w(C)V_{IA}$$

$^wI$  ?u 'he',  $^wCI$  d<sub>3</sub>-u 'stream'

$^wA-^wC_2-^wCI$  ?a-re-zu 'desire',  $^wCA-^wCI$  ba-zu 'arm'

(see also Harmony in 8.7. below).

### II. (C)VC-Structure

The V-system operating in this structure consists of three terms: I, E and A, thus:

$$(C)VC_{IEA}$$

The exponent of I is close tongue position.

The exponent of E is mid tongue position.

The exponent of A is open tongue position.

The examples of the terms are given in relation to y/w prosodies, the prosodies of length are implicit in the

structure.

Exx.

Y(C)VC<sub>IEA</sub>

<sup>Y</sup> CIC	tir 'arrow',	<sup>Y</sup> IC	No example found.
<sup>Y</sup> CEC	mes 'copper',	<sup>Y</sup> EC(-CVC)	?en-sa n 'human'
<sup>Y</sup> CAC	tar 'wet',	<sup>Y</sup> AC(-CVC)	?ad-va r 'periods'

W(C)VC<sub>IEA</sub>

<sup>W</sup> CIC	pur 'son',	<sup>W</sup> IC	?ud 'a musical instrument'
<sup>W</sup> CEC	por 'full',	<sup>W</sup> EC(-CVC)	?os-ta d 'master'
<sup>W</sup> CAC	pa r 'past',	<sup>W</sup> AC	?a r 'shame'

In

1)/CAH,  $\dot{y}/w$  prosodies are in free variation e.g.

CAH: jah : <sup>W</sup>CAH, or jah : <sup>Y</sup>CAH 'king'

CVCCAH: xarga h: CVC<sup>W</sup>CAH, or xargah CVC<sup>Y</sup>CAH 'Royal tent'

CAH: ma h <sup>W</sup>CAH, or mah <sup>Y</sup>CAH 'moon'

2) In <sup>W</sup>CVN, I and A are in free variation when N is D, e.g.

<sup>W</sup>CVD ~~gan~~ : <sup>W</sup>CAD, or, ~~gun~~ <sup>W</sup>CID 'soul'

<sup>W</sup>CVD nan : <sup>W</sup>CAD, or, nuna <sup>W</sup>CID 'bread'

Except when the term is in a loan word, e.g.:

<sup>W</sup>CAD xan 'Khan' (and not 'xun') Turkish

CVC<sup>W</sup>CID Ganun 'law' (and not \*Ganan) Arabic. (1)

III. (C)VCC-Structure

Two sub-structures are set up and different V-systems are given for each of them as follows:

A. (C)VFC Sub-structure

A V-system of three terms: I,E,A is set up for this sub-structure. The exponents of the terms are as

(1) - See 7-4.2 for C-system at simple coda.

those in (C)VC. F represents the fricative consonantal sub-systems (see 7.4.34.). Thus:

(C)VFC<sub>TEA</sub>

Exx.

Y(C)VFC<sub>TEA</sub>

Y<sub>CI</sub>FC zist 'existence', Y<sub>IF</sub>FC ?ist 'halt'

Y<sub>CE</sub>FC kef t 'sowing', Y<sub>EF</sub>FC ?esm 'name'

Y<sub>CA</sub>FC baxt 'fortune', Y<sub>AF</sub>FC ?ast 'afternoon'

W(C)VFC<sub>TEA</sub>

W<sub>CI</sub>FC pust 'skin', W<sub>IF</sub>FC no example found

W<sub>CE</sub>FC moj t 'first', W<sub>EF</sub>FC ?oxt 'getting used to sb.'

W<sub>CA</sub>FC baxt 'loss', W<sub>AF</sub>FC no example found.

### B. (C)VCC sub-structure

The second C in this sub-structure excludes the consonantal sub-system F. The V-system operating in the V place of this sub-structure comprises 2 terms, E and A, thus:

(C)VCC<sub>EA</sub>

The exponent of E is mid tongue position.

The exponent of A is open tongue position.

Exx.

Y(C)VCC<sub>EA</sub>

Y<sub>CE</sub>CC mehr 'kindness' Y<sub>EC</sub>CC ?ers 'heritage'

Y<sub>CA</sub>CC marz 'boundary' Y<sub>AC</sub>CC ?arz 'foreign exchange'

<sup>W</sup>(C)VCC<sub>EA</sub>

<sup>W</sup>CECC mohr 'seal'                      <sup>W</sup>ECC ?ozr 'excuse'

<sup>W</sup>CACC kard 'loan'                      <sup>W</sup>ACC ?ard 'flour'

Examples for <sup>W</sup>(C)ACC are extremely limited; in fact only two examples were found among the originally Persian words namely: 'kard' 'knife', and '?ard' 'flour'.

It is worth mentioning that although the V-systems in (C)VC structure and (C)VFC sub-structure have both the same number of terms, they cannot be brought together under one overall V-system because the terms in each system have different functions, thus while I in (C)VC may precede any consonantal element, I in (C)VFC can only precede a term from the F sub-system. Therefore although the number of terms in each V-system above are the same the values of the terms are not.

Similarly although the V-systems in CV and CVCC have the same number of terms, the values of the terms in one system differ from those of the terms in the other because the two terms in the V-system of CV are I and A, whereas those in the V-system of CVCC are E and A. Thus while A in CV is used in contradistinction from I, in CVCC it is used in contrast with E as shown above.

IV. Loan Words

As described above (7.3.21.III.B.) the sub-structure (C)VCC does not include the vowel element I. Therefore, any word of (C)ICC structure is a loan, e.g.

<sup>Y</sup>CICC : mink 'mink',                      <sup>W</sup>CICC : pudr 'powder'

<sup>Y</sup>CICC : silk 'silk'

$\text{V}^{\text{C}}\text{CICC}$  : litr 'litre'

### 7.3.3. The Syllabic Element $\text{ə}$

The syllabic element  $\text{ə}$  referred to above (7.3.2.) does not commute with the terms in any V-system. Instead it has the syntagmatic function of linking grammatical elements with each other (see 4.2.4.), e.g. (the syllabic elements representing  $\text{ə}$  are underlined):

{ $\text{?amuz}$ }	'teach'	+ { $\text{gar}$ }	→ [ $\text{?ámúzégar}$ ]	'teacher'
{ $\text{?as}$ }	'mill'	+ { $\text{mān}$ }	→ [ $\text{?ásémān}$ ]	'sky'
{ $\text{goft}$ }	'said'	+ { $\text{gu}$ }	→ [ $\text{goftógú}$ ]	'conversation'

As seen in the examples above,  $\text{ə}$  has several phonetic exponents, all conditioned by the phonetic contexts, within which it functions thus:

- 1) Before  $\text{J}$ ,  $\text{ə}$  is [i] e.g. [ $\text{?á siya.b}$ ] 'watermill',  
[ $\text{k'ámi} a.b}$ ] 'satisfied'.
- 2) After a fricative it is [ě] e.g. [ $\text{p'á sěbā.n}$ ] 'police',  
[ $\text{? áfet' a.b}$ ] 'sunshine'.
- 3) Elsewhere,  $\text{ə}$  is generally an [ǒ]-like vocoid if the preceding and following syllables have w-prosody, and an [ě]-like vocoid if they have y-prosody, e.g.

$\text{W}^{\text{C}}\text{CVCC} + \text{W}^{\text{C}}\text{CV}$  : [ $\text{goftógú}$ ] 'conversation'

$\text{W}^{\text{C}}\text{CVCC} + \text{W}^{\text{C}}\text{CVC}$  : [ $\text{roftórú}$ ] 'clearing up'

$\text{Y}^{\text{C}}\text{CVCC} + \text{Y}^{\text{C}}\text{CVC}$  : [ $\text{p'arzéfar}$ ] 'farmer'

$\text{Y}^{\text{C}}\text{CVCC} + \text{Y}^{\text{C}}\text{CVC}$  : [ $\text{šarděsir}$ ] 'occidental'

### 7.3.4. Summary

- 1) The non-syllabic contoids [-i] and [-u] are treated consonantly as the consonantal terms  $\text{J}$  and  $\text{f}$

respectively.

2) V (exponent: voicing) has three degrees of tongue positions: close (I), mid (E), and open (A).

3) Four V-systems are set up for different structures or sub-structures:

$y/w(C)V_{IA}$        $y/w(C)VC_{IEA}$        $y/w(C)VFC_{IEA}$        $y/w(C)VCC_{EA}$

4) The structure  $y/w(C)ICC$  is limited to loans.

5) Apart from the V-elements commuting as terms in V-systems, a syllabic element,  $\text{ə}$ , is considered whose function is syntagmatic and is not systemic, i.e. it does not hold paradigmatic relation with any V-elements.

#### 7.4. Consonantal Systems

Separate consonantal systems (C-systems) are set up for different C-places in the syllable structure, and if necessary, for different places in different structures. Each system consists of sub-systems within which terms are described with reference to  $y/w$  syllables and  $h/h$  onsets and codas as appears below. Throughout the description of the consonantal systems only the exponents of the terms being described are given in narrow phonetic transcription with diacritics; the remaining C and V elements are given in reading transcription as their detailed phonetic representation is not necessary for the specific description.

##### 7.4.1. Onset C-System

The C-system operating at syllable onset comprises four sub-systems symbolized as:

P, exponent: plosiveness

N, exponent: nasality at the onset and V-place

L, exponent: liquid continuance

F, exponent: friction.

The sub-systems operate in y and w prosodic structures viz.:

$$y/w \text{ } \underline{C} \text{ } \text{--} \text{ } \underline{P/N/L/F}$$

The sub-systems P and F function in h and h onsets with the exception of one term in P and two in F which function only in h or h onsets, thus:

$$h/h \text{ } \underline{C} \text{ } \text{--} \text{ } \underline{P/F}$$

But the sub-systems N and L function in h-onsets only, thus:

$$\underline{h} \text{ } \underline{C} \text{ } \text{--} \text{ } \underline{N/L}$$

#### 7.4.11. P (stop) sub-system

The sub-system P consists of five terms as follows:

- 1) B, exponent: bilabiality
- 2) D, exponent: denti-alveolarity
- 3) Ć, exponent: palato-alveolarity
- 4) K, exponent: palato-velarity
- 5) G, exponent: uvularity.

In addition to the terms above an extra term is set up for the sub-system P to account for the loan words, Arabic and others. The loan term is ? (exponent: glottality). ? does not function at word and bound form initial onsets and is limited to word medial onsets (e.g. mo-?in 'supporter', and mal-?un 'cursed'). Glottal contoids at word initial (e.g. [ʔa .b] 'water') and at bound form initial (e.g. [nǎ mǎ + [-ʔi] → [nǎ mǎ ʔi] 'a letter') are treated prosodically (see 8.2.).

The term G functions in h onsets<sup>1</sup> and the loan term ? in h onsets only. The remaining stop terms function in h and h onsets, thus:

$h_P$  B/D/Č/K/?                       $h_P$  B/D/Č/K/G.

Exx.

B:	$y_{BVC}$ : [p <sup>f</sup> il] 'elephant'	$h_{BVC}$	$y_{BVC}$ [bil] 'spade'
	$h_{BVC}$	$w_{BVC}$ : [p <sup>u</sup> ul] 'money'	$w_{BVC}$ [bur] 'blond'
D:	$y_{DVC}$ : [t <sup>f</sup> ir] 'arrow'	$h_{DVC}$	$y_{DVC}$ [dir] 'late'
	$h_{DVC}$	$w_{DVC}$ : [t <sup>u</sup> ur] 'net'	$w_{DVC}$ [dur] 'distant'
Č:	$y_{ČVC}$ : [t <sup>f</sup> in] 'curl'	$h_{ČVC}$	$y_{ČVC}$ [d <sub>3</sub> ir] 'plastic'
	$h_{ČVC}$	$w_{ČVC}$ : [t <sup>u</sup> un] 'like'	$w_{ČVC}$ [d <sub>3</sub> ur] 'type'
K:	$y_{KVC}$ : [c <sup>f</sup> ar] 'deaf'	$h_{KVC}$	$y_{KVC}$ [fir] 'hairpin'
	$h_{KVC}$	$w_{KVC}$ : [k <sup>u</sup> ar] 'work'	$w_{KVC}$ [gur] 'grave'
G:	$y_{GVC}$ : [gir] 'tar'		
	$h_{GVC}$	$w_{GVC}$ : [gar] 'cane'	
? (loan)	$y_{?VC}$ : [(mal) ?ab] 'plajthing'		
	$h_{?VC}$	$w_{?VC}$ : [(mal) ?un] 'cursed'	

Table 1 below represents a summary of the description of the stop consonantal sub-system at the onset:

1. In some southern dialects, such as Jahromi G functions only in h onsets. Such dialects make use of h/h correlation for the term X (exponent: uvularity) of the sub-system F (exponent: friction) (see 7.4.14.). Thus the statement of the term G in these dialects is:

G:  $y_{GVC}$ : [gir] 'tar'  
 $h_{GVC}$ :  $w_{GVC}$ : [g.om] 'name of a town'

See also footnote (1) in 7.4.14.

TABLE 1

STOP SUB-SYSTEM AT ONSET

Sub-System		P (Stop)											
Terms		B		D		Č		K		G		? (loan)	
		h	h̄										
Prosodies		h	h̄										
		y <sup>w</sup>	y	y <sup>w</sup>	y <sup>w</sup>								
Exponents		p <sup>c</sup>	p <sup>w</sup>	t <sup>c</sup>	t <sup>w</sup>	č <sup>c</sup>	č <sup>w</sup>	k <sup>c</sup>	k <sup>w</sup>	g <sup>c</sup>	g <sup>w</sup>	?	?
			p <sub>̄</sub>		t <sub>̄</sub>		č <sub>̄</sub>		k <sub>̄</sub>		g <sub>̄</sub>		?



### 7.4.13.1 (liquid) sub-system

The sub-system L consists of three terms as follows:

- 1) L, exponent: laterality
- 2) R, exponent: roll
- 3) J, exponent: palatality

Exx.

L:  $\underline{h}$ LVC     $^y$ LVC: [liz] 'slippery'  
                    $^w$ LVC: [lus] 'spoilt'  
 R:  $\underline{h}$ RVC     $^y$ RVC: [riz] 'small'  
                    $^w$ RVC: [ruz] 'day'  
 J:  $\underline{h}$ JVC     $^y$ JVC: [jal] 'athlete'  
                    $^w$ JVC: [yal] 'mane'

The description of the liquid sub-system is represented in Table 3 below:

TABLE 3  
SUB-SYSTEM L AT THE ONSET

Sub-system		L (liquid)					
Terms	L		R		J		
Prosodies	$\underline{h}$		$\underline{h}$		$\underline{h}$		
	y	w	y	w	y	w	
Exponents	$\underline{l}$	$\underline{l}$	$\underline{r}$	$\underline{r}$	j	y	

7.4.14. F (fricative) sub-system

The sub-system F comprises five terms as follows:

- 1)  $f$  exponent: labio-dentality
- 2)  $s$ , exponent: alveolarity
- 3)  $\int$  exponent: pre-palatality
- 4)  $X$ , exponent: uvularity
- 5)  $H$ , exponent: pre-glottality.

The terms  $X^1$  and  $H$  function only in  $h$  onsets, the remaining fricatives function in  $h$  and  $\underline{h}$  onsets, thus:

$${}^h_F \underline{f} /s/ \int /X/H \quad {}^h_F \underline{f} /s/ \int$$

Exx.

$f$ :	${}^h_f VC$ :	${}^y_f VC$ :	$[f il]$	'elephant'	${}^h_f VC(C)$	${}^y_f VC$ :	$[verd]$	'prayer'
		${}^w_f VC$ :	$[fal]$	'fortune'		${}^w_f VC$ :	$[yam]$	'lean'
$s$ :	${}^h_s VC$	${}^y_s VC$ :	$[sir]$	'full'	${}^h_s VC$	${}^y_s VC$ :	$[zir]$	'beneath'
		${}^w_s VC$ :	$[sur]$	'party'		${}^w_s VC$ :	$[zur]$	'force'
$\int$ :	${}^h_{\int} VC$	${}^y_{\int} VC$ :	$[\int ir]$	'lion'	${}^h_{\int} VC(C)$	${}^y_{\int} VC$ :	$[zarf]$	'deep'
		${}^w_{\int} VC$ :	$[\int ur]$	'salty'		${}^w_{\int} VC$ :	$[zarf]$	'flattery'
$X$ :	${}^h_X VC$	${}^y_X VC$ :	$[xi f]$	'relative'				

1. In dialects where the term  $G$ , uvular stop, functions in  $h$  onsets only (see footnote 1. in 7.4.11.),  $X$  appears both in  $h/\underline{h}$  onsets, thus:

	${}^y_X VC$	$[yam]$	'sorrow'	${}^y_X VC$	$[xam]$	'bent'
${}^h_X VC$ :				${}^h_X VC$		
	${}^w_X VC$	$[yar]$	'cave'	${}^w_X VC$	$[xar]$	'thorn'

But in Standard Colloquial Persian this  $h/\underline{h}$  correlation has disappeared in the course of history and such forms as  $[yam]$  and  $[yar]$  above have become indistinguishable with those having the term  $G$  at their  $\underline{h}$  onsets and the forms  $[y]$  and  $[y]$  have become the realization of the term  $G$  at word non-initial onsets (see Table 1 in 7.4.11. and 3.4.26.).

X:  $h_{XVC}$   $w_{XVC}$ : [xɔf] 'pleasant'  
 H:  $h_{HVC}$   $y_{HVC}$ : [hiz] 'lecherous'  
 $w_{HVC}$ : [hur] 'angel'

The description of the fricative sub-system is represented in Table 4 below.

Table 4

SUB-SYSTEM F AT THE ONSET

Sub-system		F (fricative)															
Terms	f		s		ʃ		x				h						
Prosodies	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	
	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w	
Exponents	f	<u>f</u>	v	<u>v</u>	s	<u>s</u>	z	<u>z</u>	ʃ	<u>ʃ</u>	ʒ	<u>ʒ</u>	x	<u>x</u>	h	<u>h</u>	

The forms [v w] and [h̥ h̥] among the exponents are restricted to word non-initial onsets (see 3.4.26. and 3.4.27.).

7.4.2. Simple Coda C-system

Having described the onset C-system, no extra sub-system or term needs to be introduced for the coda C-system, i.e. the number and type of the sub-systems are the same both in the onset and coda C-systems. But there are some differences between the two systems which need to be described. They are as follows:

- 1) h/h contrast ceases to be significant in some

cases at word final coda<sup>1</sup> (simple or complex), and therefore is not functional, for example in the following words:

[ʃi.tʃ <sup>h</sup> ]	or alternatively	[ʃi.d <sup>h</sup> ]	'confused'
[xi.c <sup>h</sup> ]	"	[xi.ʃ <sup>h</sup> ]	'hide water vessel'
[hɛf.-dɛ <sup>h</sup> ]	"	[hɛ-v.-dɛ <sup>h</sup> ]	'seventeen'

All such examples may be regarded as having h or alternatively h coda. In other cases the distinction is phonologically functional but phonetically it is not always made. That is to say, although h/h correlation is not phonetically observed in word final coda, nevertheless, the distinction should phonologically be made because in syllabification or in word non-final codas the contrast is functional, e.g.:

[ru.z<sup>h</sup>] 'day' is phonetically hcvc<sup>h</sup>, but phonologically hCVC<sup>h</sup> since [-z<sup>h</sup>] is [z<sup>h</sup>] in [ru-z<sup>h</sup>-ʃ a<sup>h</sup>] 'day and night', and in [ru.z<sup>h</sup>-n ěmě] 'newspaper'. And [rus<sup>h</sup>.] 'Russia', is phonetically hcvc<sup>h</sup> and phonologically hCVC<sup>h</sup> because [-s<sup>h</sup>.] is [s<sup>h</sup>] in [ru-s<sup>h</sup>-...] 'Russia and ...', and in [rus<sup>h</sup>.-n ě-za.d<sup>h</sup>] 'of Russian race'.

2) Although the number of sub-systems and their terms in the coda C-system is the same as that of the sub-systems and terms in the onset C-system, there are several exponential differences between the terms in each system.

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1. See, in this connection, Jiri Kramsky, 'A Study in the Phonology of Modern Persian', Archiv. Orientalni Band XI, 1937, pp. 73-4, paragraphs 17-19, who says "At the end of a word (after a vowel) there takes place the neutralization of voice correlation of plosive and the spirants and h." and "The neutralization of voice correlation takes place in the group plosive or spirant." and "The neutralization of voice correlation of plosives takes place at the end of words in group nasal or liquid + voiced plosive."

For these reasons separate presentation of the coda C-system is given. The exponential differences are pointed out at the relevant places.

#### 7.4.21. P (Stop) Sub-system

Table 5 presents the terms in the P sub-system, and their phonetic forms in y/w and h/h structures. Two sets of phonetic forms are given for the terms in h codas, one a devoiced form as observed in word final, and the other a voiced one as observed in word non-final codas (see 3.4.31.).

TABLE 5  
STOP SUB SYSTEM AT THE SIMPLE CODA

Sub-system		P (stop)											
Terms	B				D				Č				
Prosodies	h		<u>h</u>		h		<u>h</u>		h		<u>h</u>		
	y	w	y	w	y	w	y	w	y	w	y	w	
Word final Exponents	p <sup>ɛ</sup>	p <sup>h</sup>	b <sub>o</sub>	b <sub>o</sub>	t <sup>ɛ</sup>	t <sup>h</sup>	d <sub>o</sub>	d <sub>o</sub>	t <sup>ɛ</sup>	t <sup>h</sup>	č <sub>o</sub>	č <sub>o</sub>	
			b <sub>o</sub>	b <sub>o</sub>			d <sub>o</sub>	d <sub>o</sub>			č <sub>o</sub>	č <sub>o</sub>	
Sub-system		P (stop)											
Terms	K				G				? (loan)				
Prosodies	h		<u>h</u>		h		<u>h</u>		h		<u>h</u>		
	y	w	y	w	y	w	y	w	y	w	y	w	
Word final exponents	c <sup>ɛ</sup>	c <sup>h</sup>	ɟ <sub>o</sub>	ɟ <sub>o</sub>			g <sub>o</sub>	g <sub>o</sub>	ɣ <sub>o</sub>	ɣ <sub>o</sub>			
			ɟ <sub>o</sub>	ɟ <sub>o</sub>			g <sub>o</sub>	g <sub>o</sub>	ɣ <sub>o</sub>	ɣ <sub>o</sub>			

Unlike the term B in the onset C-system, in simple coda B does not have the variant phonetic forms [ B<sub>o</sub> B<sub>o</sub> ],

G does not have [ʎ ɣ], and the loan term ? does not have [ʔ ʔ̥]. Instead it has the variants [ʔ̥ ʔ̥̄ ʔ̥̄̄]. In the onset C-system, on the other hand the terms do not have devoiced phonetic variants.

Exx.

B:	CVB <sup>h</sup>	ʎCVB: [tip <sup>ʎ</sup> ] an army division	CVB <sup>h</sup>	ʎCVB [tab] 'fever'
		<sup>w</sup> CVB: [tup <sup>ʎ</sup> ] 'ball'		<sup>w</sup> CVB [tab̥] 'curl'
D:	CVD <sup>h</sup>	ʎCVD: [sit <sup>ʎ</sup> ] 'fame'	CVB <sup>h</sup>	ʎCVD [bid̥] 'willow'
		<sup>w</sup> CVD: [sut <sup>ʎ</sup> ] 'whistle'		<sup>w</sup> CVD [bud̥] 'existence'
Č:	CVČ <sup>h</sup>	ʎCVČ: [ʃit <sup>ʎ</sup> ] 'confused'	CVČ <sup>h</sup>	ʎCVČ [had̥z] 'pilgrimage to Mecca'
		<sup>w</sup> CVČ: [ʃut <sup>ʎ</sup> ] 'ram'		<sup>w</sup> CVČ [tad̥z] 'crown'
K:	CVK <sup>h</sup>	ʎCVK: [xic <sup>ʎ</sup> ] 'hide water vessel'	CVK <sup>h</sup>	ʎCVK [ri <sup>ʎ</sup> ] 'pebble'
		<sup>w</sup> CVK: [xuc <sup>ʎ</sup> ] 'pig'		<sup>w</sup> CVK [su <sup>ʎ</sup> ] 'mourn'
G:			CVG <sup>h</sup>	ʎCVG [mi <sup>ʎ</sup> ] 'cloud'
				<sup>w</sup> CVC [mo <sup>ʎ</sup> ] 'fireworship'
?	(loan) CV? <sup>h</sup>	ʎCV?: [(ra)bi <sup>ʎ</sup> ] 'spring'		
		<sup>w</sup> CV?: [su <sup>ʎ</sup> ] 'vice'		

#### 7.4.22. N (nasal) sub-system

Table 6 represents the above sub-system, its terms and their phonetic forms in y/w and h structures. Two sets of phonetic exponents are given for each term, one a devoiced set as observed in word final codas, and the other a voiced set whose members are mostly homorganic with the C-elements at the onsets of the syllable following except when the latter is a pre-glottal or a glottal contoid in which case the nasal contoid is denti-alveolar (e.g. [m̥o.nh̃ni] 'semi-circle', and [s̥a.n̥a.t̥] 'industry'). The term B is always non-homorganic with the contoid following it.







the relation between the terms in this C-system and  $h/h$  prosodies is different from the terms in other C-systems as will be seen below.

#### 7.4.31. P (stop) sub-system

All terms except D function either in  $h$  or in  $\underline{h}$  structures, D functions in both, thus:

$$h_P D/K/? \qquad \underline{h}_P B/D/\check{C}/G$$

Table 9 below presents the sub-system P, its terms and their exponents in  $y/w$  and  $h/h$  structures. Two phonetic forms are given for the terms in  $\underline{h}$  structures, one a devoiced one as observed in word final complex coda, and the other a voiced form as observed in word non-final complex coda (see 3.4.41.).

TABLE 9

P SUB-SYSTEM AT THE FIRST PLACE IN COMPLEX CODA

Sub-system	P (stop)													
Terms	B		D				$\check{C}$		K		G		? (loan)	
Prosodies	$\underline{h}$		h		$\underline{h}$		$\underline{h}$		h		$\underline{h}$		h	
	y	w	y	w	y	w	y	w	y	w	y	w	y	w
Exponents	b	b	t <sup>f</sup>	t <sup>h</sup>	d	d	ʧ	ʧ	c <sup>f</sup>	c <sup>h</sup>	g	g	ʔ	ʔ
Word non-final	b	b			d	d	ʧ	ʧ			g	g		

Exx.

B:

CVBC<sup>h</sup> y CVBC: [sabr] 'patience'  
 W CVBC: [Gobh] 'ugliness'

- D: CVDC<sup>h</sup>  $\mathcal{Y}$ CVDC: [sat<sup>h</sup>l] 'bucket' CVDCh  $\mathcal{Y}$ CVDC [sa<sup>h</sup>dr] 'top'  
 $\mathcal{W}$ CVDC: [got<sup>h</sup>ur] 'thickness'  $\mathcal{W}$ CVDC [po<sup>h</sup>dr] 'powder'
- Č: \_\_\_\_\_ CVČC<sup>h</sup>  $\mathcal{Y}$ CVČC: [hed<sup>h</sup>gr] 'remoteness'  
 $\mathcal{W}$ CVČC: [had<sup>h</sup>gb] 'shyness'
- K: CVKC<sup>h</sup>  $\mathcal{Y}$ CVKC: [zec<sup>h</sup>fr] 'memory'  
 $\mathcal{W}$ CVKC: [hoc<sup>h</sup>um] 'order'
- G: \_\_\_\_\_ CVGC<sup>h</sup>  $\mathcal{Y}$ CVGC: [na<sup>h</sup>gl] 'story'  
 $\mathcal{W}$ CVGC: [no<sup>h</sup>gl] 'seat'
- ?(loan): CV?C<sup>h</sup>  $\mathcal{Y}$ CV?C: [sa<sup>h</sup>?d] 'fortune' or [sa<sup>h</sup>,d]  
 $\mathcal{W}$ CV?C: [bo<sup>h</sup>?d] 'distance' or [bo<sup>h</sup>,d]

#### 7.4.32. N (nasal) sub-system

Table 10 is arranged on the same principle as above to represent the sub-system N and its terms. The exponent of the term D is a hormorganic element with the C following it. But the exponent of B is always a bilabial nasal C.

TABLE 10

#### N SUB-SYSTEM AT THE FIRST PLACE IN COMPLEX CODA

Sub-system	N (nasal)							
Terms	B			D				
Prosodies	<u>h</u>			<u>h</u>				
	y	w	y			w		
Word-final Exponents	m̥	m̥	m̥	m̥	n̥	n̥	ɲ̥	N̥
Word non-final	m	m	m	m	n	n	ɲ	N

Exx.

$N_B$	$(C)VN_B C^h$	$^y CVN_B C$	$[sám̩]$	'gum'		
		$^w VN_B C$	$[ʔóm̩r]$	'age'		
$N_D$	$CVN_B C^h$	$^y CVN_D C$	$[d̩zám̩b]$	'adjacent'	$[sēm̩f]$	'type sect'
		$^w CVN_D C$	$[d̩zōm̩b]$	'movement'	$[kōnd̩z]$	'corner'
		$^y CVN_D C$	$[tām̩f]$	'tight'	$[d̩zēns]$	'type nature'

#### 7.4.33. L (liquid) sub-system

Table 11 represents the above sub-system. The exponent of J is [-i] except when followed by the same term (i.e. -jj) in which case it is [j] (see 3.3.2.). J functions in y structures only.

TABLE 11

#### L SUB-SYSTEM AT THE FIRST PLACE IN COMPLEX CODA

Sub-system	L (liquid)					
Terms	L		R		J	
Prosodies	<u>h</u>		<u>h</u>		<u>h</u>	
	y	w	y	w	y	w
Exponents	$l̩$	$l̩$	$r̩$	$r̩$	-i	j
Word Non-final	$l̩$	$l̩$	$r̩$	$r̩$		

Exx.

L:	$CVLC^h$	$^y CVLC:$	$[d̩zēld]$	'cover'
		$^w CVLC:$	$[xōld]$	'eternity'

R: CVRC<sup>h</sup> <sup>y</sup>CVRC: [Ga<sub>2</sub>rb] 'west'  
           <sup>w</sup>CVRC: [Go<sub>2</sub>rb] 'closeness"  
 J: CVJC<sup>h</sup> <sup>y</sup>CVJC: [Geid] 'bondage'

Not functioning with w structures.

#### 7.4.34. F (fricative) sub-system

The terms *f* and S function in h/h structures, the remaining terms function in h structures only, thus:

<sup>h</sup>F<sub>f/S/ſ/X/H</sub>                      <sup>h</sup>F<sub>f/S</sub>

Table 12 below represents the F sub-system.

TABLE 12

#### F SUB-SYSTEM AT THE FIRST PLACE IN COMPLEX CODA

Sub-system:		F (fricative)																		
Terms	<i>f</i>		S		ſ		X		H											
Prosodies	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>	h	<u>h</u>										
	y w	y w	y w	y w	y w	y w	y w	y w	y w	y w										
Exponents	f <sub>2</sub>	f <sub>w</sub>	y <sub>2</sub>	-u	s <sub>2</sub>	s <sub>w</sub>	z <sub>2</sub>	z <sub>w</sub>	ʃ <sub>2</sub>	ʃ <sub>w</sub>			X <sub>2</sub>	X <sub>w</sub>			h <sub>2</sub>	h <sub>w</sub>		
Word non-final			v <sub>2</sub>				z <sub>2</sub>	z <sub>w</sub>												

The forms [v<sub>2</sub> y<sub>2</sub>] are always followed by the same consonant (see 3.3.2.) (e.g. [d<sub>2</sub>ay<sub>2</sub>] 'atmosphere': h ČA<sub>2</sub>f<sub>2</sub><sup>h</sup>).

[-u] is found only in w-structures.

Exx.

*f*: CVfC<sup>h</sup> <sup>y</sup>CVfC: [na<sub>2</sub>f<sub>2</sub>:s] 'essence'    CVfC<sup>h</sup> <sup>y</sup>CVfC: [d<sub>2</sub>ay<sub>2</sub>] 'atmosphere'  
           <sup>w</sup>CVfC: [mo<sub>2</sub>f<sub>2</sub>:t] 'cheap'                      <sup>w</sup>CVfC: [d<sub>2</sub>our] 'cruelty'

s:	CVSC <sup>h</sup> yCVSC:	[das:t]	'hand'	CVSC <sup>h</sup> yCVSC	[hez <sub>2</sub> b]	'party'
	WCVSC:	[hog:n]	'beauty'	WCVSC	[moz <sub>2</sub> d]	'wage'
ʃ:	CVʃC <sup>h</sup> yCVʃC:	[xeʃ:t]	'brick'			
	WCVʃC:	[poʃ:t]	'back'			
x:	CVXC <sup>h</sup> yCVXC:	[sax:t]	'hard'			
	WCVXC:	[poʒ:t]	'cooking'			
h:	CVHC <sup>h</sup> yCVHC:	[Gaht]	'famine'			
	WCVHC:	[boht]	'stupor'			

#### 7.4.4. Complex Coda C-system, Second Place

Sub-systems and terms are the same as for simple coda, the points stated in relation to the simple coda C-system (see 7.4.2.) are also applicable to this C-system. But the relation of the above C-system to h/h prosodies is different from that of other C-systems as will be seen.

#### 7.4.41. P(stop) sub-system

The terms D and K function in h/h structures, the remaining terms function either in h or in h structures, thus:

$$h_P \text{ D/K/?} \qquad \qquad \qquad \overset{h}{-}P \text{ B/D/Č/K/G}$$

Table 13 below gives the terms and their exponents in y/w and h/h structures. Two phonetic sets of exponents are included in the table, the set representing voiced contoids is for word non-final coda.

Exx.

B:	-----	CVCB <sup>h</sup> yCVCB:	[zar <sub>2</sub> ]	'hit'		
		WCVCB:	[sor <sub>2</sub> ]	'lead'		
D:	CVCD <sup>h</sup> yCVCD:	[bax <sub>2</sub> t <sub>2</sub> ]	'fortune'	CVCD <sup>h</sup> yCVCD	[Geid <sub>2</sub> ]	'condition'
	WCVCD:	[bax <sub>2</sub> t <sub>2</sub> ]	'loss'	WCVCD	[gor <sub>2</sub> d <sub>2</sub> ]	'athlete'

Č:	_____	CVCC <sup>h</sup>	yCVCC: [xard <sub>3</sub> ] 'expense'
			wCVCC: [bord <sub>3</sub> ] 'tower'
K:	CVCK <sup>h</sup>	yCVCK: [ma <sub>3</sub> fc <sub>3</sub> ε] 'hide water vessel'	CVCK <sup>h</sup>
		wCVCK: [mo <sub>3</sub> fc <sub>3</sub> u] 'perfume'	yCVCK: [bār <sub>3</sub> ɸ] 'loaf'
			wCVCK: [gór <sub>3</sub> ɸ] 'wolf'
G:	_____	CVCG <sup>h</sup>	yCVCG: [bar <sub>3</sub> g] 'electricity'
			wCVCG: [tou <sub>3</sub> g] 'iron collar'
?:	CVC? <sup>h</sup>	yCVC? [gat?] 'cut' or [Ga, t̄]	
		wCVC? [vos?] 'capacity'	_____

TABLE 13

F SUB-SYSTEM AT THE SECOND PLACE IN COMPLEX CODA

Sub-system	P (stop)															
Terms	B		D		Č		K		G		?(loan)					
Prosodies	<u>h</u>		h		<u>h</u>		h		<u>h</u>		h					
	y	w	y	w	y	w	y	w	y	w	y	w	y	w	y	w
Exponents	b <sub>0</sub>	b̄ <sub>0</sub>	t̄ <sub>0</sub>	t̄ <sub>0</sub>	d̄ <sub>0</sub>	d̄ <sub>0</sub>	č̄ <sub>0</sub>	č̄ <sub>0</sub>	c <sub>0</sub>	c <sub>0</sub>	ḡ <sub>0</sub>	ḡ <sub>0</sub>	ḡ <sub>0</sub>	ḡ <sub>0</sub>	ʔ <sub>0</sub>	ʔ <sub>0</sub>
Word non-final	b̄ <sub>1</sub>	b̄ <sub>1</sub>			d̄ <sub>1</sub>	d̄ <sub>1</sub>	č̄ <sub>1</sub>	č̄ <sub>1</sub>			ḡ <sub>1</sub>	ḡ <sub>1</sub>				

7.4.42. N (nasal) sub-system

Table 14 represents the N sub-system, its terms and their exponents in y/w and h structures.

Exx.

N <sub>B</sub> :	CVCN <sub>B</sub> <sup>h</sup>	yCVCN <sub>B</sub> : [hazm <sub>2</sub> ] 'digestion'
		wCVCN <sub>B</sub> : [d̄ <sub>3</sub> orm <sub>3</sub> ] 'penalty'
N <sub>D</sub> :	CVCN <sub>D</sub> <sup>h</sup>	yCVCN <sub>D</sub> : [d̄ <sub>3</sub> a <sub>3</sub> n <sub>2</sub> ] 'celebration'
		wCVCN <sub>D</sub> : [hozn <sub>3</sub> ] 'sorrow'

TABLE 14

N SUB-SYSTEM AT THE SECOND PLACE IN COMPLEX CODA

Sub-system	N (nasal)			
Terms	B		D	
Prosodies	<u>h</u>		<u>h</u>	
	y	w	y	w
Word final Exponents	m	<u>m</u>	n	<u>n</u>
Word non-final	<u>m</u>	<u>m</u>	<u>n</u>	<u>n</u>

7.4.43. L (liquid) sub-system

Table 15 contains the terms in the above sub-system, their exponents in y/w and h/h structures. The term J does not function in w-structures. [j] is always preceded by the same element (e.g. [hajj] 'alive', see 3.3.2.) and [ç] by other elements (e.g. [sa:pç] 'attempt').

TABLE 15

L SUB-SYSTEM AT THE SECOND PLACE IN COMPLEX CODA

Sub-system	L (liquid)					
Terms	L		R		J	
Prosodies	<u>h</u>		<u>h</u>		<u>h</u>	
	y	w	y	w	y	w
Word non-final Exponents	<u>l</u>	<u>l</u>	<u>l</u>	<u>l</u>	j ç	
	<u>l</u>	<u>l</u>	<u>l</u>	<u>l</u>	j	



S:	CVCS <sup>h</sup>	<sup>y</sup> CVCS: [habs <sub>ɣ</sub> ] 'prison'	CVCS <sup>h</sup>	<sup>y</sup> CVCS: [ramz <sub>ɣ</sub> ] 'secret'
		<sup>w</sup> CVCS: [xobs <sub>ɣ</sub> ] 'meanness'		<sup>w</sup> CVCS: [gorz <sub>ɣ</sub> ] 'mace'
J:	CVCf <sup>h</sup>	<sup>y</sup> CVCf: [na <sup>?</sup> ɣ] 'corpse'	_____	
		<sup>w</sup> CVCf: [foh <sub>ɣ</sub> ] 'curse'		
X:	CVCX <sup>h</sup>	<sup>y</sup> CVCX: [masx <sub>ɣ</sub> ] 'metamorphosis'	_____	
		<sup>w</sup> CVCX: [sorx <sub>ɣ</sub> ] 'red'		
H:	CVCH <sup>h</sup>	<sup>y</sup> CVCH: [zeb <sub>h</sub> ] 'beheading'	_____	
		<sup>w</sup> CVCH: [sob <sub>h</sub> ] 'morning'		

#### 7.4.5. The Relation between the C-systems within Complex Coda

All the terms in the C-system set up for the first place in complex coda combine with all the terms in the C-system stated for the second place. This relation may therefore be stated in the following way:

CVPP	tebb	medicine,	CVPP	hadd	limit
CVPN	hokm	order,	CVNP	gandz	treasure
VPL	?abr	cloud,	CVLP	pelk	eyelash
CVPF	habs	prison,	CVFP	mo <sub>ɣ</sub> t	fist

The following restrictions are however observed with individual terms:

B does not occur in CVCC<sup>h</sup> either at the first or at the second place. Thus no such examples as, say, \*?apr or \*?arp are found except in loans, e.g.: [harp] 'harp'.

Č also does not occur in CVCC<sup>h</sup> either at the first or at the second place. Thus no such examples as, say, \*pot<sub>ɣ</sub>r or \*port<sub>ɣ</sub> are found except for the following words whose origin is not known to the writer:

Gart <sub>ɣ</sub>	'mushroom'	par <sub>ɣ</sub>	'fixing a pin'
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$\int$  does not occur in  $CVCC^h$  either at the first or at the second place. Thus no such examples as, say, \*bor<sub>3</sub> or \*bo<sub>3</sub>r are found.

K does not occur at the first place in  $CVCC^h$ ; thus no such examples as, say, \*fegr are found except in loans, e.g. regl 'period'. But K does occur at the second place in the structure above, e.g.  $\int$ ang 'war', barg 'leaf'.

#### 7.4.6. Summary of Syllable Structure

1) Prosodies: i) V, VC, VCC, CV, CVC, CVCC

ii) short: (C)V, intermediate: (C)VC,

long: (C)VCC

iii)  $y/w(C)V(C(C))$

iv)  $h/h(C)V(C(C))h/h$

2) Phonematic Systems<sup>1</sup>

A) V-Systems (C)V<sub>2</sub> (C)V<sub>3</sub>C (C)V<sub>3</sub>FC (C)V<sub>2</sub>CC

B) C-Systems C<sub>P6</sub>/N<sub>2</sub>/L<sub>3</sub>/F<sub>5</sub>

i) Onset:

$h_{P_{4+1}}$  loan  $h_{P_5}$

---  $h_{N_2}$

---  $h_{L_3}$

$h_{F_5}$   $h_{F_3}$

ii) Simple Coda:  $-C_{P_6}/N_2/L_3/F_5$

$h_{P_{4+1}}$  loan  $h_{P_5}$

---  $h_{N_2}$

1. Numerals refer to the number of terms in the sub-systems.

$h_{L_3}$   
 $h_{F_5}$        $h_{F_3}$   
 iii) Complex coda, first place:  $-C_{P_6/N_2/L_3/F_5}$

$h_{P_{2+1} \text{ loan}}$        $h_{P_4}$   
 $h_{N_2}$   
 $h_{L_3}$   
 $h_{F_5}$        $h_{F_2}$   
 iv) Complex coda, second place:  $-C_{P_6/N_2/L_3/F_5}$

$h_{P_{2+1} \text{ loan}}$        $h_{P_5}$   
 $h_{N_2}$   
 $h_{L_3}$   
 $h_{F_5}$        $h_{F_2}$

## CHAPTER 8

### PROSODIES OF NOMINAL WORDS

The phonological structure of the nominal word includes that of the syllable, which is stated in the preceding chapters, and a number of new prosodies which can only be stated at word level and not at syllable level. In this chapter the prosodies of the nominal word are described. But first a definition of word, and of nominal word is given below.

#### 8.1. Word and Nominal Word: Definitions

Before nominal word can be defined, a definition of word is necessary.

Word as used in this thesis is a grammatical unit which has "stable internal composition" and "free mobility within larger sequences".<sup>1</sup> This definition includes in itself, in Professor R.H. Robins's words "such other features as uninterruptability by pause or parenthesis in normal discourse, general immobility of the order of its internal morphological constituents or segmental morphemes, and limited and regulated extensibility at any point as against the almost indefinite extensibility of word groups by the addition of other words".<sup>2</sup> A word which meets the definition above corresponds in most cases, but not always,

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1. R.H. Robins, 'In Defence of W.P.', 1959, p.120.

2. Ibid., p.120. See also John Lyons, 'Introduction to Theoretical Linguistics', 1968, pp. 194-206; and R.H. Robins, 'General Linguistics, An Introductory Survey', 1966, pp. 193-200.

with Bloomfield's "minimal free form".<sup>1</sup>

According to this definition of word, a Persian form like {mardi} 'manliness' (composed of {mard} 'man' and {-?i} 'relative suffix') is a word. But a form like {mardi} 'a man', (composed of {mard} 'man', and {?i} 'indefinite particle') (see 9.6.1.) is not a word because while the former has internal stability, and mobility within larger sequences, the latter does not have either of the two requirements, i.e. it does not have internal cohesion, e.g. in {mard e xub i} 'a good man', the forms {?e} and {xub} have interrupted the form {mardi}; and it does not have mobility within larger sequences, e.g. it cannot function as the first constituent of ezafe constructions (see 9.6.5.), nor can it occur before the particle {ra} 'object marker' (see 9.6.10.).

The term 'nominal word' as used in this thesis, refers to a class of words whose members may or may not be nouns, but they can all function in similar positions in syntactic constructions. Nominal word class is, therefore, set up in terms of syntactic criteria, and membership of a word to the class thus designated, requires commutability of the word with other members of the same class in certain positions within syntactic constructions. Thus the class nominal word is more general than the class of word referred

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1. 'Language', 1965, pp. 178-183.

to as noun class since it includes in itself nouns as well as words from other classes.

The need for distinguishing nominal word class from noun class arises from two factors, as follows:

1) Persian exhibits an extreme case of overlapping between word classes,<sup>1</sup> that is words generally have more than one class membership, e.g. the word {mard} 'man', functions as a noun in:

{mard raft} the man went.

But it functions as an adjective in:

{behruz duss-e mard i je} 'Behruz is a manly friend'

And it functions as an adverb in:

{ali mard ?amad o mard raft} 'Ali was born a man and died a man.'

Cf: {ali mard ane ?amad o mardane raft} 'Ali was born a man and a man died.'

2) Yet despite this class overlapping, it is possible to establish different word classes on the basis of morphological criteria. For example nouns may be distinguished from adjectives by the category of number which applies to nouns and not to the adjectives (e.g. {mard} 'man' vs {marda} 'men' but not e.g. {xof} 'pleasant' vs \*{xofa} ), or by different types of affixes which appear with nouns but not with adjectives or vice versa (e.g. in {Girgun} 'black as tar' the suffix {-gun} has combined with the noun {Gir} , but it does not combine with

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1. See also V.S. Rastorgueva, 'A Short Sketch of the Grammar of Persian', 1964, pp. 16-18.

adjectives. Or in {xubtar} 'better', the suffix {-tar} has combined with the adjective {xub}. Verbs may also be distinguished from nouns and adjectives by the categories of person (e.g. {goftam} 'I said', {gofti} 'you said', etc.), tense (e.g. {gujam} 'I say', {goftam} 'I said', etc.) or by mood, aspect,<sup>1</sup> etc., each one of these being morphologically marked. Verbs, nouns and adjectives may be distinguished from adverbs by such suffixes as {-?ane} which are generally found in combination with the adverbs (e.g. {fab} 'night', {fabane} 'nightly', {sal}, {saldane} 'yearly', etc.).<sup>2</sup>

Therefore, on the basis of morphological observations it is possible to set up such word classes as noun, adjective, verb, adverb, etc. Such morphologically orientated word classes do not hold at syntactic level because the members of all such classes may appear in similar syntactic positions. For example, consider the following case:

{xub} 'good', is morphologically an adjective for it may be: {xubtar} 'better'.

{dast} 'hand', is morphologically a noun for it may be: {dasta} 'hands'.

{ruz} 'day' is morphologically an adverb for it may be:

{ruzane} 'daily'.

{kejt} 'sowing' is morphologically a verb for it may be: {kejtam} 'I sowed'.

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1. For the definitions of the terms mentioned in this paragraph, see R.H. Robins; 'General Linguistics, An Introductory Survey', 1965, pp. 245-270 and 278-291. See also John Lyons, 'Introduction to Theoretical Linguistics', 1968, pp.270-333.
  2. It is not intended here to give a full grammatical description of word classes as to do this is beyond the scope of this thesis.

{ha ʃt} 'eight' is morphologically a number for it may be {ha ʃtom} 'eighth', ({- ?om} is a suffix which appears only with numbers, thus may serve as a criterion to establish a class, or a sub-class of nouns as numerals.) But all the words given above may appear in the syntactic construction given below at the positions marked by N (noun), i.e. they may all function as noun in the construction:

{N + ra + ?az + N + ta ʃ xiz namide.} 'He does not recognize N from N.'

e.g.:

{xub o ?az bad ta ʃ xiz namide} 'He does not recognize good from bad'.

{dast " " pa " " } 'He does not recognize hand from foot.'

{ruz " " ʃab " " } 'He does not recognize day from night.'

{ke ʃt " " zar? " " } 'He does not recognize farming from sowing.' etc.

Because of the lack of congruence between word classes established syntactically and morphologically, it was found useful to refer to the former by separate terms. Thus noun class is a morphological class and it includes only nouns, whereas nominal class is a syntactic class and includes words from different morphological word classes. Adjectival, verbal and adverbial word classes too, have similar positions in relation to the word classes designated as adjectives, verbs and adverbs respectively.

Unless otherwise specified the terms word, noun and nominal are used, in this thesis, in free variation with

nominal word as defined above. This does not cause confusion as long as it is borne in mind that the subject of this thesis is Nominal pieces and not Noun pieces.

A nominal word may function in the following syntactic positions, in most of which it is accompanied by a particle which marks the word for the specific function in the position. Particles do not constitute a component of nominal words, therefore, words plus particles are no longer words, they are nominal pieces (see 9.3.):

1) Subject Position: Nominal words may function as the subject of a sentence where they are unmarked by particles, but may be marked by intonation, e.g.

{ mard ?ɑ mad } 'the man came'  
subj.

2) Object Position: Nominal words may function as the object in a sentence where they are marked by the particle {rɑ} (see 9.6.10.) e.g.

{ mard o didam } 'I saw the man'  
obj.

3) Ezafe Position: Nominal words may function as the first constituent of an 'ezafe'-construction where they are marked by the particle {?e} (see 9.6.5.), e.g.

{ mard e dāne ʃmand } 'the knowledgeable man'

4) In Possessive Constructions: Nominal words may enter into possessive construction with the pronominal endings (see 9.6.6.), e.g.

{ ketāb am } 'my book'

5) Definitive Constructions: Nominal words may function in definitive constructions where they are marked by the particle {?e} (see 9.6.8.), e.g.

{ mard e ?ɑ mad } 'The man came'

6) Prepositional Constructions: A nominal word may function as the constituent of a prepositional construction (see 9.6.3.), e.g.

{ba mard ?amad} 'he came with the man'

7) Predicate Position: A nominal word may enter into construction with the conjugated forms of the verb {?astan} or {hastan} 'to be' to construct a predicate (see 9.6.2.) e.g.

{man baradār e ?an mard:am} 'I am that man's  
brother'.

8) Vocative Constructions: A nominal word may enter into construction with the particle {?a} (see 9.6.7.) e.g.

{xoda ja} Oh Lord!

9) Persuasive Construction: A nominal word may be marked by the particle {?a} to construct a persuasive construction (see 9.6.9.) e.g.

{beri xune ha} 'Go home and don't forget!'

10) Conjunctive Construction: Nominal words may also take a position in conjunctive constructions (see 9.6.11.) e.g.

{mard o zan} 'man and woman'

11) Definite and Indefinite Constructions: A nominal word may be marked by the particle {?i} to make a definite construction if then followed by {ke} e.g.:

{mard i ke ?amad} 'the man who came ...'

or to make an indefinite construction (see 9.6.1.), e.g.

{mard:i ?amad} 'Some man came'

Having defined nominal words, the prosodic features

that mark the structure of this class of word may now be described as follows:

### 8.2. Prosody of Words and Bound Forms Initial

In Chapter 7, ʔ (representing glottal stop and its phonetic variants) was described as a phonematic loan term which commutes with other terms in the C-systems set up for all the C-places in the syllable except for the onset place of word and bound form initial syllables where ʔ functions prosodically rather than consonantly. The reason for the prosodic treatment of ʔ at the onset of word and bound form initial syllable is that its presence or absence at this place in the structure is governed by the position and the grammatical relation of the word or bound form in a larger grammatical structure.

The prosodic statement of ʔ will, therefore, be given in various places in the rest of this thesis in relation to different grammatical structures which require the presence or absence of ʔ as a prosody. In the remaining part of this paragraph ʔ is described in relation to words and bound forms as given in isolation.

With the exception of a few bound forms (see 9.6.11.), all V-beginning words and bound forms are presented and pronounced in dictionary entries, grammatical texts, and in citations, with an initial glottal stop. In writing the presence of glottal stop at the beginning of such forms is marked by the relevant symbols generally used to represent ʔ (i.e. 'hamze' ( ء ), 'ʔalif' ( ا, آ ) and 'ʔein' ( ع ), the last one used exclusively for Arabic loans.

Thus in the dictionary all the V-beginning words and bound forms are entered not under the relevant vowels (e.g. e, u, i, etc.) but under the 'alif', 'hamze' and 'ein'. For example, the words {ʔa b} 'water', {ʔu} 'he', {ʔas b} 'horse', and {ʔis a r} 'generosity', all V-beginning words, and the bound forms {-ʔa n} 'plural suffix', {ʔe} 'ezafe particle', and {-ʔand e} 'agentive suffix' are all entered under 'alif' in dictionaries. In pronouncing such forms in isolation the glottal stop is present.

In view of these observations, glottal stop is abstracted at this level of analysis as the prosody of word and bound form initial which marks the initials of V-beginning words and bound forms in isolation or in larger constructions when the words are preceded by silence or pause.

C-beginning words and bound forms are not marked by ʔ-prosody. ʔ-prosody is symbolized by a superscript ʔ at the beginning of the structure, e.g.

ʔVC: {ʔa b} 'water',      -ʔVCCV: {ʔand e} 'agentive suffix'

The exponents of ʔ-prosody are [ʔ] in y-syllables and [ʔ] in w-syllables.

The treatment of glottal stop, at this level, as the prosody of words and bound forms initial (and not as junction prosody), is supported by the fact that none of the V-beginning suffixes (which are in isolation marked by ʔ-prosody) express their relations with the stems through glottal prosody, but through other prosodies, such as J-, H-prosodies, etc. (see 8.4.23.). For example, although the suffix {-ʔand e}, as above, is produced and presented in

citation form and dictionary entries as [ʔande], its junction with the stem is marked by J-prosody when it enters into construction with the stem to make a complex word. (see 8.4.), e.g.

$$CV + ?VCCV \rightarrow CV^J VCCV: \{gu\} + \{-ʔande\} \rightarrow \{gujan de\}$$

'speaker'

Or the suffix  $\{-ʔak\}$  'diminutive', which in citation is [ʔac<sup>h</sup>] expresses its relation with stem through H-prosody, e.g.

$$CVCV + ?VC \rightarrow CVCV^H VC: \{ba ba\} + \{ʔak\} \rightarrow \{ba ba ha k\}$$

'the darling father'

Even when the relation between two elements in a structure is marked by ʔ-prosody of junction, it is structurally necessary to state the ʔ-prosody of words and bound forms initial separately for the form in isolation in order to give a full structural picture of the form. But it is not necessary to state this prosody for the form after it has combined with other components as the form is no longer in initial position. Thus:

$$CV + ?VCVC \rightarrow CV^? VCVC \quad \{ba\} + \{ʔadab\} \quad \{ba ʔadab\}$$

'polite'

The symbol ʔ in the structural representation of the word  $\{ʔadab\}$  in isolation i.e. in  $?VCVC$ , stands for ʔ-prosody of word and bound form initial, but the symbol ʔ in the structural representation of the resultant word  $\{ba ʔadab\}$ , i.e. in  $CV^? VCVC$ , stands for ʔ-prosody of junction (see 8.4.11.) and not for the former prosody since the word is not at the initial place of the resultant form.



expression of any of their relations to the piece or sentence except that it marks their initiality in the nominal and verbal constructions just as much as their initiality in isolation, while their relations to other components in the piece or sentence are expressed by other prosodies as is described in the following pages.

### 8.3. The Syllable Structure of Nominal Words

The statement of the syllable structure of nominal words constitutes a part of the prosodic statement of the unit. Syllable structure has already been described in Chapters 6 and 7. In this section a brief statement of word syllable structure is given.

Simple, complex, compound and complex-compound words each have different types of syllable structure. These grammatical distinctions, therefore, also need to be kept at the level of phonological analysis of word structure.

Syllable division is marked by - in the following paragraph.

#### 8.3.1. Simple Nominal Word

Simple words may be mono-syllabic or poly-syllabic. The poly-syllabic nominal words may consist of 2, 3 or 4 syllables. Simple words consisting of more than four syllables are generally loans, e.g. {te-le-vi-zi-jon} 'television', {po-rol-ta-ri-ja} 'proletariat'. Examples of quadri-syllabic simple words are also very rare. In fact most of the examples of this structure are of Arabic origin, and generally of the structure (C)V-CV-CV-CV, e.g.

{mo-la-he-ze} 'considerations', {ʔa-ra-me-ne} 'Armenians'. Such Arabic loans are mostly in the Arabic broken plural form.<sup>1</sup> The word: {bu-Ga-la-mun} 'turkey' is also of this structure; but the origin of the word is not known to the writer. Its meaning, 'turkey', suggests that it may not be Persian as the turkey is not a native bird of the country. The word may alternatively be pronounced as {bu-Gal-mun} in which case it is trisyllabic.

All the six different syllable structures set up in Chapter 6 (6.4.1.) are found as simple mono-syllabic nominal word structures, three of which require the addition of ʔ-initial prosody in order that they represent the prosodic feature of V-beginning words. Thus the structural statement of mono-syllabic words may be given as follows:

ʔV : {ʔu} 'he', ʔVC : {ʔab} 'water', ʔVCC : {ʔabr} 'cloud',  
 CV : {azu} 'stream', CVC : {xab} 'sleep',  
 CVCC : {sabr} 'patience'.

The statement above may be generalized in the formulae below:

CV(C(C)), ʔV(C(C))

Each of the structures may have y/w prosodies. Thus the relation of y/w prosodies to the simple mono-syllabic words may be stated as:

y/w(C)V(C(C))

Simple disyllabic words may be of the following 12 structures:

ʔV-CV	ʔVC-CV	CV-CV	CVC-CV
ʔV-CVC	ʔVC-CVC	CV-CVC	CVC-CVC

1. See A.K.S. Lambton, 1967, pp. 219-232.

?V-CVCC            ?VC-CVCC            CV-CVCC            CVC-CVCC

In simple disyllabic words the syllable structures V and VC can only function as word initial syllables and the syllable structure CVCC can only function as word final syllable, while the structure VCC does not function in simple disyllabic words at all. The structures CV and CVC are common to both initial and final places.

The statement above may be summarized in the following formulae:

?V(C)-CV(C(C))            CV(C)-CV(C(C))

All permutations of y and w prosodic syllables are possible, e.g.

y/w(c)V(C)-y/wCV(C(C))

Exx.

w <sup>?</sup> V <sup>y</sup> CV	{ʔali}	'excellent'	y <sup>?</sup> V <sup>w</sup> CCV	{ʔabru}	'eye brow'
y <sup>?</sup> V <sup>w</sup> CVC	{ʔanar}	'pomegranite'	y <sup>?</sup> VC <sup>y</sup> CVC	{ʔaxgar}	'sparkle'
w <sup>?</sup> V <sup>y</sup> CVCC	{ʔagang}	'frowning'	y <sup>?</sup> VC <sup>w</sup> CVCC	{ʔargang}	'a type of tree'
w <sup>?</sup> CV <sup>w</sup> CV	{xada}	'God'	y <sup>?</sup> CVC <sup>w</sup> CV	{pahlu}	'side'
y <sup>?</sup> CV <sup>w</sup> CVC	{nefan}	'sign'	y <sup>?</sup> CVC <sup>y</sup> CVC	{bandar}	'port'
w <sup>?</sup> CV <sup>y</sup> CVCC	{tofang}	'Gun'	w <sup>?</sup> CVC <sup>w</sup> CVCC	{sougang}	'vow'

Simple trisyllabic words are of the following 16 structures:

?V-CV-CV	?VC-CV-CV	CV-CV-CV	CVC-CV-CV
?V-CV-CVC	?VC-CV-CVC	CV-CV-CVC	CVC-CV-CVC
?V-CVC-CV	?VC-CVC-CV	CV-CVC-CV	CVC-CVC-CV
?V-CVC-CVC	?VC-CVC-CVC	CV-CVC-CVC	CVC-CVC-CVC

The syllable structures CVCC and VCC do not generally function in simple trisyllabic words.<sup>1</sup> The syllable structures V and VC can only function as word initial syllables, while the structures CV and CVC are common to all places.

The statement above may be summarized in the formulae below:

$${}^?V(C)-CV(C)-CV(C) \quad CV(C)-CV(C)-CV(C)$$

All permutations of y and w syllables are possible, e.g.

$$y/w(C)V(C)-y/wCV(C)-y/wCV(C)$$

Exx.

${}^w{}^y{}^wCV{}^wCV$ {ʔafend} familiar,	${}^y{}^?VC{}^wCV{}^yCV$ {ʔandaze} size
${}^y{}^?V{}^yCV{}^wCVC$ {ʔalekol} alcohol	${}^w{}^?/C{}^wCV{}^wCVC$ {ʔostovar} subtle
${}^y{}^?V{}^yCVC{}^wCV$ {ʔabargu} name of town	${}^?VC$ CVC CV No example found
${}^y{}^?V{}^wCVC{}^wCVC$ {ʔamordad} 2nd summer month	${}^y{}^?VC{}^yCVC{}^wCVC$ {ʔesterdad} return
${}^yCV{}^wCV{}^yCV$ {pijade} on foot	${}^wCVC{}^wCV{}^yCV$ {dgorboze} courage
${}^wCV{}^wCV{}^yCV$ {mosafer} traveller	${}^wCVC{}^wCV{}^wCVC$ {GoltjomaG} stong
${}^wCV{}^yCV{}^wCV$ {sohada}	${}^wCVC{}^yCVC{}^wCV$ {hovejda}
${}^yCV{}^yCVC{}^wCVC$ {tamaxar} ridicule	${}^yCVC{}^yCVC{}^yCVC$ {farvardin} 1st spring mth.

### 8.3.2. Compound and Complex Nominal Word<sup>2</sup>

Persian words combine with each other and with affixes into compound and complex or compound-complex words

1. Only one exception was found to this rule: {ʔor-di-be-e<sup>s</sup>t} 'the second spring month', which is historically a polymorphemic word but synchronically can be regarded as simple.
2. For a definition of compound and complex words, see 8.4. and 8.5.

fairly freely. The types of syllable structure that result from these combinations are so numerous that listing them could hardly serve any purpose. No attempt is, therefore, made here to compile such lengthy lists. The following general points may, however, be noted:

1) The lowest number of syllables in a nominal complex or compound word is two (e.g. *dus-ti* 'friendship'). But to give the highest number of syllables in a compound and/or complex word would need extensive studies of these classes of word which would go beyond the scope of this thesis.<sup>1</sup> Furthermore, the two following factors seem to make it impossible to give any definite figure for the highest number of syllables in the above classes of words:

Firstly, as mentioned above, the morphological process of word formation through affixation and compounding is extremely common and productive in the language, and although in practice the size of words is constrained by many practical factors, in theory it is possible to construct new examples with a considerable number of syllables.

The largest compound-complex word actually found is:

{*bo-zor-gar-te ſ -t a -r a n -f a r -m a n -d e*} 'commander in chief  
of the army force'.

This particular example consists of 9 syllables as marked above, but theoretically it is still possible to extend the form, for example, to:

{*bo-zor-gar-te ſ -t a -r a n -f a r -m a n -d e -g i*} 'Acting as  
commander in chief of the army force,

---

1. See M. Shaki, 'Nominal Compounds in Neo-Persian', 1963.

or to:

{bo-zor-gā r-teš -ta-rān-far-mān-de-gān}

'commanders in chief ...',

and the resultant forms are still possible compound-complex words which satisfy all the criteria suggested for establishing words (see 8.1.).

Secondly the border-line between morphology and syntax is not clear. As a result many borderline cases are found on whose status as single words there may not be agreement among linguists. For instance M. Shaki regards the form {pa bar d̄zā} 'steady', as an example of what he refers to as "syntactic [bound] phrases" (sic.).<sup>1</sup>

Whereas such words are treated as compounds in this study, because they satisfy the criteria set up for establishing compound words (see 8.5.). This factor also makes it more difficult to suggest a definite figure for the highest number of syllables in a compound or complex word.

In view of the observations above it is concluded that while the lowest number of syllables in a compound/complex word is two, the highest number is not finite although the longest word found has 9 syllables.

2) The syllable structures V and VC which in simple words occur only as the initial syllable, are not restricted to the initial place in compound/complex words. They occur in medial and final positions where they are, of course, marked by the prosodies of junction, e.g.

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1. 'Nominal Compounds in Neo-Persian', 1963.

CV-CV + <sup>?</sup>VCCV + <sup>-?</sup>V → CV-CV<sup>J</sup> VC-CV<sup>J</sup>V :<sup>1</sup>  
 {nema} + {-?ande} + {-?i} → {nema.jandegi} 'being a  
 representative'.

In the example above the elements ?, j and g are exponents of ?- and J- prosodies. They cannot be regarded as consonantal elements since their presence or absence is governed by structural requirements. j and g do not, for instance, appear in the following examples with the same suffixes as they are not structurally required (see 8.4.23.II.):

CVC + <sup>?</sup>VCCV → CV-<sup>J</sup>CVCCV : {xan} + {?ande} →  
 {xan.ande} 'singer'  
 CVC + <sup>-?</sup>V → CV-<sup>J</sup>CV : {xub} + {-?i} → {xubi}  
 'goodness'.

3) The syllable structures VCC (which does not function in simple poly-syllabic words) and CVCC (which only functions in the final position of simple disyllabic words) appear freely anywhere in the structures of compound/complex nominal words, e.g.

CV-CVCC-CVC : {na-bard-ga h} 'battlefield'  
<sup>?</sup>VCC-CVCC : {?ard<sub>3</sub>-mand} 'of high position'.

#### 8.4. Prosodies of Junction in Nominal Complex Words

The term 'nominal complex word' as used in this thesis refers to a poly-morphemic word whose first immediate constituent (I.C.)<sup>2</sup> analysis results in a stem and an

1. See 8.2. for ?-prosody and 8.4.23.II. for J-prosody.

2. The concept of I.C. analysis is used here in its broad sense to cover both syntactic as well as morphological constructions. See Charles F. Hockett, 'A Course in Modern Linguistics', 1965, Chapter 17.

affix,<sup>1</sup> e.g.

{daneʃ} 'knowledge' : {dan} 'stem' {-ʔeʃ} suffix

{bidaneʃ} 'ignorant' : {bi-} 'prefix' {daneʃ} stem

{daneʃmand} 'learned' : {daneʃ} 'stem' {-mand} suffix

{daneʃpezuh} 'scholarship' {daneʃpezuh} stem {-ʔi} suffix

Each of the examples above is a complex word since the first I.C.s of each of them are a stem and an affix. The stem, therefore, may be a simple word (e.g. {dan} ), complex word (e.g. {daneʃ} ) or a compound word (e.g. {daneʃpezuh} , see 8.5.). The stems are generally free-forms in Persian nominal words, except for a very limited number, e.g. {ʔa s} 'mill', found in {ʔa siʒa b} 'water mill', and {ʔa semɑ n} 'sky', but the latter may be regarded as exceptions.

Affixes are always bound forms and are positionally (i.e. in relation to the stem) divided into pre-fixes and suffixes. It is open to argument whether one should set up a third class of affix, namely infixes, in the true sense of the term, for Persian nominal words. For infixes, according to Professor R.H. Robins, "are affixes that appear within the consonant and vowel sequences of root forms";<sup>2</sup> and no affixes of this type have been found in Persian by the writer. There are, however, some marginal cases which need discussion:

The affixes {ʔa} as in: {rɑ ʒɑ pɑ} <sup>3</sup> 'barter',

1. For the definition of stem and affix as used above, see H.A. Gleason, 'An Introduction to Descriptive Linguistics', 1966, pp. 59 (5.20.) and 58 (5.18.-19.).

2. 'General Linguistics, An Introductory Survey', 1965, p.210.

3. The form {ʔa} is as in isolation, i.e. ʔ<sub>v</sub>, but in connected form it is marked by J-junction prosody (see 8.2. and 8.4.23.II.).

The element ʔ in this and in other examples is ʔ-initial prosody (see 8.2.).

The stem formatives are, therefore, grouped with prefixes and suffixes and their prosodic statement is included in that of the prefixes and the suffixes.

#### 8.4.1. Prosodies of Junction of Prefixes with Stems

Prefixation is generally less common among the nominal words than suffixation;<sup>1</sup> but it is by no means non-productive. The number of productive prefixes is also far lower than that of suffixes. Seven prefixes have been found which are commonly used in the language and they are of the syllable structures CV and CVC as follows:

CV : {ba<sup>-</sup>, bi<sup>-</sup>, na<sup>-</sup>, be<sup>-</sup>}

CVC: {bar<sup>-</sup>, ham<sup>-</sup>, dar<sup>-</sup>}

In addition to the prefixes above several other words may be analyzed into prefixes and stems, thus adding to the list a number of new prefixes. But such prefixes are synchronically of no significance since they are no longer productive. Furthermore some of the stems obtained in this way are rarely found elsewhere in Modern Persian, e.g.

{farzane} 'learned' {fartut} 'old' {farman} 'order'

{farhang} 'culture' {farzad} 'of high descent'

On the basis of such examples one could say that the part {far-}

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1. The reverse seems to hold for complex verbal forms where prefixation appears to be more common than suffixation. This may be due to the fact that the pronominal suffixes which combine with verbal stems do not allow the addition of further suffixes (such forms as: {xordami} 'I used to eat', composed of {xord} 'stem', {-?am} 'pronominal suffix', and {?i} 'marker of aspect', where {-?i} comes after the pronominal suffix {?am}, are archaic, no longer in use in Modern Persian). Therefore, the only way open to verbal forms to expand seems to be prefixation, e.g. in the sentence {?ali va?de ro beham namizane} 'Ali will not cancel the appointment' the underlined part is a verbal form composed of {be-}, {ham}, {na-}, {mi} {zan} 'stem', and {-?e} pronominal suffix, and all the constituents are prefixed to {-zane}.

and  $\{-?o\}$  as in:  $\{zad\underline{o}rd\}$  'quarrel', are not usually found at word final position, that is, they require the presence of further components to follow, and the words containing them are most generally compound (rather than complex) words, with such affixes linking the two constituents of the compounds together. Therefore such affixes are positionally different from what is generally referred to as prefix and suffix. Nevertheless they do not "appear within the consonant and vowel sequences of root forms", thus they cannot readily be referred to as infixes either. They seem to be closer to what has been called by Gleason (1966, p.60), 'stem-formatives' than to any of the other three classes of affix.

In this study such marginal cases are grouped with prefixes and suffixes because, as will be seen in the examples below, they express their relation with the stems through the same prosodic features as those which mark the relation between the stems and prefixes or suffixes, e.g.

i)  $CV + ?V + CV \rightarrow CV^J V^2 CV$  :  $\{pa\} + \{?a\} + \{pa\} \rightarrow \{pajapa\}$

in the same way as:

ii)  $CV + ?VCCV \rightarrow CV^J VCCV$  :  $\{pa\} + \{?ande\} \rightarrow \{pajande\}$

In i) the 'stem formative'  $\{?a\}$  has expressed its relation to the preceding constituent  $\{pa\}$  through J-prosody, just the same as the suffix  $\{-?ande\}$  'agentive' has in ii). The relation between the 'stem formative'  $\{?a\}$  and the following constituent is expressed through  $?-$ prosody just as the relation between the prefix  $\{ba\}$  and the stem  $\{davam\}$  in example iii) following, (see 8.4.11. below):

iii)  $CV + CV^2 CV \rightarrow CV^2 CV^2 CV$   $\{ba-\} + \{davam\} \rightarrow \{baddvam\}$  'lasting'

is a prefix and, perhaps, one could find historical evidence for this treatment, but there are two reasons against this treatment. Firstly the examples above do not share a common meaning that could be attributed to the prefix {far-} <sup>1</sup>, and secondly the stems that remain after the prefix is abstracted from the examples above do not occur elsewhere as words or as the constituents of a word (e.g. \*{zane} in the first example).

The same argument may be used against analyzing the following forms into prefixes {doɟ-} or {doɟ-} and {ʔan-}, and stems:

{doɟxim} 'bad nature'    {doɟman} 'enemy'    {doɟnam} 'curse'  
 {ʔandam} 'figure'    {ʔandɔam} 'end'    {ʔandɔoman} 'society'

For the reasons above such forms as {far-}, {doɟ-}, {ʔan-} etc. are excluded from the list above although they may historically be regarded as prefixes.

A general structure is set up for the prefixes as follows:

CV(C)

the structure may have y/w prosodies thus:

y/w CV(C)

Both h- and h-prosodies function at the onset part while the coda is always marked by h-prosody. In other words h/h contrast does not function at the coda thus:

h/h CV(C)

The C-system operating at the onset part comprises

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1. See Charles F. Hockett, 'A Course in Modern Linguistics', 1965, pp. 123-4, paragraph II.

four terms symbolized as B, D, N, H. The term H functions in  $\bar{h}$  structures, and the remaining terms in  $\underline{h}$  structures only, viz:

$$\begin{array}{cc} \bar{h}C-H & \underline{h}C-B/D/N \end{array}$$

The exponent of the term B is bilabial plosive, [b̥ b̥]

" " " " " D is denti-alveolar plosive,

[d̥ d̥]

" " " " " N is denti-alveolar nasal, [n̥]

" " " " " H is pre-glottal fricative [h̥].

Two V-systems are set up for the structures CV and CVC as follows:

$$\begin{array}{cc} CV_{AI} & CVC_A \end{array}$$

The exponents of A are [ə̥] in  $\bar{y}CV$ , and [ḁ̈] in  $^WCV$

The exponent of I is [i̥] in  $\bar{y}CV$ ;  $^WC_I$  is not found.

The exponent of A is [a] in  $\bar{y}CVC$ ;  $^WCAC$  is not found.

The C-system operating at the coda part has two terms R and N, thus:

$$-C_{R/N}$$

The exponent of the term R is alveolar rolled, [r̥]

The exponent of the term N is bilabial nasal, [m̥]

The structures of the prefixes may now be represented as:

$$CV_A: \bar{y}/\underline{h}_{BA}: \{be-\} \quad \bar{w}/\underline{h}_{BA}: \{b\alpha-\} \quad \bar{w}/\underline{h}_{NA}: \{n\alpha-\}$$

$$CV_I: \bar{y}/\underline{h}_{BI}: \{bi-\}$$

$$CVC_A: \bar{y}/\underline{h}_{BAR}: \{bar-\} \quad \bar{y}/\underline{h}_{DAR}: \{dar-\} \quad \bar{y}/\underline{h}_{HAN}: \{ham-\}$$

### 8.4.11. Statement of Prefix-Stem Prosodies

The junction between the prefixes and stem are marked by ?/? prosodies as follows:

#### I. ?-prosody

?-prosody functions at the junction of V or C-ending prefixes with V-beginning stems, viz.

<u>Prefix</u>	?	<u>Stem</u>
-V/-C	+	V-

The exponents of ?-prosody are: a) glottality, [ ~ ], at the junction of V-ending prefixes with V-beginning stems, viz.

<u>Prefix</u>	[ ~ ]	<u>Stem</u>
-V	+	V-

Exx.

CV + <sup>?</sup>VC → CV<sup>?</sup>VC : {bi-} + {<sup>?</sup>ab} → [bi<sup>~</sup>ab] 'barren'

CV + <sup>?</sup>VC V CV → CV<sup>?</sup>VCVCV : {na} + {<sup>?</sup>aʃena} → [na<sup>~</sup>aʃena] 'stranger'

b) Syllabification at the junction of C-ending prefixes and V-beginning stems, viz:

<u>Prefix</u>	[syllabification]	<u>Stem</u>
-C	+	V-

Exx.

CVC + <sup>?</sup>VCVCC → CV<sup>?</sup>CVCVCC : {ham} + {<sup>?</sup>ahang} → [hã<sup>~</sup>mãha:ŋʃ]

CVC + <sup>?</sup>VCVC → CV<sup>?</sup>CVCVC : {dar} + {<sup>?</sup>amad} → [dã<sup>~</sup>gãmad]

#### ii. ?-Prosody

?-prosody functions at the junction of V or C-ending prefixes with C-beginning stems, viz.

<u>Prefix</u>	?	<u>Stem</u>
-V/-C	+	C-

The exponents of ?-prosody are a) No glottality at the junction of V-ending prefixes with C-beginning stems, viz:

<u>Prefix</u>	[no glottality]	<u>Stem</u>
-V	+	C-

Exx.

CV + CVC → CV<sup>?</sup> CVC : {bi} + {xab} → {bixab} sleepless

CV + CVC → CV<sup>?</sup> CVC : {nā} + {gah} → {nagah} sudden

b) No syllabification at the junction of C-ending prefixes with C-beginning stems, viz:

<u>Prefix</u>	[no syllabification]	<u>Stem</u>
-C	+	C-

Exx.

CVC + CVC → CVC<sup>?</sup>CVC : {ham} + {kar} → {hamkar} 'colleague'

CVC + CVCVC → CVC<sup>?</sup>CVCVC : {dar} + {gozast} → {dargozast} 'death'

#### 8.4.20. Prosodies of Junction of Suffix with Stem

#### 8.4.21. Class A and Class B Suffixes

Suffixation is extremely common with nominal words, and suffixes by far exceed prefixes in number, structure and application. Two classes of suffixes are distinguished and referred to as Class A and B. The grammatical and phonological justification for this classification is as follows:

Grammatically Class A suffixes stand on the borderline between suffixes and particles (see 9.1. and 9.6.). That is to say, such suffixes, like the particles, stop further affixation of the word. In other words, once a suffix of Class A is added to a stem, there is no possibility of introducing a new affix to the resultant form. Consider the examples below:

{tefl}	'child' + {?ak}	→{teflak}	'little child'
{baba}	'fellow' + {?ak}	→{babahak}	'poor fellow'
{name}	letter + {ha}	→{nomeha}	'letters'

Both {-?ak} and {-ha} are Class A suffixes. As a result of the addition of these suffixes to the stems {tefl} {baba} and {name}, no further affixes can be added. The only bound forms which may occur after a suffix of this class are the particles which are not considered as part of the word for reasons given later (see 9.3.).

Furthermore, {-ha} is, perhaps, the only inflectional suffix in Persian.<sup>1</sup> It is an inflectional suffix because it imposes certain syntactic restrictions on the resultant complex nominals<sup>2</sup> (e.g. {?amaleha} 'the workers', can function in {... kare<sup>s</sup>un o tam<sup>a</sup>m kardan(d)} '... finished their work', but it cannot function in {...kare<sup>s</sup> o tam<sup>a</sup>m kard} '...finished his work', where the word {?amale} may occur).

Suffixes of Class A cannot be included among the particles because when added to stems they form a part of the word and, unlike the particles, cannot be separated from

- 
1. The plural suffix {-?an} is becoming archaic so that it is already hard to consider it as a feature of the colloquial dialect although it is not possible to exclude it entirely. However {-?an} is, in this respect, like {-ha} except that it is limited to the written and literary styles.
  2. "Broadly speaking inflectional formations, or alternations are those which uniquely determine and restrict the grammatical functioning of the resultant word forms ..." Prof. R.H. Robins, 'General Linguistics', 1966, p.267.

the stem. Stem and suffixes, therefore, meet the criteria set up for defining words (see 8.1.). Apart from this, they differ from the particles in their accentual patterns and show the same characteristics in this respect as other suffixes (see 8.6.3.).

Class B suffixes, on the other hand, do not theoretically impose any restriction on further expansion of the resultant complex nominal word so that the resultant word can still be further affixed or compounded, e.g.

{dan}	'know'	stem +	{-ʔeʃ}
{daneʃ}	'knowledge'	+	{-mand}
{daneʃmand}	'knowledgeable'	+	{-ʔane}
{daneʃmandane}	'scientifically'	+	{na-}
{nadaneʃmandane}	'unscientifically'	etc.	

Phonologically Class A suffixes differ from Class B in that the former express their relation with the stem through H-prosody of junction and the latter through J, ə/ə prosodies of junction as will be described below (8.4.23.).

#### 8.4.22. Syllable Structure of Suffixes

The following suffixes have been found in use and are felt to be productive as far as the present stage of the dialect under observation is concerned:

##### Class A:

{-ʔak, -ʔake, -ʔaki, -ha} <sup>1</sup>

##### Class B:

{-ʔi, -ʔe, -ʔa, -ʔu}

---

1: Contrary to other V-beginning bound forms, which are generally marked by ʔ-initial prosody (see 8.2.) the suffix {ha} is marked by h-prosody in isolation (see also footnote 1 in 8.4.23.I. below).

{-?in, -?eʃ -?an, -?ur, -?un, -?om, -? an,  
-? ar, -?a k, -? a t }<sup>1</sup>

{-?ine, -? ane }

{-?and }

{-?ande }

{-tʃi , -tʃe , -va -ta }

{-gin, -sir, -sar, -var, -gar, -tar, -vaʃ

-far, -g un, -g ah, -ka r, -ga r, -za r,

-ka m, -ba r, -sa r, -va r, -s en, -ba n,

-d an, -ja r, -na k, -ma n, -la x, -va n,

-fa m }.<sup>2</sup>

{-mand, -vand }

{-sta n }

{-kade }

Suffixes have the following syllable structures.

The V-beginning suffixes are marked for ?-initial prosody when given in isolation:

?v, ?VC, ?VCC, ?V-CV, ?VC-CV  
CV, CVC, CVCC, CCVC, CV-CV

The structures above may be represented in four generalized structures as follows:

1) (C)V(C), 2) (C)VCC, 3) CCVC, 4) (C)V(C)-CV

The structure 1) may have y/w prosodies; 2) has y-prosody and 3) w-prosody only. The first syllable in 4) may have y/w and the second syllable y-prosodies, thus:

- 
1. The suffixes {-?is} and {-?iz} are non-productive and archaic and are, therefore, excluded.
  2. The suffixes {-taʃ} and {-ʃa r} are non-productive and archaic. They are excluded from the list.

- 1)  $y/w(C)V(C)$ ,                      2)  $y(C)VCC$ ,  
 3)  $wCCVC$ ,                              4)  $y/w(C)V(C)-yCV$

The structure 1) may have  $h/h$  onset and  $h/h$  coda, 2) has  $h$  onset, and  $h$  coda, 3)  $h$  onset and  $h$  coda, and the first syllable in 4) has  $h$  onset and  $h$  coda, the second syllable has  $h$  onset, viz:

- 1)  $h/h(C)V(C)h/h$ ,                      2)  $h(C)VCC$ ,  
 3)  $hCCVC$ ,                              4)  $h(C)V(C)h-hCV$

1)  $y/w(C)V(C)$

A C-system comprised of four sub-systems, symbolized as P, N, L and F, is set up for the onset C-place, thus:

$C-P/N/L/F$

The exponent of P is plosiveness

The exponent of N is nasality at the C and V places

The exponent of L is liquid continuance

The exponent of F is friction.

P and F function in  $h/h$  structures and N and L in  $h$  structure only, viz.

$h_C-P/F$

$h_C-P/F/N/L$

P consists of four terms symbolized as B, D, Č and

K viz.

$$P_{B/D/\check{C}/K}$$

The exponent of B is bilabiality

The exponent of D is denti-alveolarity

The exponent of  $\check{C}$  is palato-alveolarity

The exponent of K is palato-velarity.

The term B functions in  $\underline{h}$  structures, and  $\check{C}$  in h-structures only; D and K function in  $h/\underline{h}$  structures, viz.

$$hP_{D/\check{C}/K}$$

$$hP_{B/D/K}$$

N consists of two terms symbolized as B and D

viz.

$$N_{B/D}$$

The exponent of B is bilabiality

The exponent of D is denti-alveolarity.

L consists of two terms symbolized as L and J,

viz.

$$L_{L/J}$$

The exponent of L is laterality

The exponent of J is palatality.

F consists of two terms symbolized as  $f$  and S,

viz.

$$F_{f/S}$$

The exponent of  $f$  is labio-dentality

The exponent of S is alveolarity.

A V-system comprised of two terms symbolized as I and A is set up for the syllabic place, viz.

$$V_{I/A}$$

The exponents of I are: [i] in y- and [u] in w-structures

The exponents of A are: [a] in w-structures, [e] in y-structures when the syllable is CV, or when it is ?VC with  $\int$  functioning at its coda only (e.g. in:  $\{-?e\int\}$ ), and [a] elsewhere in y-structure.

A C-system comprised of four sub-systems symbolized as P, N, L and F is set up for the coda C-place, viz.

$$-C_{P/N/L/F}$$

The exponents of the sub-systems are as above in the onset C-system.

P and F function in h-structures, and N and L in h structures only, viz.

$$\underline{h}C_{P/F}$$

$$\underline{h}C_{N/L}$$

P consists of two terms symbolized as D and K, viz.

$$P_{D/K}$$

The exponents of D and K are as above in the onset C-system.

N consists of two terms symbolized as B and D, viz.

$$N_{B/D}$$

The exponents of B and D are the same as in the onset C-system.

L consists of one term symbolized as R, viz.

$$L_R$$

The exponent of R is roll.

F consists of three terms symbolized as  $\int$ , X and H, viz.

$$F \int /X/H$$

The exponent of  $\int$  is pre-palatality

The exponent of X is uvularity

The exponent of H is pre-glottality.

### 2) $\int$ (C)VCC

A C-system comprised of two terms, symbolized as N and F, is set up for the onset C-place, viz.

$$C-N/F$$

The exponent of N is bilabial nasal, symbolized as B

The exponent of F is denti-alveolar fricative,  
symbolized as  $f$ .

An open V-element functions at the syllabic part. This is symbolized as A and its exponent is [a].

A nasal and a stop C-element function at the first and second places of the complex coda, the two C-elements are homorganic and of denti-alveolar nature. They are symbolized as ND. Three suffixes belong to this structure as follows:

$${}^?AND : \{-?and\} \quad , \quad fAND : \{-vand\} \quad , \quad BAND : \{-mand\}$$

### 3) $\int$ CCVC

A fricative and a stop C-element function at the onset places. The former is alveolar, symbolized as S, and the latter is denti-alveolar, symbolized as D. An open V-element functions at the syllabic part. This is also symbolized as A and its exponent is [a]. A nasal

element functions at the coda C-place. It is denti-alveolar and symbolized as N. One suffix belongs to this structure as follows:

SDAN: {-st a n}

4) y/w(C)V(C)-CV

A stop C-element functions at the onset of the first syllable. It is of palatal nature, symbolized as K.

A V-system consisting of two terms symbolized as I and A functions at the syllabic place in the first syllable.

The exponent of I is [i] in y-structures. I does not function in w-structures.

The exponents of A are [a] in y- and [a] in w-structures.

A nasal C-element functions at the coda of the first syllable; it is of denti-alveolar nature and symbolized as N.

A C-system of three terms symbolized as N, D and K functions at the onset of the second syllable.

The exponent of N is denti-alveolar nasal

The exponent of D is denti-alveolar stop

The exponent of K is palatal stop.

A V-system of two terms, symbolized as I and A functions at the syllabic part of the second syllable.

The exponent of I is [i]

The exponent of A is [e].

Six suffixes belong to this structure as follows:

?AKA : {-?ake}

?AKI : {-?aki}

?INA : {-?ine}      ?ANA : {-?ane}  
 ?ANDA : {-?ande}      KADA : {-kade}

#### 8.4.23. Statement of Stem-Suffix Prosodies

The relation between the stem and suffixes is expressed through the following three prosodies:

I) H-prosody, marking the junction of stem with Class A suffixes;

II) J-prosody, marking the junction of stem with V-beginning suffixes of Class B.

III) ə/ə -prosodies marking the junction of stem with C-beginning suffixes of Class B.

#### I. H-prosody

Class A suffixes are all V-beginning, and their relation to the stem is expressed through H-prosody. The stems may be V- or C-ending, viz.

<u>Stem</u>	H	<u>Class A Suffix</u>
-V/-C	+	V-

The exponents of H-prosody are: a) [ h̥ ] when the stem is V-ending, viz.

<u>Stem</u>	[ h̥ ]	<u>Class A Suffix</u>
-V	+	V-

Exx.

CV + <sup>H</sup>V → CV<sup>H</sup>V : {pa}+{-ha}→{paha} 'feet'

CV + <sup>H</sup>VC → CV<sup>H</sup>VC : {pa}+{-?ak}→{pahak} 'insects' claws

1. Unlike other V-beginning suffixes {-ha} is marked by H-prosody even in isolation whereas others are marked by ?-initial prosody (8.2.). In formal and literary styles the contour [h̥] at the onset of the form may also be treated phonematically and the form be represented as CV, because in such styles [h̥] is retained with C and V ending stems and the relation between stem and {-ha} is marked by ə/ə prosodies (see III. below), e.g.

CVC + CV → CVC<sup>ə</sup>CV : {bar}+{-ha}→{baroha} 'many times'

CVC + CV → CVC<sup>ə</sup>CV : {sar}+{-ha}→{sarha} 'heads'

$CVCV + {}^H V \rightarrow CVCV^H V$  : {xane} + {-ha} → {xaneha} 'houses'  
 $CVCV + {}^? VCV \rightarrow CVCV^H VCV$  : {d<sub>3</sub>udze} + {<sup>?</sup>aki} → {d<sub>3</sub>udzehaki}  
 'poor little chicken'

b) Syllabification when the stem is C-ending, viz.

<u>Stem</u> [syllabification]	<u>Class A Suffix</u>
-C	+
	V-

Exx.

$CVCVC + {}^H V \rightarrow CVCV^H -CV$  : {ketab} + {-ha} → {keta-ba} 'books'  
 $CVCC + {}^? VC \rightarrow CVC^H -CVC$  : {tefl} + {-<sup>?</sup>ak} → {tef-lak} 'little  
 child'  
 $CVCCVC + {}^? VCV \rightarrow CVCCV^H -CVCV$  : {doxtar} + {-<sup>?</sup>aki} → {doxta-raki}  
 'little daughter'

## II. J-Prosody

J-prosody marks the junction of C or V-ending stems with V-beginning suffixes of Class B, viz.

<u>Stem</u>	J	<u>Class B Suffix</u>
-V/-C	+	V-

The exponents of J-prosody are: a) [j ʃ g d<sub>3</sub>] at the junction of V-ending stems with the suffixes, viz.

<u>Stem</u>	[j ʃ g d <sub>3</sub> ]	<u>Class B Suffix</u>
-V	+	V-

Exx.

$CVCV + {}^? V \rightarrow CVCV^J V$  : {xoda} + {-<sup>?</sup>i} → {xodaji} 'godly'  
 $CVCV + {}^? VC \rightarrow CVCV^J VC$  : {xoda} + {-<sup>?</sup>an} → {xodajan} 'gods'  
 $CVCV + {}^? V \rightarrow CVCV^J V$  : {xane} + {-<sup>?</sup>i} → {xaneji} 'domestic'  
 $CVCCVCV + {}^? VC \rightarrow CVCCVCV^J VC$  : {ruzname} + {-<sup>?</sup>at} → {ruznamed<sub>3</sub>at}  
 'newspapers'

b) Syllabification at the junction of C-ending stem with the suffixes, viz.

<u>Stem</u>	<u>syllabification</u>	<u>Class B Suffix</u>
-C	+	-V

Exx.

CVC	+ ?V → CV <sup>J</sup> CV	: {kar} + {-?i} → {kā-ri} 'hard working'
CVCC	+ ?VC → CVC <sup>J</sup> CVCC	: {tʃeʃm} + {-?an} → {tʃeʃ-man} 'eyes'
CVC	+ ?VC → CV <sup>J</sup> CVCC	: {baʒ} + {-?at} → {ba-gat} 'gardens'

#### Notes on the Exponents of J-Prosody

1) As stated above the exponents of J-prosody at the junction of V-ending stem with suffixes are [ʃ j g dʒ]. The following are some explanations for this phonetic diversity:

[ʃ] and [g] are phonetically conditioned, that is to say, [ʃ] appears in y-syllables when the stem also ends in <sup>y</sup>CA, [g] appears in w-syllables when the stem ends in <sup>y</sup>CA, e.g.

CVC <sup>y</sup> CA	+ <sup>y</sup> ?V → CVC <sup>y</sup> CA <sup>Jy</sup> V	: {bande} + {-?i} → {bandeʃi} 'slavery'
CVC <sup>y</sup> CA	+ <sup>w</sup> ?VC → CVC <sup>y</sup> CA <sup>Jw</sup> VC	: {bande} + {?an} → {bandegan} 'slaves'

[ʃ g] and [j] are grammatically conditioned, in that [ʃ] marks the junction of stem with {-?i} 'relative suffix', [g] marks the junction of stem with {-?an} 'plural and relative suffixes', both of which are homophonous, and [j] marks the junction of stem with other suffixes, e.g.

CV	+ ?CVCCV → CV <sup>J</sup> VCCV	: {dʒu} + {-?ande} → {dʒujande} 'seeker'
----	---------------------------------	--

[dʒ] is an Arabicized variation of [ʃ] and [g] resulting from the fact that no originally Arabic symbol for the sounds above exist in the Arabic script adapted for Persian and, the Arabic orientated classical scholars refrained from using the Persian symbol for the sounds [ʃ g]. Instead they symbolized the sound by the Arabic

symbol used to represent the sound [dʒ], which resulted in the existing variation.

2) Some Arabic loans ending in a V are related to the suffix {-ʔi} by [v], as they are in Arabic which also have the same suffix. In this case the stem final V is replaced by [a], e.g.:

{mus a} - 'Moses' + {-ʔi} → {musavi} 'of Moses'  
 {Gazi} 'judge' + {-ʔi} → {Gazavi} 'of judge'

But this is not a general rule in Persian, e.g.

{tamaʃa} 'watching' (Arabic loan) + {-ʔi} → {tamaʃaji} 'spectacular'

By analogy with the Arabic loans some Persian words are also related to {-ʔi} or {-ʔom} with [v] e.g.

{sari} + {-ʔi} → {saravi} 'of Sari' (name of a town),

{se} + {-ʔom} → {sevvom} 'third' (see also 8.8.21.).

3) The word {ba zu} 'arm' is related to the suffix {-ʔan} 'plural' with [w], and the final vowel [u] becomes more open, e.g.

{ba zu} + {-ʔan} → {bazowan} 'arms'

This is an exception. The remaining [u] ending stems have J-prosody, e.g.

{mahru} 'pretty' + {-ʔan} → {mahrujan} 'pretty' (ones)

### III. ə/ə Prosodies

The prosodies above function at the junction of stem with C-beginning suffixes of Class B as follows:

əfunctions at the junction of -CC (complex coda) ending stem with C-beginning suffixes, and -C (simple coda) ending stem with C-beginning suffixes, the latter only when -C is preceded by an inherently long V. The inherently long Vs are in this relation marked by - placed

over the symbols, e.g.:  $\bar{A}$  and  $\bar{I}$ , viz.

<u>Stem</u>	$\bar{\varnothing}$	<u>Class B Suffix</u>
$-CC/-VC_{\bar{A}, \bar{I}}$	+	C-

The exponent of  $\bar{\varnothing}$  is a syllabic element which syllabifies with the last C in the preceding coda. The phonetic nature of  $\bar{\varnothing}$  is largely determined by the phonetic contexts (see 7.3.3.).  $\bar{\varnothing}$ -prosody may not be phonetically realized but in the majority of examples it is.

Exx.

$c\bar{V}C + CVC \rightarrow c\bar{V}C^{\bar{\varnothing}}CVC$	:	{jad} + {gar}	→	{ja-de gar}	‘memory’
$^{\bar{\varnothing}}V\bar{C} + CVC \rightarrow c\bar{V}C^{\bar{\varnothing}}CVC$	:	{ʔas} + {man}	→	{ʔa-seman}	‘sky’
$c\bar{V}C + CVC \rightarrow c\bar{V}C^{\bar{\varnothing}}CVC$	:	{dʒan} + {var}	→	{dʒa-navar}	‘animal’
$^{\bar{\varnothing}}VC\bar{V}C + CVC \rightarrow ^{\bar{\varnothing}}VC\bar{V}C^{\bar{\varnothing}}CVC$	:	{ʔamuz} + {gar}	→	{ʔamu-zegar}	‘teacher’
$c\bar{V}C + CVC \rightarrow c\bar{V}C^{\bar{\varnothing}}CVC$	:	{pas} + {ban}	→	{pa-seban}	‘police’
$CVCC + CVC \rightarrow CVCC^{\bar{\varnothing}}CVC$	:	{baxt} + {jar}	→	{bax-ti jar}	‘fortunate’
$CVCC + CVC \rightarrow CVCC^{\bar{\varnothing}}CVC$	:	{sowg} + {var}	→	{sow-ga var}	‘mournful’
$c\bar{V}C + CVC \rightarrow c\bar{V}C^{\bar{\varnothing}}CVC$	:	{kar} + {gar}	→	{ka-regar}	‘worker’

$\bar{\varnothing}$  functions at the junction of V-ending stem with C-beginning suffixes, and -C (simple coda) ending stem with C-beginning suffixes, the latter only when -C is preceded by an inherently short V. The inherently short V is left unmarked, e.g. E and A, viz.

<u>Stem</u>	$\bar{\varnothing}$	<u>Class B Suffix</u>
$-V/VC_{EA}$	+	C-

The exponent of  $\bar{\varnothing}$  is absence of syllabic element and no possibility of having a syllabic element.

Exx.

$CVCV + CVC \rightarrow CVCV^{\bar{\varnothing}}CVC$	:	{lale} + {zar}	→	{lalezar}	‘lilac field’
$CVC + CVC \rightarrow CVC^{\bar{\varnothing}}CVC$	:	{dar} + {ban}	→	{darban}	‘doorkeeper’
$CVCV + CVC \rightarrow CVCV^{\bar{\varnothing}}CVC$	:	{gute} + {var}	→	{gutevar}	‘floating’



### 8.5.1. Junction Prosodies of Class A Compounds

Class A compounds express the relation between their components through special affixes whose function is merely to link the constituents of the compounds together. Such affixes are referred to as 'stem formative' (see 8.4.), and the relations between the stem formatives and the preceding and following components are expressed through junction prosodies of prefix-stem and stem-suffix respectively as mentioned earlier (8.4.).

The major stem formatives are given below with examples to illustrate their prosodic relations with other components of compound words:

- 1) {?a} : CV + ?V + CV → CV<sup>J</sup>V<sup>2</sup>CV : {pa} + {?a} + {pa} → {pajapa} 'barter'
- 2) {?o} : CVC + ?V + CVCC → CV<sup>J</sup>CV<sup>2</sup>CVCC : {zad} + {xord} → {za-doxord} 'quarrel'
- 3) {bar} : CV + CVC + CV → CV<sup>∅</sup>CVC<sup>2</sup>CV : {pa} + {bar} + {dza} → {pabardza} 'steady'
- 4) {ta} : CVC + CV + CVC → CVC<sup>∅</sup>CV<sup>2</sup>CVC : {sar} + {ta} + {sar} → {sartasar} 'throughout'
- 5) {dar} : CVC + CVC + CVC → {CVC<sup>∅</sup>CVC<sup>2</sup>CVC} : {dah} + {dar} + {sad} → {dahdarsad} '10%'
- 6) {be} : CV + CV + CV → CV<sup>∅</sup>CV<sup>2</sup>CV : {do} + {be} + {do} → {dobedo} 'in rows of two.'

As shown above the relation between the stem formative affixes and preceding components is marked by the same junction prosodies as function at the junction of stem with suffixes (i.e. J and ∅/∅ prosodies but not H-prosody which is limited to Class A suffixes), and the relation between the stem formatives and following components is marked by the same junction prosodies as mark the junction of prefixes with stem (i.e. ?/?).

Traditionally the stem formative affixes are considered as prepositions except for {?o} which is classed among conjunctions (i.e. it is regarded as {va} : [vã wõ ö] 'and'), and {?a} which is classed among affixes. In this thesis all these forms are regarded differently from conjunctions and prepositions for the following reasons:

Both prepositions and conjunctions constitute independent word classes which enter directly into syntactic constructions of phrases and sentences and function like any other words, within the larger grammatical units.<sup>1</sup> Neither prepositions nor conjunctions could be said to have any role in the morphological process of word formation except that they may constitute the components of compound words (e.g. {dar} 'preposition', in {dargoza,t} 'passed away'). It is obvious that the role of the stem formatives differs from the syntactic functions of prepositions, (e.g. {ru} in {ru je miz} 'on the table'), and conjunctions (e.g. {va}<sup>2</sup> in {to wo man} 'you and me') or from the role of {dar} in {dargoza,t} above. In the latter case {dar} is different from the stem formatives in that while {dar} has combined with {goza,t} 'passed' directly and made the new word {dargoza,t} 'passed away', thus adding to the meaning of the word, the stem formatives

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1. See R.H. Robins, 'General Linguistics', 1965, p.227; and John Lyons, 'Introduction to Theoretical Linguistics', 1968, pp. 273 and 302.

2. For the explanation of the variations {va} and {wo} see 9.6.11.

merely link the preceding and the following constituents together and, apart from this, they do not have other grammatical functions.

In view of the differences between the stem formatives and the prepositions and conjunctions, the former are considered as members of a separate class whose function is morphological and whose status is as bound forms. The fact that historically they may or may not be prepositions and conjunctions, or, that they are homophonous with the prepositions and conjunctions is not relevant.

#### 8.5.2. Junction Prosodies of Class B Compounds

Class B compounds express the relation between their components through ?- and ə/ə prosodies as follows:

##### I. ?-Prosody

The above prosody functions at the junction of V or C-ending components with V-beginning components of compound words, viz.

<u>Component</u>	?	<u>Component</u>
-V/-C	+	V-

The exponents of ?-prosody are a) Glottality [ ~ ] at the junction of V-ending components with V-beginning ones, thus:

<u>Component</u>	[ ~ ]	<u>Component</u>
-V	+	V-

Exx.

CV + <sup>?</sup>VCVC → CV<sup>?</sup>VCVC : {ru} + {ʔavar} → {ruʔavar} 'loading towards'  
 CVCV + <sup>?</sup>VCCVC → CVCV<sup>?</sup>VCCVC : {ziba} + {ʔandam} → {zibaʔandam} 'athletic'

b) Syllabification at the junction of C-ending components with V-beginning ones, viz.

<u>Component</u>	[Syllabification]	<u>Component</u>
-C	+	V-

Exx.

CVC + <sup>?</sup>VC → CV<sup>?</sup>CVC : {ʃad} + {ʔab} → {ʃa-dab} 'cheerful'  
 CVC + <sup>?</sup>VCVC + CV<sup>?</sup>CVCVC : {dar} + {ʔamad} → {da-ramad} 'income'

## II. ə/ə Prosodies

The two prosodies above function at similar junctions within compound words to those described in relation to the complex words and they have the same exponents (see 8.4.23.III. above), thus:

<u>Component</u>	ə	<u>Component</u>
-CC/-VC <sub>AI</sub>	+	C-

and

<u>Component</u>	ə	<u>Component</u>
-V/VC <sub>EA</sub>	+	C-

Exx.

ə -Prosody:

c̄VC + CVC → c̄VC<sup>ə</sup> CVC : {pir} + {zan} → {pi-rezan} 'old woman'  
 c̄VC + CVC → c̄VC<sup>ə</sup> CVC : {kam} + {jab} → {ka-mijab} 'satisfied'  
 CVCC + CVC → CVC<sup>ə</sup> CVC : {bord} + {bar} → {bor-do bar} 'patient'  
<sup>?</sup>VC + CV → <sup>?</sup>VC<sup>ə</sup> CV : {ʔab} + {ru} + {ʔaboru} 'prestige'

ə-prosody may/in quick speech be realized phonetically. Or in some examples this possibility is stronger, e.g.

c̄VC + CVC → c̄VC<sup>ə</sup> CVC : {din} + {dar} → {dindar} 'religious'

But in the majority of examples it is realized. In some cases there are two variant forms, one with and one without the realization of the prosody, e.g.

c̄VC + CVC → c̄VC<sup>ə</sup> CVC : {mah} {tab} → {mahtab} or {ma-hotab} 'moonlight'

In all such cases ə-prosody differs from ɔ̄-prosody in that the latter has no possibility of having a syllabic element in all cases.

#### ə-Prosody

CVC + CVCC → CVC<sup>ə</sup>CVCC: {sar} + {saxt} → {sarsaxt} 'stubborn'  
 CVC + CVC → CVC<sup>ə</sup>CVC: {dɛl} + {dar} → {dɛldar} 'courageous'  
 CVCV + CVC → CVCV<sup>ə</sup>CVC: {xoda} + {dad} → {xodadad} 'God's gift'

### 8.6. Accentual Patterns

In Part I (4.4.), various factors which render a syllable more prominent than others were described and a method of classification was suggested, according to which different degrees of prominence were grouped into four classes on the basis of their pitch variations and their degrees of stress as follows:

- 1) Primary Prominence, associated with changing pitch and primary stress;
- 2) Secondary Prominence, associated with mid level pitch and secondary stress;
- 3) Tertiary Prominence, associated with low level pitch and tertiary stress;
- 4) Emphatic Prominence, associated with high level or changing pitch and emphatic stress.

In the present section the term 'accent' and its associated forms will be used to refer to phonetic prominence in relation to its phonological function. Accent, therefore, implies pattern, structural significance and function while prominence merely denotes observable phonetic factors.

### 8.6.1. Accent, a Word Prosody

Accent is abstracted at word level as a prosodic feature of word, rather than of syllable for the reason that it marks the unity and boundary of word and not of syllable. Although accent is carried over the syllable within a word, it is not the structure or type of syllable that determines the type of accent, rather it is the position of the syllable in the word and its relation to the whole structure of the word, as well as the grammatical class to which the word belongs (i.e. whether it is a noun, verb, etc.). Consider the following examples: {divar<sup>1</sup>} 'wall', {divar<sup>1</sup>e} 'hedge' {sargoza<sup>1</sup>t} 'life story'. The last syllables of the words above differ from each other structurally and prosodically except that they all share the same type of accent (i.e. they all carry primary accent, see below) because they all occupy similar positions in the words, viz. final position. This particular type of accent is therefore, a feature of word and marks the end of the word regardless of what type of syllable functions at that position. The same applies to other types of accent as is shown below.

### 8.6.2. Types of Accent

Emphatic accent aside, three types of accent are distinguished for nominal words as follows:

- 1) Primary accent. Exponents: A change in the direction of pitch within the syllable accompanied by primary stress and longer duration of vowels when compared with the same vowel in a syllable of the same

structure but without primary accent. In some cases it is also accompanied by gemination at syllable boundaries (see 8.8.)

Primary accent is marked by ' placed over the start of the relevant syllable.

- 2) Secondary accent: Exponents: Mid level pitch accompanied by secondary stress, and shorter duration of vowels than that observed with the same vowel in comparable syllables carrying primary accent. In some cases it may be accompanied by gemination as well (see 8.8.).

Secondary accent is marked by , placed under the start of the syllable.

- 3) Tertiary accent. Exponents: Low level pitch accompanied by tertiary stress and the shortest duration of vowels when compared with the same vowels in comparable syllables carrying other accents.

Tertiary accent is left unmarked.

In addition, a fourth degree of accent is set up whose phonological functions differ from those of the above accents as described below and that is:

- 4) Emphatic accent. Exponents: Emphatic stress accompanied by extra long duration of vowels and high changing or level pitch.

Emphatic accent is marked by " placed over the start of the relevant syllable.

### 8.6.3. Bound Positions Versus Fixed Positions

All accents except the emphatic are BOUND to particular positions in the structure of nominal words in the sense that no matter how far the morphological composition of the nominal word is expanded (through affixation or compounding), the accents always mark the same positions in the structure of the word. They are not FIXED in the sense that they are shifted to new syllables as new elements are added to the word (unless the new elements are particles in which case they do not enter into morphological construction with nominal words as will be described later (see Chapter 9). Therefore, although the accents do shift from one syllable to another as part of morphological process of word formation, they remain bound to specific positions in the word. Consider the following examples:

{<sub>1</sub>da 'neʃ}      'knowledge'  
 {<sub>1</sub>daneʃ'mand}      'knowledgeable'  
 {<sub>1</sub>daneʃmandəne}      'in the manner of the knowledgeable (man)'  
 {<sub>1</sub>bidəneʃ}      'ignorant'

In the examples above the primary accent is bound to the final syllable of the words and as a new suffix is added it is shifted to the final syllable of the new element. Similarly the secondary accent is bound to the initial syllable and when a new element (such as {bi-}) is introduced to the word, it is shifted to the initial syllable of the new element. Thus accents are bound to particular positions in the word but they are not fixed in the sense described above.

#### 8.6.4. Patterns

8.6.41. Primary Accent: It is always bound to the final syllable of nominal words, whether the words be simple, complex or compound. Mono-syllabic words have primary accent on their one syllable. When a new suffix is added to the word the accent shifts over to the final syllable of the suffix, e.g.

{ 'baxʃ } 'share'  
 { bax 'ʃeʃ } 'generosity'  
 { baxʃeʃ 'gar } 'generous'  
 { baxʃeʃga 'ri } 'being generous'

{ baxʃeʃgari 'ha } 'showing instances of generosity'

The suffixes {-ʔeʃ}, {-gar}, {-ri} and {-ha} in the examples above have shifted the accent to the final syllable of the resultant form. If the new element following the word does not constitute a morphological component of the word, but marks it for a syntactic function, the accent is not shifted,

e.g.

{ 'kar } + { ra } → { 'karo }<sup>1</sup> as in { 'kar o tamam kard } 'He finished the job'  
 { 'kar 'gar } + { ʔe } → { 'kar 'gar e } as in { 'kar 'gar e 'xubi je } 'He is a good worker'

In the first example above the form [o] of the particle {ra} does not constitute a component of the word {kar}, that is even after the introduction of [o] the word is still a simple monomorphemic one which is marked by the particle for a specific function in the syntactic construction (viz. objective). The primary accent is, therefore, not shifted

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1. For the description of variations of form of the particles see 9.6.5. and 9.6.11.

to [o]. Similarly in the second example the form [e] of the particle {?e} does not constitute a part of the word {k ar'gar}. It marks the word for a syntactic function in an 'ezafe construction' (see 9.6.5.). The accent is, therefore, not shifted to it. The same factor also prevents the shifting of primary accent from {'xub} to {?i} or {?e} which follow it. (For experimental findings see 10.3.4.).

As implied in the statement above nominal words have no primary accent when they constitute the non-final components of compound words but they are accented when they are the final part of the compounds, e.g.

{sar'baz} 'soldier', but {sarbazxa'ne} 'army camp'  
 {go'lab} 'rosewater', but {golab'pas} 'rose water spray'

8.6.42. Secondary Accent: It is always bound to the first syllable in poly-syllabic nominal words whether the words be simple, complex or compound. Monosyllabic words do not have secondary accent, e.g.

{ho'nar} 'art'

The addition of a new prefix to the beginning of words causes shifting of the secondary accent to the first syllable of the resultant form, e.g.

{bi-} + {ho'nar} → {biho'nar} 'tactless'  
 {dar} + {go'zast} → {dargo'zast} 'death'

But if the element preceding a word does not constitute a component of the word (i.e. if it is a preposition or other separate word), then the accent is not shifted, e.g.

1) {dar go'zast e zaman} 'In the passing of the time...'

as compared with:

2) {,dargo'zast e ʔu} 'his death'

or:

3) {dar ʔamador'raft e ʔu} 'in his frequenting (the place)'

as compared with

4) {,daru'mad e ʔu} 'his income'

In 1) and 3) the word {dar} 'in' is not a part of the words following it; therefore, the secondary accent does not fall on it. But in 2) and 4) {dar} is affixed to the words, therefore, it is marked by secondary accent for word initial position.

As is implied in the statement above, when a word functions as a medial constituent of a complex or compound word, it does not have secondary accent, e.g.

{,xofu'jand} pleasant, but {,naxofu'jand} unpleasant

8.6.43. Tertiary Accent: It is bound to all but the first and the final syllables of poly-syllabic nominal words.

Mono- and disyllabic words do not have tertiary accent, e.g.

1) {,dargo'zast} 'death'

2) {,nabehan'gam} 'suddenly'

The second syllable in 1) and the second and third syllables in 2) are marked by tertiary accent for word medial positions.

When a word functions as the medial component of a compound or complex word, all its syllables have tertiary accent, e.g.

{bi} + {ʔabo'ru} + {ʔi} → {,biʔaboru'ji} infamy

In the resultant form above all the three syllables in {ʔaboru} are marked by tertiary accent for word medial position.

8.6.44. Emphatic Accent: It has two different functions:

a) Emphasis, b) Contrast, each requiring a different

phonological statement as follows:

a) When used for emphasis, the word has the same accentual pattern (i.e. primary accent in final position, secondary in initial, and tertiary in medial positions), but it is articulated on a higher pitch level or a higher starting point than when not emphasized. Thus in a word with type a) emphatic accent, the primary, secondary and tertiary accents are associated with higher pitch, accompanied by extra breath force and extra duration of vowels. This type of emphasis is symbolized by " used to indicate both primary and secondary accent in the same word, e.g.

{ "pijna" had } suggestion (emphasized)  
 { "xoda" vand } God ( " )

b) When used for contrast, only the syllable being contrasted has emphatic accent, that is, it has high level or changing pitch according to its position in the word. Thus if the syllable is in initial or medial position in a word, it has high level pitch, e.g.

{ mo "fas 'sal } 'extensive', as contrasted with { ,mavassal }  
 'connected'  
 And if the syllable is in the final position in a word it has high changing pitch, e.g.

{ na "had } 'nature', as contrasted with { na'hal } 'plant'  
 Type b) emphatic accent may fall on a syllable which is not part of the structure of the word, but belongs to a particle marking it, e.g.

{ toxme "morg } 'egg' as contrasted with { toxmb'org } 'egg and  
 hen'

#### 8.6.5. Accentual Patterns and Word Classes

Verbal forms have different accentual patterns from nominal words. To give a full account of the verbal

accentual patterns is beyond the scope of this thesis. No attempt will, therefore, be made to deal with the accentual patterns of the verb here; instead a brief comparison is made between the so-called 'simple and compound verbs',<sup>1</sup> and the nominal words.

Simple verbs have primary accent on the last syllable of the root if no verbal prefixes are affixed to them. If the root is mono-syllabic, the accent falls on the one syllable of the root, e.g.

{ 'goft } + { ?am } → { goftam } 'I said'  
 { gozast } + { ?am } → { gozastam } 'I passed'  
 { talabid } + { ?am } → { talabidam } 'I asked for'

But simple verbs have primary accent on the first syllable of the first prefix whenever verbal prefixes are affixed to them, e.g.

{ 'migoftam } 'I was saying'  
 { 'namigoftam } 'I was not saying'  
 { 'migozastam } 'I was passing'  
 { 'namigozastam } 'I was not passing'  
 { 'mitalabidam } 'I was asking'  
 { 'namitalabidam } 'I was not asking'

In compound verbs the verbal component does not generally have primary accent. Primary accent falls on the last syllable of the non-verbal component of compound

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1. The terms 'simple' and 'compound' are generally used in relation to verbs in a different way from the way they are used in relation to nominal words in this thesis (see 8.4. and 8.5.). A verb is said to be simple if its root is simple (e.g. {xandam} 'I read'), and it is said to be compound if its root is compound (e.g. {dars xandam} 'I studied').

verbs which usually precede the verbal component. If the non-verbal component is mono-syllabic, the accent falls on the one syllable of the word, e.g.

{dar} + {gozajt} → {dargozajt} '(he) died'

{gazd} + {xord} + {ʔam} → {gazoxordam} 'I had meal'

{zamin} + {xord} + {zam} → {zaminxordam} 'I fell down'

Therefore, in comparison with the nominal words, which have primary accent on the final syllable, in verbal forms primary accent is not bound to any particular position in the verbs, and it may fall on the final syllable (e.g. {gozajt} 'he passed'), on the penultimate syllable (e.g. {gozajtam} 'I passed'), or on the first syllable (e.g. {migozajtam} 'I was passing').

As a result of the accentual characteristic of compound verbal forms, as stated above, some compound verbs are distinguished from their nominal counterparts purely by their accentual patterns, e.g.

{dar} + {gozajt} → {dar<sup>Verb</sup>gozajt} '(he) died', {dargozajt<sup>Noun</sup>} 'death'

{dar} + {ʔamad} → {daramad} '(he) came' {dardamad} 'income'

{soxan} + {gu} → {soxangu} 'speak' (imp.) {soxangu} 'speaker'

{rah} + {row} → {rahrow} 'walk' " {rahrow} 'passage'

#### 8.6.6. Nominal Particles Vs Nominal Suffixes

As stated above (8.6.41. and 8.6.42.) nominal affixes shift the accent. Nominal particles (see 9.3.), on the other hand, do not. Consider the following examples:

{ʔaʃena} 'an acquaintance' + {-ʔi} 'relative suffix' → {ʔaʃenaʃi} 'acquaintance'

{ʔaʃena} " " + {-ʔi} 'indef. part.' → {ʔaʃenaʔi} 'some acquaintance'

In an article named "Word Stress in Persian"<sup>1</sup> Charles A. Ferguson distinguishes three kinds of non-final stress in Persian. He refers to them (in his terms) as:

- 1) Inflectional non-final stress (pp. 125-129)
- 2) Lexical non-final stress (pp. 129-131)
- 3) Morphemic non-final stress (pp. 131-132).

The first type of 'non-final stress' in Ferguson's terms, will be re-examined here; the remaining two will be dealt with in paragraph 8.6.7. below.

Under the general heading "Inflectional Non-final Stress", Ferguson distinguishes two types of "affixes" which function accentually differently from other affixes. These are "stressed prefixes" (p.126-7, paragraph 2.1.1.) which are observed with verbs only (and hence lie outside the scope of this thesis and will not be discussed), and "unstressed suffixes" (p.127-9). He groups under "unstressed suffixes" the following items:

- A) "Connective Suffix: '-o'<sup>2</sup> 'and', 'hæ m' 'also, too', '-ke' 'that', e.g.:  
'dæstopá' 'hand and foot', 'súpm'I want soup too', 'géfthæ...'  
'he said that...'
- B) Pronominal suffixes: '- æm' 'my, me',  
'- æt' 'your, you', '- æš' 'his him'  
'-em an' 'our us', '-et an' 'your you',  
'-ešə n' 'their them' and their variant forms,  
e.g. 'Ketábæš' 'his book', 'Ketabháyæm' 'my books'
- C) Personal endings: '- æm' 'I', '-i' 'you',

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1. Language, Vol. 33, No.2, 1967.

2. Ferguson's transcriptions of the forms and examples.

'-æd' (colloq. -e) 'he, she, it', '-im' 'we',  
 -id 'you', '-ænd' 'they', all occurring with  
 verbs only, and thus not concerning us here.  
 But the so called "suffixed forms" of the  
 present tense of the verb {?astan} 'to be',  
 which are, as Ferguson agrees, homophonous with  
 the personal endings above except for the third  
 person singular which is '-æst' (colloq. -e),  
 do concern us since they occur with nominal  
 words, e.g.: (Ferguson's examples) mæ mnúnám  
 'thank you', 'kój á'id' 'where are you', 'xúbe' 'it  
 is good.

- D) "Noun inflectional endings: '-i' 'indefinite'  
 (sic), '-ra' 'definite objective', '-e' 'connective  
 - the ezafe ending, e.g. 'ketá b' 'book', 'ketá bi'  
 'a book', 'ketá bra' 'the book (obj.)', ketá be'  
 'the book of'.

In relation to all the so-called 'suffixes' listed  
 above, Ferguson states that they "fail to pull the stress over,  
 allowing it to remain on the old final syllable" or "in item-  
 and-arrangement" terms, stress in words containing one or more  
 of such suffixes "falls on the syllable immediately preceding  
 the first or only such suffix" (p.125, paragraph 2.1.). And  
 it goes without saying that by the term 'stress' Ferguson means  
 what is called in this thesis 'primary accent'.

Ferguson's observation of the accentual patterns  
 of words containing such so-called 'suffixes' is entirely  
 correct; none of the forms listed above require shift of  
 accent (or in his terminology, stress shift). But it is,  
 however, arguable whether one can, on formal grounds, regard

such forms as suffixes at all for the reasons stated in 9.3. and referred to below:

If suffixation is to be considered as a morphological method of word formation, in other words, if after the application of a suffix, to stem (whether derivational or inflectional), the resultant form should still be a word, then, none of the forms listed by Ferguson, and included above, can possibly be regarded as suffixes because their application to word does not result in a larger and more complex word. In fact none of the resultant forms of such processes meets the general criteria for establishing word as suggested in linguistic texts.<sup>1</sup>

Furthermore, if suffixation applies to word (simple, complex and compound) acting as stem, and not to longer grammatical units, then none of the forms above can be regarded as suffixes since they do mark words and longer grammatical units alike to constitute nominal pieces. A more detailed description of these forms is given in Chapter 9 where it is shown with examples why such forms are not regarded as suffixes, but rather as independent grammatical items which function syntactically rather than morphologically, and whose functions are to mark nominal pieces, (which by coincidence may consist of one word) for specific positions in larger grammatical constructions. In traditional terminology such forms may be regarded as examples of "minor word classes",<sup>2</sup> as opposed to "major word classes", or, in modern

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1. For instance in R.H. Robins, 'General Linguistics', 1966, pp. 193-200, and John Lyons, 'Introduction to Theoretical Linguistics', 1968, pp. 199-206.

2. John Lyons, op.cit., p.273.

linguistic terms, they are "grammatical items" as opposed to "lexical items".<sup>1</sup> The fact that Persian orthography (which indeed fails in many cases to show the grammatical status of the units and their relations<sup>2</sup>) does not represent such items differently from suffixes may partly be responsible for inclusion of the items among the suffixes.

For reasons referred to above, and discussed in more detail in Chapter 9, such grammatical items as listed above are (for want of a better term) named particles and excluded from the nominal suffixes. As a result it is re-stated here that primary accent falls generally on the final syllable of nominal words; and the particles (in Ferguson's terms the "inflectional unstressed suffixes") do not enter into the morphological construction of words; they occur after them to mark them as nominal pieces just as the English words 'of', 'the', 'an', and 'a' etc. appear before or after nominal words or nominal pieces but never constitute their morphological components. The examples given by Ferguson may now be represented as follows on the basis of the status they are given in this thesis (the space marks the boundaries of words and particles):

- A)    { 'dast } + { va } + { pa } → { 'dast o 'pa }    'hand and foot'  
       { 'goft } + { ke }    → { 'goft ke }    'he said that'  
       { 'sup } + { ham }    → { 'sup ham }    'soup too'
- B)    { ketab } { 'eʃ } → { ketab eʃ }    'his book'  
       { ketab } { ha } { 'am } → { ketaba jam }    'my books'

1. John Lyons, op.cit., pp. 435-8.

2. See M. Shaki, 'Nominal Compounds in Neo-Persian', 1963, p.139.

- C) { mamnun } + { ?am } → { mamnun am } 'thank you'  
 { kodža } + { ?id } → { kodža ?id } 'where are you?'  
 { 'xub } + { ?e } → { 'xub e } '(it) is good'
- D) { ketab } + { ?i } → { ketab i } 'a book'  
 { ketab } + { ?ra } → { ketab o } 'the book' (obj.)  
 { ketab } + { ?e } → { ketab e } 'the book of'

The resultant constructions are nominal pieces except for { goft ke } which is verb + relative pronoun. These nominal pieces are all comprised of a nominal word and a particle, but they all may be expanded so that the particles mark larger units than word as appears below:

- A) { 'dast e daraz o pa je kutah } 'long hand and short leg'  
 { 'sup e 'garm ham } 'hot soup too'  
 { 'goft be 'man ke } '(he) said to me that'
- B) { ketab o daftar e } 'his book and notebook'  
 { ketaba wo daftarā jam } 'my books and notebooks'
- C) { mamnun o motašakker am } 'I am thankful and grateful'  
 { kodža ye 'šahr id } 'where in the town are you'  
 { 'xub o motanāseb e } 'it is good and proper'
- D) { ketab e bozorg i } 'a big book'  
 { ketab e bozorg o } 'the big book (obj.)'  
 { ketab o daftar e } 'the book and notebook of'

In the examples above it is seen that as new elements are added to the nominal pieces the particles are moved to the end of the expanded pieces. Therefore the particles do not have the same relations with the preceding word as suffixes.

G. Lazard in 'Grammaire du Persan Contemporain', (1957, pp. 62-70) is the only linguist, known to the writer,

who treats such grammatical items differently from suffixes, and refers to them as Particles, Articles and Post-positions.

### 8.6.7. Nominal Words v. Other Word Classes and Minor Sentence Types<sup>1</sup>

In the article mentioned above, Ferguson groups under the two headings "Lexical non-final stress" and "morphemic non-final stress" forms which belong to different word classes and some of which are, in fact, not words but minor sentences, and none of the forms are primarily nominal words. In this thesis the forms are grouped into two classes: non-nominal words and minor sentence types.

The non-nominal words belong to various word classes such as prepositions (e.g. {<sup>2</sup>'baraye} 'for', {<sup>1</sup>'bedune} 'without',) adverbs (e.g. {<sup>1</sup>'guya} 'perhaps', {<sup>1</sup>'avvalan} 'Firstly', {<sup>1</sup>'hamana} 'indeed', {<sup>1</sup>'xeyli} 'very', {<sup>1</sup>'basi} 'often'), conjunctions (e.g. {<sup>1</sup>'amma} 'but', {<sup>1</sup>'liken} 'but', {<sup>1</sup>'vali} 'but'), verbal forms (e.g. {<sup>1</sup>'natavan} 'cannot be ...', {<sup>1</sup>'mitavan} 'can be', {<sup>1</sup>'bada} 'may it be'), etc. It is with extreme rarity that such words may (if at all) function as nominal words. Therefore they do not concern us here, and since each word class in Persian has special accentual patterns which need to be stated separately, it is not surprising that non-nominal words have primary accent on their first syllable rather than on their final one.

Under the headings quoted above Ferguson also

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1. For the definition of minor sentence types, see R.H. Robins, 'General Linguistics', 1966, pp. 231-4.
  2. All examples from Ferguson's article.

includes a number of forms which do not seem to belong readily to any of the word classes. They seem best to be regarded as examples of special types of sentences because each one is by itself a complete meaningful utterance. Furthermore, they do not function as the constituents of larger sentences. They are referred to here as minor sentence types as opposed to basic sentence types. They include interjections (e.g.: {<sup>1</sup>vahasrata} 'alas!', {<sup>1</sup>xodara} 'by God!', {<sup>1</sup>xodaja} 'Oh God!', {<sup>1</sup>xofa} 'happy is ...'), one word sentences (e.g. {<sup>1</sup>?ari} 'yes', {<sup>1</sup>naxejr} 'no', {<sup>1</sup>bale} 'yes'), vocatives (e.g. {<sup>1</sup>?aga} 'Sir!', {<sup>1</sup>xonom} 'madam!', {<sup>1</sup>?ahmad} 'Ahmad!'), etc. Such forms when cited, have the accentual patterns of nominal words (as Ferguson himself has rightly observed and stated in his article although with some reservations, see p.132). That is they have primary accent on their final syllable (e.g. {<sup>1</sup>xo<sub>1</sub>ja} {<sup>1</sup>vahasra<sub>1</sub>ta} , {<sup>1</sup>xodara<sub>1</sub>} {<sup>1</sup>?a<sub>1</sub>ga} etc.), and as sentences they have primary accent on their first syllable. Therefore, it seems more appropriate to regard the shift of accent in such utterances as an exponent of intonation in minor sentence types rather than as word accentual pattern.

In the light of the discussion above the following general points may be made:

1) Primary accent always falls on the final syllable of nominal words.

2) Any grammatical item that follows a nominal word and does not require shift of accent, should not be treated as a component of the word, but as a separate word (i.e. particle).

3) A shift of primary accent from the final to the initial syllable of a nominal word marks the word as a minor sentence.

4) Different word classes have different accentual patterns.

(For some experimental findings in relation to accent, see 10.3.4.)

### 8.7. Harmony

In Part 1, 3.3.13. and 3.3.14. the vocoids of Persian were divided into two groups, inherently long and inherently short. It was then stated that the short vocoids in phonetic syllables of CV-type (where they are further marked by the syllable feature of shortness, see 2.2.), are subject to variation, the variation being mostly governed by the syllables immediately following.<sup>1</sup> In this Section a phonological treatment for this feature is suggested. The phenomenon is referred to as harmony (see 10.4.3. for experimental findings).

#### 8.7.1. Harmony, a Word Prosody

Harmony operates within word structure only, and it distinguishes words from nominal pieces of comparable structures. Consider the following comparison between nominal words and nominal pieces. (Throughout this section the examples are given in phonetic transcription for the purpose

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1. G. Lazard, in 'Grammaire du Persan Contemporain', 1957, (pp. 13-18), is the only linguist who has listed these variations in detail, but his description implies vowel alternation (see 0.4.1. for discussion on vowel alternation).

of comparison and contrast, unless no comparison is made):

<u>Nominal Words</u>	<u>Nominal Pieces</u>
[,bě'ha.r̥] 'spring'	[,bě'ha.l̥] 'to (one's) condition'
[,bǎ'hu.r̥] 'seas'	[,bě'hu.r̥] 'to the angle'
[,tʰǎ'zɪ̃fɪ] 'freshness'	[,tʰǎ'zɛ̃t̃,ɪ̃] 'a new....'
[,tʰǎ'zɪ̃hǎ] 'new (thing)s'	[,tʰǎ'zɛ̃hǎ.l̥] 'cheerful'
[,sě'rǎ] 'house'	[,sě'rǎ] 'three (obj.)'
[,sǎ'tʰu.r̥] 'animals'	[,sě'tʰu.r̥] 'three nets'
[,sǎ'xǎ.r̥] 'infants'	[,sě'tʰu.r̥] 'three nets'
	[,sě'gǎ.r̥] 'three caves'

In the examples above the in the nominal words harmonize with the syllables following in respect of openness of vowels and, to some degree, y and w-features, but this is not the case in comparable syllables of nominal pieces. Harmony is therefore, a syntagmatic relation held between parts of word structure and is one of the criteria for distinguishing word structure from piece structure.

### 8.7.2. Domain of Harmony

Harmony operates only between two syllables at a time. Some disyllabic words may, therefore, be marked throughout by the prosody of harmony (e.g.: [sǎ'kũ.n̥] 'stand still', closeness and rounding harmony). But in poly-syllabic words only two syllables are affected by this prosody (e.g.: [nɪ̃'ɪ̃mǎ.n̥] 'seat', closeness and non-rounding harmony in the first two syllables).

Harmony is a regressive process, that is, the preceding syllable always harmonizes with the syllable following. Consider the examples:

[xǎn̄ẽr̄]	'house'
[xǎn̄ĩf̄i]	'domestic'
[xǎn̄ẽh̄ä]	'houses'

The last syllable of the stem,<sup>1</sup> (i.e. [-n̄ẽr̄ ]), has the forms [-n̄ĩ] before [-f̄i], and [-n̄ẽ] before [-h̄ä ], that is, the final vocoid of the stem may have three degrees of openness: mid open when no affix follows, close when a close grade vocoid follows, and open when an open grade vocoid follows.

### 8.7.3. Conditions

Prosodic harmony operates under the following conditions only:

- a) The first of the two syllables is of the structures V or CV, or in more general terms (C)V; the second syllable may be of any structure.
- b) The vowel element in (C)V is not from the inherently long vowels (i.e. <sup>y/w</sup>I and <sup>w</sup>A). Thus harmony does not apply to such words as <sup>y/w</sup>CI-CV(C) {bu-se} 'kiss', and {di-va r} 'wall', and <sup>w</sup>CA-CVC {m.a -dar} 'mother'.

It is for the statement of such words that a V-system of two terms, I and A, was set up (in 7.3.21.) for the (C)V structure, otherwise the (C)V structure does not need a V-system when the V-place is occupied by a short V.

- c) The C-system operating at the onset of the second syllable excludes the term J, thus harmony does not

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1. The stem is considered to have the same form as the word in isolation.

operate in CV-JVC (e.g.: {si-ja<sup>h</sup>} 'black').

#### 8.7.4. Prosodic Statement

The structure within which prosodic harmony operates may, therefore, be given as follows ( <sup>v</sup> indicates that the first V is inherently short):

$$(C)\overset{v}{V}-(C)V(C(C))$$

A prosodic system consisting of three terms is set up to account for the harmony. The terms are A, E and I.

The exponent of A is openness.

The exponent of E is half open or half close.

The exponent of I is closeness.

It must be borne in mind that the symbols A, E and I as used in relation to harmony and written as superscripts, have different structural implications from their use elsewhere in the thesis, since here they represent prosodic terms whereas elsewhere they refer to phonematic units in V-systems.

No V-system is set up for the V-place in the first syllable. It suffices to state that the V-place is occupied by a syllabic element symbolized as  $\varnothing$  whose nature is determined by the V-element in the syllable following.

A V-system of three terms, symbolized as I, E and A, is set up for the V-place in the second syllable. The exponents of the terms are the same as elsewhere (see 7.3.21.). The structure above may now be represented as

$$\begin{array}{c} A/E/I(C) \varnothing -(C)V(C(C)) \\ I/E/A \end{array}$$

Furthermore, the syllables harmonize with each other in their y- and w- prosodies, that is the first syllable has the same y- or w-prosody as the second syllable (see the examples in 8.7.2. above), or the first syllable is strongly shaded by the y/w prosodies of the second syllable so that it is easier to consider it as having the same prosody than to regard it as having a different prosody. Consider the examples below:

- 1)  $w/A_{Cə} - w_{CAC}$  : [bʰə́r] 'spring'
- 2)  $w/A_{Cə} - w_{CA}$  : [sʰrǎ] 'house'
- 3)  $(CV)w/A_{Cə} w_{CA}$  : [xǎ-nʰhǎ] 'houses'
- 4)  $w/A_{Cə} w_{CAC}$  : [sʰrǎ.g] 'visit'
- 5)  $w/I_{Cə} w_{CIC}$  : [ʃǎru.ʔ] 'start'
- 6)  $y/I_{Cə} y_{CIC}$  : [mǎ̃.i.ŋ] 'supporter'
- 7)  $y/I_{Cə} y_{CIC} y/A_{Cə} y_{CACC}$  : [bʰi.ʔ bǎbǎ̃:ŋ] 'arrest'

In the examples 1-5 both syllables harmonize in w-prosody and in the examples 6-7 they harmonize in y-prosody. Example 6 shows less harmony in y-prosody than 7, but [ǎ̃] in the first syllable of this example is distinctly different in degrees of backness and rounding from [ǎ̃] in 5 and [ǎ̃] in [ʃǎru.ʔ] camel. Therefore the syllable [mǎ̃-] in no.6 can also be said to have been conditioned by [-i.ŋ].

On the basis of these observations it is concluded that syllables in the structure above harmonize both in degrees of openness as well as in backness and frontness, and rounding and non-rounding. As a result, y- and w-prosodies are only stated for the second syllable, the first syllable being unmarked as follows:

$$A/E/I_{(c)ə} - y/w_{(C)V(C(C))}$$

I/E/A

Exx:

${}^I C\bar{a}^W C I C$ : [f<sup>o</sup>r<sup>u</sup>f.] 'sale', [z<sup>o</sup>k<sup>u</sup>.r] 'male', [x<sup>o</sup>r<sup>u</sup>s.] 'rooster'

${}^E C\bar{a}^W C E C(C)$ : [f<sup>o</sup>t<sup>o</sup>.r] 'camel', [d<sup>o</sup>r<sup>o</sup>f:t<sup>u</sup>] 'big', [s<sup>o</sup>t<sup>o</sup>:r<sup>o</sup>f] 'huge'

${}^A C\bar{a}^W C A(C)-(C V)$ : [t<sup>e</sup>x<sup>a</sup>.r] 'trough', [r<sup>e</sup>h<sup>a</sup>] free, [n<sup>e</sup>x<sup>a</sup>l<sup>e</sup>.] 'nut'

$(C V) {}^I C\bar{a}^Y C I(C)$ : [n<sup>i</sup>f<sup>i</sup>.n] 'precious stone', [n<sup>i</sup>f<sup>i</sup>.b] ', [x<sup>a</sup>n<sup>i</sup>f<sup>i</sup>] 'domestic'

${}^E C\bar{a}^Y C E C(C)-(C V)$ : [s<sup>e</sup>r<sup>e</sup>:t<sup>e</sup>] '(one's) nature', [n<sup>e</sup>y<sup>e</sup>.t<sup>e</sup>.] 'script'

${}^A(C)\bar{a}^Y C A C$ : [s<sup>a</sup>h<sup>a</sup>.r] 'dawn', [ʔ<sup>a</sup>ʔaʔ.] 'beans' [t<sup>a</sup>l<sup>a</sup>.b] 'request'

### 8.7.5. Grammatical Correlations

As stated in 8.7.1., prosodic harmony functions within words only. It is observed in the following positions in words:

1) Between two syllables in mono-morphemic words,

e.g. [s<sup>o</sup>r<sup>u</sup>f.] 'Heavenly messenger'.

2) Between prefixes and stem, e.g.:

{be} + {bor} + {be} + {bar} [b<sup>o</sup>b<sup>o</sup>r o b<sup>a</sup>b<sup>a</sup>r] 'cut and take'

3) Between stem and suffixes, e.g.

{xane} + {?i} → [x<sup>a</sup>n<sup>i</sup>f<sup>i</sup>] 'domestic'

In all three cases above prosodic harmony is one of the means of distinguishing a sequence of syllables as either parts of one word, or as belonging to more than one word. In the following part of this paragraph the three cases of harmony are contrasted with comparable pieces in order to illustrate this point (the examples are given in phonetic transcription to show the contrast).

#### 8.7.51. Mono-morphemic Words v. Pieces

${}^A C\bar{a}^W C A C V C$ : [s<sup>e</sup>r<sup>a</sup>ja.t<sup>e</sup>] 'gossip', Vs:  ${}^Y C A^W {}^V Y C A C$ : [s<sup>e</sup>. ʔ<sup>a</sup>ja.t<sup>e</sup>] '3 verses of Qoran'

${}^I C\bar{a}^Y C I C$ : [n<sup>i</sup>f<sup>i</sup>.b] 'slope', Vs:  ${}^Y C A {}^Y C I C$ : [n<sup>a</sup> f<sup>i</sup>.b] 'not slope'

${}^I C\bar{a}^W C I C$ : [b<sup>o</sup>r<sup>u</sup>.z] 'appearance', Vs:  ${}^Y C A {}^W C I C$ : [b<sup>e</sup> ru.z] 'till day'

### 8.7.52. Prefixed Words v. Pieces

Examples of this case are abundant among the verbs prefixed by {be-} e.g.

$I_{C\alpha}^Y C I C$ : [b̥ĩfi.r̥] 'take!' v.  $^Y C A^Y C I C$ : [b̥ěfi.r̥] 'in trap'  
 $A_{C\alpha}^Y C A C$ : [b̥ǎpa.r̥] 'take away' v.  $^Y C A^Y C A C$ : [b̥ě pa.r̥] '(put) on ǎ'

Nominal words derived from such verbs provide many examples of this class, but no pairs were found among pieces for contrast:

$E_{C\alpha}^W C E C$   $I_{C\alpha}^Y C I C$ : [b̥ǒx̥ǒ-r̥õñěm̥i.r̥] 'subsistence'

$I_{C\alpha}^Y C I C$   $A_{C\alpha}^W C A C$ : [b̥ĩr̥iz̥õb̥p̥a.r̥] 'spendthrift'

### 8.7.53. Suffixed Words v. Pieces

$C V C^I_{C\alpha} J^Y I$ : [z̥ě.nd̥ĩf̥i] 'life' v.  $C V C C A^? Y I$ : [z̥ě.nd̥ě.ĩ] 'some living person'

$C V^A_{C\alpha} H^W A$ : [x̥an̥ěf̥á] 'houses' v. No pair found

### 8.7.6. Notes and Exceptions

As mentioned above (8.7.3.), if the onset place of the second syllable is occupied by the consonantal term J, i.e. if the structure is (C)V-JV(C(C)), prosodic harmony does not operate. Instead the V-element in the first syllable harmonizes with J, and is phonetically [i̥], e.g.:

CAJAC: [s̥i̥ya.h] 'block'

CAJA<sup>J</sup>AC: [n̥i̥y̥ǎje.f̥] 'prayer'

CAJA<sup>E</sup>C<sup>W</sup>CEC: [b̥i̥y̥ǎb̥õr̥õ.u] 'coming and going'.

Certain words whose first syllables begin with the consonantal term *ʃ*, and the second syllable with the term K or *ʃ*, as exceptions do not show prosodic harmony, probably due to the palatal nature of *ʃ* and K, e.g.

[ʃ̥ěca.r̥] or [ʃ̥i̥ca.r̥] 'sugar'

[ʃ̥ěk̥<sup>4</sup>a.r̥] or [ʃ̥i̥k̥<sup>4</sup>a.r̥] 'hunting'

[ṣ̌ẹʃo.ṃ]	or	[ṣ̌ịʃo.ṃ]	'sixth'
[ṣ̌aḳu.ṛ]	_____		'thankful'

But this is not a general rule as there are also examples of the same type in which harmony is observed, e.g.

[ṣ̌ic̣i.ḅ]	'patience'
[ṣ̌aḳu.ḥ]	'glory'

### 8.8. Geminatation

In Part 1 (5.3.), a phonetic description of long contoids in native Persian words was given with reference to the relevant grammatical units. In this section a phonological description of long contoids is given and the phenomenon is called gemination. (For experimental findings see 10.3.5.).

#### 8.8.1. Long Contoid as exponent of C-Cluster

Certain instances of long contoid are merely exponents of consonantal terms appearing in cluster at the boundaries of adjacent syllables. When two homorganic contoids function as consonants in a cluster, they may harmonize into one long contoid. But this does not always take place. Different types of harmony are observed in such cases. For example, the second consonant may harmonize with the first, e.g.:

{daste}	→	{dasse}	'handle'
{baste}	→	{basse}	'parcel'
{mesle..}	→	{messe}	'like'

Or the first consonant may harmonize with the second, e.g.:

{badtar}	→	{battar}	'worse'
{sadt a}	→	{satta}	'one hundred'

Or they may harmonize into new consonants, e.g.

{masdʒed} → {matʃtʃ<sup>h</sup>ed} 'mosque'

where the consonants have harmonized in the features voicelessness and pre-palatality. Such instances of long contoid are excluded from the statement of gemination that follows, since they are merely phonetic exponents of C-clusters.

### 8.8.2. Long contoid as exponent of Gemination

Primary and secondary accents may be accompanied by long contoids, but long contoid is an optional component of the accents. This is to say that the words have two forms, standing in free variation, one with and the other without gemination, e.g.

{,par're} or {ba're} 'lamb'  
 {,batʃtʃ<sup>h</sup>e} or {batʃ<sup>h</sup>e} 'child'  
 {'setta} or {'seta} 'three items'

Such instances of long contoid are treated as cases of gemination since they, unlike those mentioned in 8.8.1., are not the exponents of C-clusters, i.e. the underlying structures do not originally contain consonant clusters. The following are examples of the most recurrent cases of gemination.

### 8.8.21. Primary Accent and Gemination

When an accented morpheme (bound or free) of CV-structure is followed by a C-beginning morpheme marked by tertiary accent, the onset C of the latter may be geminated. This is commonly observed in numerals ending in CV followed by the numerative {ta} e.g.

{'se} + {ta} → {'setta} 'three items'

{tʃelo'do} + {ta} → {tʃelodotta} or {tʃelodota} '42 items'

Incidentally the same rule also applies to some C-beginning verbal roots whose initial C may be geminated when preceded by the accented prefixes {be} and {na} e.g.

{be} + {pa} → {beppa} or {bepa} 'watch out'<sup>1</sup>

{na} + {pare} → {nappare} or {napare} 'watch it!'

{be} + {farma} → {beffarma} or {befarma} 'after you! or  
come on, join us.'

Other instances of gemination in relation to primary accent are found among onomatopaeic words. When an accented onomatopaeic word of CVC structure, or ending in a CVC structure, is followed by the particle {?i}, the coda C of the form is geminated, e.g.

{xex} + {?i} → {xexxi} 'with some xesh noise'

{zer} + {?i} → {zerri} " " zer "

{tolop} + {?i} → {toloppi} " " tolop "

#### 8.8.22. Secondary Accent and Gemination

Gemination in relation to secondary accent is observed in the following cases:

When a numeral of CV-structure is suffixed by {-?om} the J-prosody (8.4.23.II.) marking the relation between the stem and the suffix is geminated, e.g.

{se} + {-?om} → {sej'jam} or {sev'vom} '3 items'

{do} + {-?om} → {doj'jam} or {dov'vom} '2 items'

(for the variant forms of the prosody see the notes in 8.4.23.II.).

1. Ferguson in 'Word Stress in Persian', 1957, noted this form (p.127), but was at a loss as to how to account for it.

This type of gemination is also observed in disyllabic words of (C)V-CV(C) structure, where the first syllable is marked by secondary and the second syllable by primary accents. In such cases the C-elements functioning at the onset of the second syllable may be geminated, e.g.

{parre } or {ba're } 'lamb'  
 {ʔam'mid } or {ʔomid } 'hope'  
 {galle } or {gale } 'herd'  
 {mazze } or {maze } 'taste'

### 8.8.23. Gemination in relation to junction prosodies

The junction between a C-ending onomatopaeic word and its reduplicated component (8.9.) may be marked by gemination in which case it is co-occurrent with ə-prosody as follows:

{'xex} → {xex'xex} or {xex'xex} 'repeating a xesh noise'

ə-prosody at the junction of reduplicated onomatopaeic words is the result of gemination, in that when the C at the simple coda of the onomatopaeic word is geminated a new instance of -CC + C- junction appears which, as stated earlier (see 8.4.23.III. and 8.5.2.II.) is marked by ə-prosody. Therefore, in onomatopaeic words gemination and ə-prosody are always observed together. In all such cases gemination and the subsequent ə-prosody is optional. When gemination does not occur, the junction is marked by ə-prosody since it is an instance of -C + C- junction (see 8.4.23.III. and 8.5.2.II.), e.g.

{zeg} → {zeggozeg} or {zegzeg} 'repeating a zegue noise'  
 {tag} → {taggotag} or {tagtag} " " zer "  
 {fer} → {ferrofer} or {ferfer} " " fer "  
 {top} → {toloppotop} or {toloptop} " tolop "

### 8.8.3. Prosodic Statement

In all the cases above gemination is abstracted as a prosodic element which marks either certain word structures (e.g. {,barre} 'lamb') or the relation between morphemes in certain structures (e.g. {se} + {ta} → {setta} 'three items'). No further consonantal place than those already stated, therefore, needs to be set up in such structures to account for the gemination; instead, it is stated prosodically and symbolized as G, referred to as G-prosody. The exponents of G-prosody are:

- 1) Long duration of contoids
- 2) Lack of release throughout the long contoid
- 3) Tenseness in the articulatory organs during the production of the contoids
- 4) Extra length in the vocoid preceding the long contoid
- 5) Higher degree of prominence in the preceding syllable than what is observed in the non-geminated form of the same word.

The prosodic representation of some of the examples given above is given below:

CV + CV → CV<sup>G</sup>CV : {se} + {ta} → {setta} '3 items'  
 CV + CVCV → CV<sup>G</sup>CVCV : {na} + {pare} → {nappare} 'watch it'  
 CV + CVCCV → CV<sup>G</sup>CVCCV : {be} + {farma} → {beffarma} 'come on join us'  
 CVC + <sup>?</sup>V → CV<sup>G</sup>CV : {xɛʃ} + {ʔi} → {xɛʃʃi} 'with some xesh noise'  
 CV + <sup>?</sup>VC → CV<sup>GJ</sup>VC : {se} + {ʔom} → {sejʃam} 'third'

CV<sup>G</sup>CV : {,barre} 'lamb'

<sup>?</sup>V<sup>G</sup>CVC : {ʔommid} 'hope'

$CVC + CVC \rightarrow CV^G C^{\ominus} CVC: \{ 'xesh' \} + \{ 'xesh' \} \rightarrow \{ 'xesh' 'xesh' \}$  'repeating a  
 'xesh noise'  
 $CVC + CVC \rightarrow CV^{\dagger} C^{\ominus} CVC: \{ 'zer' \} + \{ 'zer' \} \rightarrow \{ 'zerro'zer' \}$  'repeating a  
 'zer noise'

### 8.9. Reduplicatives and Onomatopaeic Words

Reduplication as a morphological method of word formation is fairly common in Persian. Yet no previous account of this aspect of the language has been found by the present writer. Similarly no description has been found of onomatopaeic words which make up a large proportion of reduplicatives, and are equally common. A brief phonological description of reduplicatives is given in this section which includes some remarks on onomatopaeic words. But before this can be done the grammatical status of reduplicatives is discussed.

#### 8.9.1. Criteria and Terminology

The term reduplicatives is used to refer to nominal words which satisfy the following criteria:

1) All or part of their "radical elements" (in Sapir's terminology<sup>1</sup>) are repeated.

2) Each example from a particular class of reduplicatives shares a class meaning with other members of its class (e.g. they all generalize the meaning of the underlying forms as { 'nun' 'bread' { 'nuncmun' 'bread and the like' ).

3) They all have the nominal accentual patterns and function as nominal word so that they are included among the nominals. Adverbial reduplicatives do not

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1. Edward Sapir, 'Language', pp.76-8 (paperback U.S.A.).

generally function as nouns but phonologically have the same features as nominals (i.e. they have the same accentual patterns as nouns (see 8.5.) and their junctions are marked by the same junction prosodies). They are therefore included in the description.

Sapir's "radical element" is here termed 'stem' and the reduplicated part, or parts, are termed 'reduplicated part(s)'; for example in {ketabmetab} 'book and the like', the part {ketab} 'book', is the stem and the part {-metab} is the reduplicated part. In complete reduplicatives it is convenient for the purpose of analysis to refer to the first occurrence of the word as the stem and the second as the reduplicated part. Thus in {xeʃxeʃ} 'repeating a xesh noise', {xeʃ-} is the stem and {-xeʃ} is the reduplicated part.

#### 8.9.2. Quasi-reduplicatives, Lexical coincidence

The above term is employed to refer to repeated words or pieces which look like reduplicatives but do not meet the criteria set up above. Quasi-reduplicatives may be of the following types:

##### 8.9.2.1. Repeated Verbal Forms

A verbal form may be repeated twice, or possibly three times, to convey continuity. In this case each occurrence retains the original verbal accentual pattern and remains phonologically a separate word. The resultant form is, furthermore, interruptible and contains a potential pause within itself, so that it is also grammatically more than one word as it lacks internal cohesion (see 8.1.). Repeated verbal forms do not satisfy the criteria 2) and 3),

and are regarded as sequences of words rather than as reduplicatives. Consider the example:

{ tamam e jab ,ne'ast o ,ne'ast o (ne'ast)ta sobh fod }

'He sat up on and on (and on) throughout the night till day broke.' Each occurrence of the verbal form { ,ne'ast }

has the verbal accentual pattern, differing from that of the reduplicatives and the resultant form is interruptable, e.g.

by the adverbial { hej } which emphasizes the continuative

aspect, as in: { tamam e jab ,ne'ast o hej ,ne'ast o (hej ,ne'ast) ta sobh fod }

'He kept on sitting on and on (and on) ...'

Repeated verbs are, therefore, best treated as sequences of separate words rather than reduplicated words.

Compound verbs, (see footnote 1 in 8.6.5.), may be repeated completely as in:

{ havu ,tarik fod o ,tarik fod ta 'jab rasid }

'It grew darker and darker till night fell.'

Or only the verbal component may be repeated as in:

{ havu ,tarik fod o fod ta 'jab rasid }

Or the non-verbal component may be repeated as in:

{ havu ,tarik o ,tarik fod ta 'jab rasid }

### 8.9.22. Repetition for Emphasis

A word may be repeated for emphasis. In this case too it is excluded from reduplicatives as each repetition has a separate nominal accentual pattern and may be marked separately by some particle which makes it a nominal piece, e.g.:

{ ,xaste je ,xaste fodam } 'I became very tired'

Each instance of { ,xaste } above has its own separate accent

and the former is marked by the particle {ʔe} ezafe (see 9.65.); each is therefore a separate word.

### 8.9.23. Repetition in Compound Nominal Words

The components of some compound words, mostly verbal derivatives, are different forms of one and the same word so that the resulting compound looks like a reduplicative. But these are excluded from the reduplicatives on the ground that firstly they do not have the class-meaning of any class of the reduplicatives (see (2) in 8.9.1.). Secondly they share the class-meaning of certain classes of compound words which include both quasi-reduplicatives, and compounds whose components are not from the same word. Such quasi-reduplicatives are, therefore, compound words which by lexical coincidence resemble reduplicatives, e.g.

{dʒostodʒu}	'search',	both	{dʒost}	and	{dʒu}	are from
						{dʒostan}
{ʃostofu}	'wash'	"	{ʃast}	and	{ʃu}	are from
						{ʃostan}
{GalɔGil}	'argument',	"	{Gal}	and	{Gil}	are from
						{Gowl}
{bogumagu}	"	"	{bogu}	and	{magu}	are from
						{goftan}
{bando bast}	'phtting',	"	{band}	and	{bast}	are from
						{bastan}

These quasi-reduplicatives have the same class-meaning (which may be called 'infinitival') as the following compounds which are also verbal derivatives but whose components are not from the same word:

{dʒastoxiz}	'jumping'	from	{dʒastan}	and	{xastan}
{biʒa borow}	'coming and going',	from	{ʔamadan}	and	{raftan}
{ʔijabo zahab}	"	"	"	"	"

Arabic loans.

### 8.9.3. Reduplicatives

The forms which, according to criteria given

earlier are regarded as reduplicatives fall into two major groups: Complete and Partial reduplicatives, as follows:

8.9.31. Complete Reduplicatives: are those whose stems are repeated with or without a syllabic junction in between the stem and the reduplicated part. They are of two classes:

I. Adverbials, which function as adverbs, e.g.

{,kamkam}	'gradually'
{,gunegun}	'of different types'
{,rafterafte}	'gradually'
{,ʔahesteʔaheste}	'slowly'
{,javasjavas}	'slowly'
{,pandzopandz}	'in groups of 5'

II. Onomatopaeic Words, whose class meaning implies

'repetition of the same thing'. The stem and reduplicated part may be linked by syllabic junction, e.g.

{,zerrozer}	or	{zerzer}	'making a zer noise repeatedly'
{,tʃah tʃah}		" " tʃah "	"
{,GoroGar}		" " Gar "	" (cockrow)

In some cases the reduplicated part has an 'e' ending which is not found in the stem, but this is not general, e.g.

{,zamzame}	'murmuring'
{,tʃahtʃahe}	as above

8.9.32. Partial Reduplicatives have part of the stem repeated before or after, or both before and after the stem. The reduplicated part(s) and the stem may be joined by a syllabic element. Partial reduplicatives are of three classes referred to as Class A, B and C, all having the same class meaning which implies generalization of the meaning of the stem. They are as follows:

I. Class A: The whole stem is repeated apart from the word initial C-onset which is replaced by a bilabial nasal element symbolized as m. The element m is treated as having consonantal, and not prosodic, function since the junction of stem and reduplicated part is marked by ə/ə -prosodies as will be seen below (8.9.42.). The consonantal element is represented in structural statements as m. The following are some examples of this class:

{pul} money {pulomul} 'money and the like'  
 {gaza} food {gazamaza} 'food " " " "  
 {nun} bread {nunmun} 'bread " " " "'

When the stem is a V-beginning word, the ?-initial prosody is replaced by m in the reduplicated part, e.g.

{'ab} water {'abomab} 'water and the like'  
 {'andze} size {'andzemandoze} 'size and the like'

Words beginning with a bilabial nasal are not reduplicated in the manner of Class A. Thus such words as {mah} 'moon' and {madad} 'pencil', etc. are excluded from Class A. They may be reduplicated in other ways.

II. Class B: Only the word initial onset of the word ~~is~~ is repeated. In V-beginning words the ?-initial prosody is repeated. The reduplicated part constitutes the onset, or the ?-initial prosody of a new syllable of (C)VC structure which precedes the stem. The stem and the reduplicated part are joined with a syllabic element. The structural statement of the reduplicated form is given in 8.9.41. Here are some examples:

{,ketab} book {,katoketab} 'book and the like'  
 {'gand} sugar {'gato'gand} 'sugar " " " "  
 {,xom're} barrel {,xatoxom're} 'barrel " " " "'

{pa}	foot	{pakopa}	'foot and other parts of body'
{ʔab}	water	{ʔakoʔab}	'water and the like'
{nun}	bread	{nakonun}	'bread and the like'
{madad}	pencil	{makomadad}	'pencil " " " "
{mah}	moon	{makomah}	'moon " " " "

III. Class C is a combination of Class A and B, e.g.

{katoketabometab}	'book and the like'
{nakonun o'mun}	'bread " " " "

#### 8.9.4. Structure and Prosodies

Only the structure of the stem is given for the reduplicatives, the reduplicated part being represented by R. The relevant prosodies of junction as well as the extra elements present in the structure are marked between the stem and the reduplicated parts or in other appropriate places.

Thus the word {kankam} is represented as:  $CVC^{\ominus}R$ ,  
 {zerrozer} as  $CVC^{G\ominus}R$ , and {nunomun} as  $CVC^{\ominus}mR$ .

Before describing junction prosodies, an account needs to be given of Class B partial reduplicatives, as follows:

##### 8.9.4.1. Structure of the reduplicated part in Class B

As stated above, the reduplicated onset or ʔ-initial prosody in Class B constitutes the onset or the initial prosody of a new syllable of CVC or ʔVC structures. A description of this syllable may be given as follows:

A syllabic element, symbolized as  $\ominus$ , functions at the V-place, the exponent of  $\ominus$  is [a]. The coda place is always marked by h and occupied by a stop phonematic

system, symbolized as P; viz.  $R_{\text{ə}} P^h$ . The exponent of P is plosiveness. The structure is always marked by y-prosody viz:  $y_{R_{\text{ə}}} P$ .

R = reduplicated part

ə = syllabic element

P = stop system.

P has two terms: D (exponent: denti-alveolarity) and K (exponent: velarity) viz:

$$P_{D/K}$$

The choice of one term in P over the other depends on the consonantal term functioning at the stem initial onset and reduplicated in  $R_{\text{ə}} P$ . Thus D appears with the following consonantal terms: K, G, X, e.g.:

K:  $y_{R_{\text{ə}}} D^{h_{\text{ə}}^1} KVCVC$ : {katoketab} 'book and the like'  
 G:  $y_{R_{\text{ə}}} D^{h_{\text{ə}}} GVCC$ : {GatoGand} 'sugar ...'  
 X:  $y_{R_{\text{ə}}} D^{h_{\text{ə}}} XVCCV$ : {xatoxomre} 'barrel ...'

And K appears with other consonantal terms as well as ?-initial prosody, e.g.:

$y_{R_{\text{ə}}} K^{h_{\text{ə}}} PV$ : {pakopa} 'foot and other parts of the body'  
 $y_{R_{\text{ə}}} K^{h_{\text{ə}}} VC$ : {?ako?ab} 'water and the like'  
 $R_{\text{ə}} K^{h_{\text{ə}}} DVC$ : {nakonun} 'bread " " " '

#### 8.9.42. Prosodies of Junction in Reduplicatives

The junction between stem and reduplicated part is marked by  $\text{ə}$  and  $\text{ə}$  -prosodies. The exponent of  $\text{ə}$

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1.  $\text{ə}$  represents  $\text{ə}$  -prosody see 8.9.42.(i) below.

is a syllabic element which syllabifies with the preceding C. ə has the possibility of being realized phonetically, but often is not realized in a very quick style of speech. The exponent of ə is lack of syllabic element, i.e. no possibility of a syllabic separation between the stem and reduplicated part.

i) ə-Prosody functions in the following

structures:

a) When the stem ends in simple coda preceded by an inherently long vowel, here marked as  $\bar{V}$ , e.g.

$C\bar{V}C^{\ominus}$  R: {,gunegun} 'of different types'

$C\bar{V}C^{\ominus}$  R: {,garogar} 'cockcrow'

? $VC\bar{V}C^{\ominus}$  R: {,aromo'arum} 'slowly'

b) When the stem ends in a complex coda, e.g.

$CVCC^{\ominus}$  mR: {,gandomand} 'sugar and the like'

$CVCC^{\ominus}$  mR: {,baxtomaxt} 'chance " " " ' "

c) In onomatopaeic words when the stem final coda is geminated (see 8.8.23.), e.g.

$CVC^{G\ominus}$  R: {,zerrozer} 'making a zer noise'

? $VC^{G\ominus}$  R: {,arro'ar} ' " " ?ar " ' "

d) Class B partial reduplicatives are always marked by ə-prosody as shown above in 8.9.41.

ii) ə Prosody functions in the following

structures:

a) When the stem ends in simple coda preceded by an inherently short vowel, e.g.

$CVC^{\ominus}$  R: {,kamkam} 'gradually'

$CVC^{\ominus}$  mR: {,sarmar} 'head and the like'

$CVC^{\ominus}$  R: {,tʃah'tʃah} 'making a tʃah noise repeatedly'

b) When the stem ends in a V, e.g.

CVCCV<sup>2</sup>R: {,dastedaste} 'in groups'

?VCVCCV<sup>2</sup>R: {?aheste?ahoste} 'slowly'

c) In onomatopaeic words when the stem final coda is not geminated, e.g.

CVC<sup>2</sup>R: {,zer'zer} 'making a zer noise'

Each reduplicated part in Class C partial reduplicatives expresses its relation to the stem in accordance with the rules given above, e.g.

R<sup>2</sup>D<sup>2</sup>KVC<sup>2</sup>V<sup>2</sup>mR: {,katoketab o'metab} 'book and the like'

R<sup>2</sup>K<sup>2</sup>CV<sup>2</sup>mR: {,pakopama} 'foot and the like'

CHAPTER 9

PROSODIES OF JUNCTION IN NOMINAL PIECES

In this Chapter the internal phonological structure of nominal word is assumed as given. Attention is focused on the phonological features that mark the junction between word and particle, or particle and word which together make a nominal piece.

9.1. Nominal Piece

A nominal piece, as used in this thesis, is a word or combination of words usually marked by a particle (but see 9.2. below) for a particular syntactic position in a larger syntactic construction. The larger construction may, in turn, be a nominal piece, or it may be a sentence.<sup>1</sup>

Consider the example below:

1) {ʔu'miz o xarid} 'He bought the table'

The part {'miz o} is a nominal piece consisting of a nominal word, {'miz} 'table', and a particle, {ra} 'object marker', whose form in the example above is [o] (see 9.6.10. below). It may be said, therefore, that the noun {'miz} is marked by the particle {ra} into the nominal piece of {'miz o} for the object position in the construction {ʔu ... xarid}.

A nominal piece may itself contain another nominal piece of a different syntactic construction, e.g.

2) {ʔu'miz o sandali ro xarid} 'He bought the table and  
the chair'

The part {'miz o sandali ro} is a nominal piece consisting of

1. See R.H. Robins' definition of sentence as given in 'General Linguistics', 1966, pp. 190-2, which is applicable to Persian.

the nouns {miz} 'table', and {sandali} 'chair', marked by the conjunctive particle {va} 'and', whose form in the example is [o] (see 9.6.11. below). The piece {miz o sandali} is, in turn, marked by the particle {ra} 'object marker', into the larger nominal piece {miz o sandali ro}. The particle {ra} in this case has the form [ro]. These relations may be represented as follows. Each pair of brackets marks the boundaries of one piece:

( (miz o sandali) ro)

A nominal piece may be composed of more than one smaller piece, e.g.

3) {ʔu {miz o sandali je sabz e ro xarid} 'He bought the green table and chair'.

In the underlined construction the part {miz o sandali} is a nominal piece as described above. This nominal piece enters into construction with {sabz} 'green', and the particle {ʔe} 'ezafe-marker', to make the larger nominal piece {miz o sandali je sabz} 'green table and chair'. The 'ezafe-marker' has the form [je] in this example (see 9.6.5. below). This larger piece enters into construction with the particle {ʔe} 'definite particle', whose form in this occasion is [e] (see 9.6.8. below) to make the nominal piece {miz o sandali je sabz e} 'the green table and chair'. Finally this latter nominal piece is marked by the object marker {ra} into the underlined nominal piece above. These relations may be represented below with brackets marking the boundaries of the pieces:

((((miz o sandali) ye sabz) e) ro)

In this chapter the phonological features that

mark the junction of word and particle, and particle and word in a nominal piece are described, whether the nominal piece be a component of another larger piece or a sentence. Thus, taking the example 3) above to illustrate, this chapter deals with the prosodic statement of features observed at junctions marked by +:

{ ?u miz + o + sandali + je + sabz + e + ro xarid. }

## 9.2. Marked and Unmarked Nominal Pieces

Nominal pieces are accompanied by particles in most syntactic positions. In other words, most positions in a sentence require the presence of a particle within the piece. In such cases nominal pieces are said to be marked. For example all the pieces in 1), 2) and 3) above are marked.

Some syntactic positions do not require the presence of any particle with nominal pieces. In such cases the pieces are said to be unmarked. For example when a nominal piece appears in subject position, it is always unmarked as in

1) { ,baran ?amad } It rained (lit. rain came)  
The piece { ,baran } is in the subject position and is unmarked.

But if an unmarked piece is larger than a word, that is, if the piece itself is made up of one or more smaller pieces, then, the syntactic relations between the constituents of the piece are marked by particles, e.g.:

2) { ,baran e jadid i ?amad } It rained heavily  
(lit. A heavy rain came)

The piece {baran e jadid i}

is in the subject position in the example above, and it is unmarked for this position. But it is composed of two smaller pieces: {baran e jadid} 'heavy rain', and {baran e jadidi} 'a heavy rain', each of which is marked by a particle for the position it has in the larger piece. Thus the internal relation of the piece may be given as follows with brackets marking the boundaries of the pieces:

((baran e jadid)i)

The relation of the piece to the sentence may also be added to this as in:

((baran e jadid)i unmarked)

The particle {?i} in 2), where it has the form [i], cannot be taken as the marker of the subject because, firstly, not all subject pieces are marked by this particle (as in 1) {baran} does not have this particle) and secondly {?i} may mark a nominal piece which occupies other syntactic positions, e.g.:

3) {mansun ?esm e baran e jadid i st} 'Monsoon is the name of a heavy rain'  
 The nominal piece {?esm e baran e jadid i st} is a predicative piece marked by the third person singular form of the verb {?astan} 'to be', which here has the form [st] 'is', and is also marked by the particle {?i}.

Nominal pieces called unmarked, as well as the marked pieces, are, of course, phonologically marked by intonational features and the possibility of long pauses before and after them. According to observations made on restricted material, a nominal piece which directly takes a

syntactic position in the construction of a sentence (e.g. {baron e fadid i} in example 2) above), constitutes a 'rhythmic unit' within a "tone unit".<sup>1</sup> But a piece which takes a syntactic position in a larger nominal piece does not constitute a 'rhythmic unit' (e.g.: {baron e fadid} in the piece {baron e fadid i}). Thus each piece in the following example is a 'rhythmic unit'. The boundaries of the rhythmic units are marked by slants:

4) {baradar am/ je hadje ?i /be xaHar am/ dad}

'My brother gave a gift to my sister.'

Or a piece may constitute a tone unit as in the example below where the boundaries of tone units are marked by double slants:

5) {?ali baba /miz o sandali je sabz e ro xarid //}

'Ali Baba bought the green table and chair.'

The first piece in example 5) constitutes a tone unit.

In this chapter, however, it is the marked nominal pieces that are described as the unmarked ones do not need further phonological description (excluding that of intonation) than what has already been stated in previous chapters.

### 9.3. Nominal Particles

In the preceding chapter (8.6.6.), it was briefly stated that the grammatical items referred to by Ferguson<sup>2</sup>

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1. See J. Towhidi, 'A Study of Intonation and Related Features in Persian', research for Ph.D. Thesis, S.O.A.S. London University.

2. See footnote (1) in 8.6.6.

as "inflectional suffixes" or "unstressed suffixes" are not treated as suffixes (whether inflectional or derivational) because they function differently from suffixes in many respects.<sup>1</sup> A more detailed account is given below, where such grammatical items are referred to as 'particles' as opposed to 'suffixes'.

The most important factors which distinguish particles from suffixes are as follows:

### 9.3.1. Word + Particle = Piece

The resultant form from the application of any particle to word fails to satisfy almost all criteria suggested for establishing words.<sup>2</sup> The resultant form from such constructions, therefore, differs from that obtained after the application of suffix to word, since the latter is still word and meets all criteria for word, while the former is no longer word.

The construction word + particle is, therefore, not a morphological one, rather it is syntactic, as particle does not constitute a component of the structure of word (hence the adoption of the term piece). Consider the following examples:

I. 1) { ketab e } 'the book of...' 2) { ketab i } 'a book'  
 3) { ketab o } 'the book' (ob.) 4) { ketab a } 'his book'

None of the constructions above have internal cohesion, or are uninterruptible. Thus the particles may be separated.

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1. As stated in 8.6.6., G. Lazard has treated such grammatical items differently from suffixes, and as far as the present writer is aware he is the only linguist who has made this distinction (see 'Grammaire du Persan Contemporain', pp.62-69).

2. See 8.1.

from the word as follows:

- II. 1) { ketab o daftar e } 'The book and notebook of...'  
 2) { ketab o daftar i } 'A book and notebook'  
 3) { ketab o daftar o } 'The book and notebook' (Object)  
 4) { ketab o daftar a } 'his book and notebook'

Furthermore none of the examples in I) has as much mobility as the word { ketab } 'book'. Thus { ketab e } does not occur by itself in subject position, object position, conjunction construction, etc. It occurs in 'ezafe-construction' only as will be seen below (9.6.5.). And finally, most of the forms with particle cannot be regarded as minimal free-form in all respects. { ketab e } cannot occur as a free form, nor can { ketab i } or { ketab o } But { ketab a } may, as in response to such questions as 'What did he have in his hand?'

In view of these observations the particles are excluded from suffixes because even inflectional suffixes, once combined with a word, do not interrupt the internal cohesion of the word as the particles do. Words plus particles are, therefore, pieces.

### 9.3.2. Word + Particle or Piece + Particle

Another factor which differentiates particles from suffixes is that while suffixes (derivational or inflectional) are added strictly to words functioning as stem, particles may mark a word or equally a piece into a nominal piece, e.g.:

- III. { ketab } + { ra } → { ketab o } 'the book' (object)

word + part. → piece

- IV. { ketab e dzeld Germez } + { ra } → { Ketab e dzeld Germez o }  
 'Book with red cover' (Obj.)  
 piece + particle → piece

In example III. the particle {ra} is added to a word, while in example IV. it is added to a piece.

Word plus particle, or piece plus particle is, therefore, a syntactic construction, as mentioned above, while word plus suffix is a morphological one.

### 9.3.3. Accent Shifting Suffixes v. Non-accent Shifting Particles

As stated in 8.6.3., particles differ phonologically from suffixes in that the latter require shift of accent whereas the former do not (but see also 9.5.).

### 9.3.4. Prosodic Distinction

Most particles are distinguished from suffixes by differences in their junction prosodies from those of suffixes as will be described in the rest of this chapter.

### 9.4. Particle Free and Bound

The term 'particle' includes all the grammatical items which mark a word or a combination of words for particular syntactic positions which are generally occupied by nominal pieces. It is, therefore, a general term and includes prepositions and conjunctions, which are generally free-forms, as well as pronominal endings, definite particle, 'ezafe' particle, etc., which are bound-forms.

Some of the particles stand on the borderline between bound- and free-forms, for example, the particle {va} 'and' may be regarded in some contexts as a bound-form (e.g. in {ketab o} 'the book and ...'),<sup>1</sup> and as a

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1. Cf. Ferguson, 'Word Stress in Persian', Language, Vol.33, No.2, 1957, p.127.

free-form in some others (e.g. in {va ketab...}  
'And book ...', at sentence initial).

No structural account of the particles is given, since the particles themselves lie outside the nominal word class although they function in nominal pieces. Moreover the structural statement of the particles is not needed for the statement of junction prosodies.

#### 9.5. Accented and Non-Accented Particles

Only two particles, namely {?e} 'definite particle', and {?a} 'persuasive particle' are accented. The remaining particles are unaccented.

#### 9.6. Statement of Junction Prosodies

The relation between particle and other constituents of a nominal piece is expressed through the following prosodies of junction:

J, H, V, R, ?, ?

The statement of the prosodies is given in the following pages with reference to relevant grammatical constructions.

A list of the constructions marked by each of the prosodies is given below:

I. ?-prosody. It marks the junction of the following constructions:

1. Definite and Indefinite pieces marked by the particle {?i}
2. Predicative Pieces marked by the conjugated forms of {?astan} 'to be'.

II. ?/?-prosodies. They mark the junction of the

following constructions:

3. Prepositional Pieces
4. The junction of all particles with the words following them within a piece.

III. J-prosody. It marks the junction of the following constructions:

5. 'ezafe' Pieces
6. Pieces marked by Pronominal endings
7. Vocative pieces

IV. H-prosody. It marks the junction of the following constructions:

8. Definite Pieces, marked by the particle {?e}
9. Persuasive Pieces, marked by the particle {?a}

V. R-prosody. It marks the junction of the following constructions:

10. Objective pieces, marked by the particle {ra}

VI. V-prosody. It marks the junction of the following construction:

11. Conjunctive pieces marked by the particle {va}

#### 9.6.1. Definite and Indefinite Pieces marked by {?i}

Traditional grammarians as well as linguists have referred to the above particle as both indefinite and definite article or suffix, and as the marker of singularity.<sup>1</sup> The use or uses of {?i} are, however, somewhat obscure and demand more discussion than the scope of the present thesis allows. It suffices here to state the following points about the uses of {?i}.

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1. See, for example, W. St Clair Tisdal, 'Modern Persian Conversation Grammar', 1958, pp. 25-6; C.A. Ferguson, 'Word Stress in Persian', 1957, p.128; V.S. Rastorgueva, 'A Short Sketch of the Grammar of Persian, 1964, pp. 19-20.

i) When {?i} is followed by {ke} 'that', it almost invariably indicates definiteness, e.g.

{mard i ke ?amad baradar am bud}

'The man who came was my brother.'

In this case the word preceding {?i} may follow a determinative adjective, e.g.

{?an mard i ke ?amad...} 'That man who came...'

ii) When {?i} is used with a word preceded by {jek} 'one', it almost invariably indicates indefiniteness, e.g.

{jek mard i ?amad} 'Some one man came.'

iii) When {?i} is used without {ke} or {jek} it may convey singularity as in:

{?ali batstje je xub i st} 'Ali is a good child'

Or it may convey indefiniteness as in:

{mard i ?amad} Some man came

Or it may even convey definiteness as in:

{pesard je fama batstjeha je xub i ?and}

'Your sons are good children.'

In connection with the statement of junction prosody, however, it is immaterial whether {?i} is regarded as definite or indefinite particle, or both, or whether it is considered as one particle, or two, or even three homophonous particles, because in all cases the relation of {?i} with the word or piece preceding is expressed through ?-prosody, both when the preceding word ends in C and when it ends in V, viz:

<u>Word</u>	?	<u>Particle</u>
-V/-C	+	?i

The exponents of ?-prosody are:

- a) [ ~ ] when the preceding word ends in V, viz:

<u>Word</u>	[ ~ ]	<u>Particle</u>
-V	+	?i

- b) [Syllabification] when the preceding word ends in C, viz:

<u>Word</u>	[Syllabification]	<u>Particle</u>
-C	+	?i

Exx.

CVCV	+ ?V	:	{gazi?i}	a/	some/the	judge
CVCV	+ ?V	:	{name?i}	"/	"/	letter
?VCV	+ ?V	:	{?ahu ?i}	"/	"/	gazelle
CVCC	+ ?V	:	{mar-di}	"/	"/	man
CVC	+ ?V	:	{dzo-?i}	"/	"/	barley

The presence of ?-prosody at the junction of word and {?i} is one of the factors that distinguishes the particle from the relative suffix {-?i} whose junction with stem is marked by J-prosody (see 8.4.23.II. above).

(See 10.3.6. and 10.3.7. for experimental findings.)

#### 9.6.2. Predicative Pieces Marked by {?astan}

The verb {?astan} 'to be', has six conjugated forms each having several variations. For clarity of exposition of the prosodic statement it is useful to start with the variation that is used in careful style, and having made the statement, the exponential variations can be described more easily.

In careful style the conjugated forms are:

[?am] 'am',	[?i] 'are',	[?ast] 'is'
[?im] 'we are',	[?id] 'you are',	[?and] 'they are'

The relation of the forms above with the preceding component of the piece is marked by ?-prosody. The preceding component may be C or V ending, viz:

Word     ?     ?astan  
-V/-C     +     ?am etc.

The exponents of the prosody in careful style are:

- a) [ ~ ] when the preceding word is V-ending, viz:

Word [ ~ ] ?astan  
-V     +     ?am etc.

- b) [Syllabification] when the preceding word is C-ending, viz:

Word [syllabification] ?astan  
-C     +     ?am etc.

Exx.

A)	CVCCV	+ ?	VC	:	{zende ?am}	'I am alive'
"	"	+ ?	V	:	{zende ?i}	'you are alive' (singular)
"	"	+ ?	VCC	:	{zende ?ast}	'(he) is alive'
"	"	+ ?	VC	:	{zende ?im}	'we are alive'
"	"	+ ?	VC	:	{zende ?id}	'you are alive' (plural)
"	"	+ ?	VCC	:	{zende ?and}	'they are alive'
"	CVC	+ ?	VC	:	{xa-bam}	'I am asleep'
"	"	+ ?	V	:	{xa-bi}	'you are asleep' etc.

When the preceding word ends in a close vowel, the exponent of ?-prosody is strongly shaded by the y/w prosodies functioning in that syllable so that in addition to glottal trill, a [j] or [w] sound can be observed. Thus, using narrow phonetic transcription, such examples may have the following forms:

B)	CVCVC <sup>w</sup> CI	+ ?	VC	:	{danej'.dʒu wam}	'I am a student'
"	CV <sup>y</sup> CI	+ ?	VC	:	{razijam}	'I am satisfied'

The presence of ?-prosody at the junction of nominal predicative pieces is one of the factors that distinguish such constructions from verbal constructions, which end in almost completely homophonous forms of personal endings ( {?am, ?i, ?ad, ?im, ?id, ?and} ), but are marked by J-prosody (e.g. {mi gu jam} 'I say', {mi pa? jand} 'they come').

In ordinary colloquial speech the forms undergo radical modification. Two trends of usage seem to be predominant:

1) The conjugated forms of the verb {hastan} ( {hastam} , {hasti} , {hast} , {hastim} , {hastid} {hastand} ), originally meaning 'to exist', seem to be increasingly favoured for use after V-ending words, while the conjugated forms of {?astan} 'to be', are maintained for use after C-ending words.<sup>1</sup> This results in such paradigms as:

- C) V-ending words: {razi hastam ~ hassam} 'I am satisfied'  
                           {razi hasti ~ hassi} 'You are "  
                           {razi hast ~ has } 'he is "  
                           {razi hastim ~ hassim} 'we are "  
                           {razi hastid ~ hassin} 'you are " (plural)  
                           {razi hastand ~ hassan} 'they are "  
 D) C-ending words: {xa-bam} 'I am asleep'  
                           {xa-bi} 'You are asleep (sing.)  
                           {xa-bast~xa-be} 'he is asleep'

1. The writer recently noticed himself following this usage.

- {xa-bin} 'we are asleep'  
 {xa-bid ~ xa-bin} 'you are asleep'  
 {xa-band~xa-ban} 'they are asleep'.

2) The conjugated forms of {?astan} are maintained both with V- and C-ending words. But while with C-ending words no other variants are found, with V-ending words the forms have the following further variations, (using a broad phonetic transcription for the examples for the purpose of showing the variations):

- E) {?am} : [jam] as in [razi jam] 'I am satisfied'  
 [wam] as in [daneʃdzu wam] 'I am a student'  
 [˜am] as in [zende ˜am] 'I am alive'  
 [m] as in [ʔindza m] 'I am here'
- {?i} : [i] as in [razi i] 'you are satisfied' (sing.)  
 [wi] as in [daneʃdzu wi] 'you are a student' "  
 [i] as in [ʔindza i] 'you are here' "
- {?ast} : [je] as in [razi je] 'he is satisfied'  
 [we] as in [daneʃdzu we] 'he is a student'  
 [˜as] as in [zende ˜as] 'he is alive'  
 [st~s] as in [ʔindza st~ʔindza s] 'he is here'
- {?im} : [m] as in [razi m] 'we are satisfied'  
 [wim] as in [daneʃdzu wim] 'we are students'  
 [jm] as in [zende jm] 'we are alive'  
 [ym] as in [ʔindza ym] 'we are here'
- {?id} : [n] as in [razi n] 'you are satisfied' (pl.)  
 [win] as in [daneʃdzu win] 'you are students'  
 [jn] as in [zende jn] 'you are alive'  
 [yn] as in [ʔindza yn] 'you are here'

{ʔand}	:	[jan]	as in	[razi jan]	'they are satisfied'
		[wan]	as in	[daneʃdgu wan]	'they are students'
		[an̄]	as in	[zende an̄]	'they are alive'
		[n]	as in	[ʔindʒa.n]	'they are here'.

All the variations above except [st ~ s] may be accompanied by some degree of glottality but not necessarily so.<sup>1</sup>

The variations do not clash with the prosodic statement made above because, firstly, as mentioned above, it is possible, though not necessarily so, that all the variations except [st ~ s] be accompanied with some glottality; secondly as stated in relation to examples B), the exponents of ʔ-prosody may in some cases be strongly shaded by frontness and backness of the preceding syllable. And in quick speech, it may be said that the phonetic context favours other features and rules out the exponent of ʔ-prosody; thirdly any speaker of the language, when speaking carefully pronounces the forms with glottal trill. Therefore, it may be said, that he recognizes the presence of a structurally significant glottal element at this position in the structure although he may not phonetically realize them on all occasions. Thus by analogy with careful style and in the light of the above considerations it may be concluded that the junction of the forms of {ʔastan} with the word preceding

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1. Carleton T. Hodge, in 'Some Aspects of Persian Style', 1957, p.363, states in general terms that "The informal (variation) has lengthening of vowel with some (glottal) stricture", which he symbolizes as / ʔ/. But it seems that the informal variation of 'to be' may be without phonetic glottal stricture as well.

is marked by ?-prosody which in careful styles has the exponents mentioned above and in quick speech not all the exponents are necessarily realized with V-ending words while with C-ending words the exponent is always syllabification.

### 9.6.3. Prepositional Pieces

Two classes of prepositions are set up and referred to as Class A and B.

#### 9.6.31. Class A Prepositions

Class A prepositions function both as prepositions and as nouns. Traditionally they are regarded as prepositions; but on formal linguistic grounds they may be treated as nouns in certain constructions. For instance, in the following example the underlined words, which are members of Class A, have nominal status as they all constitute the nominal constituents of nominal pieces.

{ xane ro rang kardam, tu ro ?abi ; birun o safid kardam }

'I painted the house; I painted the interior blue and the exterior white.'

But in the example below the underlined forms are used as prepositions:

{ tu je xane<sup>1</sup> kasi nabud; birun e dar montazer mondam }

'There was no one inside the house, I waited outside the gate.'

Members of this class express their relation with the following constituent of the piece through 'ezafe-

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1. See also 9.6.32.

construction' both when used as preposition, (e.g. {tu je xane} 'inside the house'), and as noun (e.g. {tu je xane ro didam} 'I saw the interior of the house'). Their prosodic statement is, therefore, included in that of 'ezafe piece' (see 9.6.5.) and nothing further needs to be said about them here. Class A prepositions include the following forms:

{bara je}	as in: {bara je to}	'for you'	, CVCV <sub>+</sub> <sup>J</sup> ?V + CV
{bala je}	as in: {bala je dar}	'over the door'	, CVCV <sub>+</sub> <sup>J</sup> ?V + CVC
{tu je}	as in: {tu je xane}	'in the house'	, CV <sub>+</sub> <sup>J</sup> ?V + CVCV
{ru je}	as in: {tu je sar}	'on the head'	, CV <sub>+</sub> <sup>J</sup> ?V + CVC
{zi-re}	as in: {zi-re sar}	'under the head'	, CVC <sub>+</sub> <sup>J</sup> ?V + CVC
{naz-de}	as in: {naz-de to}	'with you'	CVCC <sub>+</sub> <sup>J</sup> ?V + CVC
{baraba-re}	as in: {baraba-re to}	'in front of you'	, CVCVCVC <sub>+</sub> <sup>J</sup> ?V + CV
{bah-re}	as in: {bah-re to}	'for you'	CVCC <sub>+</sub> <sup>J</sup> ?V + CV
{biru-ne}	as in: {biru-ne dar}	'outside the door'	, CVCVC <sub>+</sub> <sup>J</sup> ?V + CVC
{mija-ne}	as in: {mija-ne xane}	'in the middle of the house'	, CVCVC <sub>+</sub> <sup>J</sup> ?V + CVCV
{pahlu je}	as in: {pahlu je dar}	'beside the door'	, CVCCV <sub>+</sub> <sup>J</sup> ?V + CVC

### 9.6.32. Class B Prepositions

Members of this class function as prepositions only and it includes the following forms:

{?az, be, ba, dar, bar, ta, bi, d<sub>3</sub>oz, bed<sub>3</sub>oz, ?andar, bad} . The last two are now becoming archaic.

The forms {tu} and {ru}, which were included in Class A (see 9.6.31.), stand at the borderline between Class A and B, because they may also express their relation with the following word through ?/?-prosodies, which are a feature of Class B, viz.

{tu xane}	in the house	CV <sub>+</sub> <sup>?</sup> CVCC
{ru ?ab}	on the water	CV <sub>+</sub> <sup>?</sup> ?VC

The relation between Class B preposition and the following word is expressed by  $\text{?/?}$ -prosodies.  $\text{?}$ -prosody marks the junction between V- or C-ending prepositions and V-beginning words, viz:

<u>Prep.</u>	?	<u>Word</u>
-V/-C	+	V-

$\text{?}$ -prosody marks the relation between V- or C-ending prepositions and C-beginning words, viz:

<u>Prep.</u>	?	<u>Word</u>
-V/-C	+	C-

The exponents of  $\text{?}$ -prosody are:

a) [ ~ ] at the junction of V-ending prepositions with V-beginning words, viz:

<u>Prep.</u>	[ ~ ]	<u>Word</u>
-V	+	V-

Exx.

CV + $\text{?}$ V	:	{be} + { $\text{?}$ u}	→	{be $\text{?}$ u}	'to him'
CV + $\text{?}$ V	:	{be} + { $\text{?}$ u}	→	{be $\text{?}$ u}	'with him'
CV + $\text{?}$ VCCVC	:	{ta} + { $\text{?}$ emruz}	→	{ta. $\text{?}$ emruz}	'till today'

b) [Syllabification] at the junction of C-ending prepositions with V-beginning words, viz:

<u>Prep.</u>	[syllabification]	<u>Word</u>
-C	+	V-

Exx.

CVC + $\text{?}$ V	:	{ba} + { $\text{?}$ ru}	→	{ba-ru}	'to him'
CVC + $\text{?}$ VC	:	{d $\text{?}$ oz} + { $\text{?}$ in}	→	{d $\text{?}$ o-zin}	'except this'

The exponents of  $\text{?}$ -prosody are:

a) [No glottality] at the junction of V-ending prepositions with C-beginning words, viz:

Prep. [no glottality] Word

-V + C-

Exx.

CV  $\frac{?}{+}$  CV : {be} + {to} → {beto} to you  
 CV  $\frac{?}{+}$  CVCC: {ba} + {dast} → {badast} with hand

b) [No syllabification] at the junction of C-ending prepositions with C-beginning words, viz:

Prep. [no syllabification] Word

-C + C-

Exx.

CVC  $\frac{?}{+}$  CV : {bar} + {to} → {barto} 'to you'  
 dar  $\frac{?}{+}$  CVCV : {dar} + {xane} → {darxane} 'at home'

#### 9.6.4. Particles + Words within a Piece

Some particles, such as {ʔe} ezafe and {va} conjunctive take medial position in a piece. Such particles express their relation to the components following by ?/?-prosodies. The statement of ?/?-prosodies at this position in the structure is the same as that given in 9.6.32. with the same phonetic exponents, thus:

<u>Particle</u>	?	<u>Word</u>	and	<u>Particle</u>	?	<u>Word</u>
-V/-C	+	V-		-V/-C	+	C-

Exx.

CVCV<sup>J</sup> + V<sup>?</sup> + V<sup>?</sup> : {name} + {ʔe} + {ʔu} → {name je ʔu} 'his letter'  
 CVCVC<sup>J</sup> + V<sup>?</sup> + VCVC : {dzelow} + {ʔe} + {ʔotaG} → {dzelow-~~wə~~-ʔotaG}  
 'in front of the room'  
 CVCC<sup>J</sup> + V<sup>?</sup> + CVC : {dast} + {ʔe} + {man} → {das-te man} 'my hand'  
 CVC<sup>J</sup> + V<sup>?</sup> + CV : {kar} + {ʔe} + {to} → {ka-re to} 'your job'

#### 9.6.5. 'ezafe' Pieces

The relation between {ʔe} -ezafe and the V-

or C-ending words preceding is expressed through J-prosody,  
viz:

<u>Word</u>	J	<u>ezafe</u>
-V/-C	+	?e

The exponents of J-prosody are:

a) [j] at the junction of V-ending words with {?e}

viz:

<u>Word</u>	[j]	<u>ezafe</u>
-V	+	?e

Exx.

$CVCV^J + ?V (+ ?V) : \{name\} + \{?e\} + \{?u\} \rightarrow \{name\} j e (?u) \}$  'his letter'  
 $CV^GCV^J + ?V (+ ?CV) : \{batjstje\} + \{?e\} + \{to\} \rightarrow \{batjstje\} j e (to) \}$   
 'your son'

In rapid speech only the exponent of the prosody may be kept, the syllabic element of the {?e} -ezafe being omitted, e.g.

$\{name\} j ?u \}$  'his letter'  
 $\{batjstje\} j man \}$  'my son'

When the final V of the preceding word is I the particle may be omitted, e.g.

$\{bazu\} man \}$  'my arm'  
 $\{bazi\} to \}$  'your play'

b) [Syllabification] at the junction of C-ending words with {?e}, viz:

<u>Word</u>	[syllabification]	<u>ezafe</u>
-C	+	?e

Exx.

$CVCVC^J + ?V (+ ?V) : \{pedar\} + \{?e\} + \{?u\} \rightarrow \{peda-re\} ?u \}$  'his father'  
 $CVCC^J + ?V (+ ?CVC) : \{dast\} + \{?e\} + \{man\} \rightarrow \{das-te\} man \}$  'my hand'

### 9.6.6. Pieces Marked by Pronominal Endings

Pronominal endings comprise six forms each having several variants, but as in the case of the verb {?astan} 'to be', it is useful to start with the careful style variants as this makes a clear description possible. As in the description of the verb {?astan} phonetic transcription is used, when necessary, to show the exponential variations.

In careful style the pronominal endings have the forms:

[?am] 'my, me', [?at] 'your, you' [?aʃ ] 'our, us'

[?em an] 'our, us' [?et a n] 'your, you' pl.

[?e ʃa n] 'their, them'.

It is possible to analyse the part -a n in the plural forms as the plural suffix {-?a n} , thus reducing the forms to three, each having a singular and a plural form. But for the following grammatical and phonological reasons this has not been done.

1) Suffixation does not apply to pieces, i.e. particles are added to words after suffixation has been completed. In other words, in dealing with pieces and particles one has already left morphology and is concerned with syntax, and to consider suffixation at this level would mean to go back to morphology (which it is preferable to avoid).

Furthermore, to abstract - a n as the suffix {-?a n} would imply that either the suffix {-?a n} functions differently from other suffixes (i.e. that, unlike other suffixes, it can be applied to pieces), or the

particles above are, for the same reason, different from other particles (i.e. they can be suffixed). In either case unnecessary complexity would be introduced to the description.

2) Phonologically the suffix  $\{-?_a n\}$  is an accent shifting suffix (e.g.  $\{soxan\}$  'speech',  $\{soxahn\}$  'speeches'), whereas the part  $-an$  in the forms above does not require shift of accent (e.g.  $\{soxanejan\}$  'their speech'). And to abstract it as the suffix  $\{-?_a n\}$  would mean to allow unnecessary variations for the suffix which in turn would mean that the suffix  $\{-?_a n\}$  functions differently from other suffixes.

For the reasons given above the plural forms of pronominal endings are regarded as monomorphemic just as the plural forms of the verb 'to be' (see 9.6.2.).

The junction between the pronominal endings and the preceding word is marked by the following prosodies:

i)  $?-$ prosody, only when the preceding word ends in a y-syllable of CA structure (e.g.  $CV^yCA$ :  $\{name\}$  'letter'), viz:

<u>Word</u>	<u>?</u>	<u>Pron. endings</u>
$-^yCA$	+	$?am$ etc.

The exponent of  $?-$ prosody is [  $\sim$  ].

Exx.

$CV^yCA$	+	$?VC$ : $\{name\} + \{?am\} \rightarrow \{name?am\}$	'my letter'
"	+	$?VC$ : $\{name\} + \{?at\} \rightarrow \{name?at\}$	'your letter'
"	+	$?VC$ : $\{name\} + \{?af\} \rightarrow \{name?af\}$	'his letter'

ii) J-prosody in all other cases, viz:

<u>Word</u>	J	<u>Pron. endings</u>
-V/-C	+	?am etc.

The exponents of J-prosody are

a) [j] at the junction of V-ending words with the endings, viz:

<u>Word</u>	[j]	<u>Pron. ending</u>
-V	+	?am etc.

Exx.

CV	<sup>J</sup> +	?VC etc.:	{pa} + {?am} → {pajam}	'my leg'
CVCV	<sup>J</sup> +	?VCVC etc.:	{bazi} + {?etan} → {bazijetan}	'your play' (pl.)

b) [Syllabification] at the junction of C-ending words with the endings, viz.

<u>Word</u>	[syllabification]	<u>Pron. endings</u>
-C	+	?am etc.

Exx.

CVC	<sup>J</sup> +	?VC etc.	{kar} + {?am} → {ka-ram}	'my job'
CVCC	<sup>J</sup> +	?VCVC etc.:	{dast} + {?eʃan} → {das-teʃan}	'their hands'

In rapid colloquial speech the forms are subject to variation especially in combination with V-ending words.

With C-ending words the forms remain almost unchanged except for a change in their vowel quality, which is as follows:

[?am]	[?et]	[?eʃ]
[?emun]	[?etun]	[?eʃ un]

The prosodic statement made above is applicable to these variations and has the same exponent (syllabification) as in careful style, e.g.

CVC	<sup>J</sup> +	?VC:	{kar} + {?et} → {ka-ret}	'your job'
-----	----------------	------	--------------------------	------------

CVC  $\overset{J}{+}$   ${}^?VCVC$ : {kar}+ { ${}^?emun$ }  $\rightarrow$  {ka-remun} 'our job'

With V-ending words in rapid colloquial speech the endings have the following forms:

[m]	[t]	[ʃ]
[mun]	[tun]	[ʃun]

The V in  ${}^?CA$  has the phonetic form [a.] when followed by these forms.

These variations, also, do not alter the prosodic statement above as it may be explained that in such styles of speech the junction prosodies  ${}^?-$  and J are phonetically not realized, but the native speaker is intuitively aware of the presence of the prosodies at this point in the structure so that when he speaks with less rapid tempo, he systematically uses J- and  ${}^?-$ prosodies, and not other prosodies which function in other structures. Therefore, the structural statement of such variants is the same as that of the forms in careful style e.g.: (using the same examples as for careful speech):

$CV{}^?CA$   $\overset{?}{+}$   ${}^?VC$  etc.: {namam, namat, namaʃ} etc.

$CV$   $\overset{J}{+}$   ${}^?VC$  etc.: {pam, pat, pamun paʃun} etc.

$CVCV$   $\overset{J}{+}$   ${}^?VC$  etc.: {bazit, bazitun baziʃ} etc.

(see 10.3.7. for some experimental findings.)

#### 9.6.7. Vocative Pieces

Vocative pieces are marked by the particle { ${}^?a$ } which follows the nominal word, or by { ${}^?ej$ } and {ja} which precede the word.

The junction of { ${}^?ej$ } and {ja} with the following word is marked by  ${}^?/?$ -prosodies as explained for

prepositional pieces (see 9.6.32.) e.g.

?VC + ?VCVCV: {<sup>1</sup>?ej} + {<sup>1</sup>?aʃena} → {<sup>1</sup>?ej <sup>1</sup>?aʃena} Oh friend!

CV + ?VCCVC: {<sup>1</sup>ʃa} + {<sup>1</sup>?allah} → {<sup>1</sup>ʃa <sup>1</sup>?allah} Oh Lord!

?VC + ?CVCV: {<sup>1</sup>?ej} + {<sup>1</sup>xoda} → {<sup>1</sup>?ej <sup>1</sup>xoda} Oh Lord!

CV + CVCCVC: {<sup>1</sup>ʃa} + {<sup>1</sup>rahman} → {<sup>1</sup>ʃa <sup>1</sup>rahman} Oh merciful!

The junction of {<sup>1</sup>?a} with the preceding word is marked by J-prosody (exponents as in ezafe pieces, see 9.6.5.) viz:

<u>Word</u>	J	<u>Vocative</u>
-V/-C	+	?a

Exx.

CVCV + <sup>J</sup>?V: {<sup>1</sup>xoda} + {<sup>1</sup>?a} → {<sup>1</sup>xoda<sup>1</sup>ja} Oh Lord!

CVCCVCC <sup>J</sup>?V: {<sup>1</sup>parvardegar} + {<sup>1</sup>?a} → {<sup>1</sup>parvardega<sup>1</sup>-ra} Oh Creator!

#### 9.6.8. Pieces Marked by {<sup>1</sup>?e} Definite Particle

The definite particle {<sup>1</sup>?e} is used mostly in the spoken language, the particle {<sup>1</sup>?i} (see 9.6.1.) still being preferred in writing. It may also be said that {<sup>1</sup>?e} is originally a feature of the local dialect of Tehran which is now becoming increasingly popular elsewhere among speakers of Standard Colloquial Persian.

{<sup>1</sup>?e}, unlike other particles, is an accent shifting particle and to that extent it resembles suffixes, but from a functional point of view it resembles particles, i.e. it marks words and pieces equally (e.g. {<sup>1</sup>pesare} 'the boy' and {<sup>1</sup>pesar <sup>1</sup>polande} 'the tall boy'), and

the resultant forms have the characteristics stated in 9.3.

The relation between the particle and the C- and V-ending word preceding is marked by H-prosody, viz.

<u>Word</u>	H	<u>Particle</u>
-V/-C	+	?e

The exponents of H-prosody are:

a) [ h ] at the junction of V-ending words with the particle, viz.

<u>Word</u>	[ <u>h</u> ]	<u>particle</u>
-V	+	?e

Exx.

CVCCV + <sup>H</sup>?V: {tak'si} + {?e} → {tak'si<sup>h</sup>e} 'the taxi'

CVCV + <sup>H</sup>?V: {name} + {?e} → {name<sup>h</sup>e} 'the letter'

b) [Syllabification] at the junction of C-ending words with {?e} viz:

<u>Word</u>	[syllabification]	<u>Particle</u>
-C	+	?e

Exx.

CVCVC + <sup>H</sup>?V: {pesar} + {?e} → {pesa<sup>h</sup>-re} 'the boy'

CVCC + <sup>H</sup>?V: {mard} + {?e} → {mar<sup>h</sup>-de} 'the man'

#### 9.6.9. Pieces Marked by {?a} Persuasive<sup>1</sup>

The particle {?a} is in some respects like the definite particle {?e} above in that it is primarily a

1. The term "persuasive" is used to refer to this particle in this thesis. {?a} does not appear to have been observed by Persian grammarians or by linguists as persuasive, or a term meaning this. In fact no previous account of the particle was found among the literature consulted and this may be because the particle is seldom used in writing. As this particle has apparently not been described before, it may be useful to give some context of situation within

feature of the spoken language (but not essentially of the local dialect of Tehran as is the case with {ʔe} ), and it requires accent shift. The relation of {ʔa} to the word preceding is marked by H-prosody which has the same exponents as stated in 9.6.8. above, viz:

<u>Word</u>	H	<u>Particle</u>
-V/-C	+	ʔ a

Exx.

(... )CV + <sup>H</sup>ʔV: { (saʔat e) 'se } + {ʔa} → { saʔat e se 'ha }  
 'At three o'clock (and don't forget!).'

(... )CVC + <sup>H</sup>ʔV: { (sobh e) 'zud } + {ʔa} → { sobh e zu- 'da }  
 'Early in the morning (and do not forget!).'

When the word preceding ends in a close vowel, the exponent of H-prosody is strongly shaded by the features frontness or backness in the preceding syllable, and, in quick speech, it may be substituted for [ h ] e.g.

{ pazija } 'play' (I remind you not, say, work) { ʔahu'wa } 'gazelle'  
 (and remember nothing else)

#### 9.6.10. Pieces Marked by {ra} Objective Particle

In reading style the particle {ra} may be treated as having CV structure with r as a consonantal element, e.g.

CVCC CV ... { mardra didam } '(I) saw the man'

CVCV CV... { name ra xandam } '(I) read the letter'

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Footnote continued from page 290.

which the particle is used. Speaker A suggests to B that it would be nice to go and watch some football. B knows, from previous experience, that A may change his mind later and take him to, say, the cinema. Thus A suggests: { berim futbal bazi be'inim }  
 'Let's go and watch a game of football.'

B answers: { faqat futbal bazi ha }  
 'Only football (remember! and don't change your mind later.).'

In the examples above representing reading style, r appears both after C- and V-ending words equally and occupies a place in the structure just as any other C-elements, i.e. its presence is not linked to the type of structure that precedes it.

In Standard Colloquial Persian the particle has become [ro] and [o], and it has the form {ra} in isolation only. The element r does not occupy a place, rather it marks the relation of the particle to the word preceding; but unlike other V-beginning words and bound forms, it is marked by R-prosody in isolation (see 8.2.). Therefore the presence or absence of r in this dialect is linked with the type of structure that precedes r is, therefore, abstracted in this analysis of the dialect, as a prosodic feature referred to as R-prosody. R-prosody marks the junction of V- and C-ending words with the particle {ra}, viz:

<u>Word</u>	R	<u>particle</u>
-V/-C	+	r a

The exponents of R-prosody are:

a) [r] at the junction of V-ending words with {ra}

viz:

<u>Word</u>	[r]	<u>particle</u>
-V	+	r a

Exx.

CVCV + <sup>R</sup>R<sub>V</sub>: {baba} + {ra} → {babaro}      father (object)

CVCV + <sup>R</sup>R<sub>V</sub>: {Gazi} + {ra} → {Gaziro}      the judge (object)

b) [Syllabification] at the junction of C-ending words with {ra}, viz:

Word [syllabification] particle

-C + ra

Exx.

CVCC + <sup>R</sup>R<sub>v</sub>: {dast}+ {ra}→{das-to} hand (object)

When the word preceding ends in a close vowel (i.e. I), the exponent of R-prosody may not be realized. In this case the elements [j] and [w] are observed at the junction, e.g.

[Gazijo] 'the judge (object)'

[danejdguwo] 'the student (object)'

9.6.11. Pieces Marked by {va} Conjunctive Particle

Like r in {ra}, and for similar reasons (see 9.6.10.) the element v in the particle {va} may be regarded consonantly in reading style where the particle has the form [va], and the presence of v is not governed by the preceding structure, e.g.

{mard va ...} 'man and ...'

{name va ...} 'letter and ...'

But in Standard Colloquial Dialect, where the particle has the form [va] only in isolation, the element v is present or absent according to the type of structure preceding, and is, therefore, best treated prosodically, symbolized as V and referred to as V-prosody. Unlike other V-beginning words and particles (see 8.2.), {va} is marked by V-prosody in isolation.

V-prosody marks the junction of V- and C-ending words and {va} viz:

Word V particle

-V/-C + va

The exponents of V-prosody are:

a) [w] at the junction of V-ending words with {va}

viz:

<u>Word</u>	[w]	<u>particle</u>
-V	+	va

Exx.

CVCV + <sup>V</sup>V: {baba} + {va} → {babawo....} father and...

CVCV + <sup>V</sup>V: {name} + {va} → {name wo...} letter and

b) [Syllabification] at the junction of C-ending words with {va}, viz:

<u>Word</u>	[syllabification]	<u>particle</u>
-C	+	va

Exx.

CVCC + <sup>V</sup>V: {mard} + {va} → {mar-do} 'man and'

CVC + <sup>V</sup>V: {mej} + {va} → {me-jo} 'wine and...'

When the word preceding ends in a syllable of <sup>V</sup>CI structure, the exponent of V-prosody may not be realized. In this case the element [j] appears at the junction, e.g.

CV<sup>V</sup>CI + <sup>V</sup>V: {Gazi} + {va} → {Gazijo} or {Gaziwo} 'judge and...'

### 9.7. An Example

The prosodic statement of the junctions between the particles and words in the example 3), in 9.1. above, may now be given below as:

{ (?u) miz o sandali je sabz e ro (xarid). }

(?V) CVC<sup>V</sup>V ?CVCCV<sup>V</sup>CV<sup>J</sup>V ?CVCC<sup>H</sup>e<sup>R</sup>V (CVCVC).

## Exponents:

V = [syllabification]

ʔ = [no glottality]

J = [j]

H = [syllabification]

R = [r]

CHAPTER 10EXPERIMENTAL SUPPORT FOR THE PERCEPTUAL DESCRIPTION10.1 Instruments

In the preparation of the experimental evidence included in this thesis the following technique and instruments were used.

10.1.1 Palatography. The technique of palatography, its types, their range of application and the necessary terminological explanations have been fully described by Prof. J.R. Firth in the following articles:

i) Word-Palatograms and Articulation, 1948.

ii) Improved Techniques in Palatography and Kymography, 1950. Both articles are available in Papers in Linguistics, J.R. Firth London, 1964, pp. 148-154 and 173-176. It is not, therefore, necessary to describe palatography here.

10.1.2 The Mingograph

The mingograph is a writing machine to which the instruments described in (a) - (c) below are connected as required. It provides a moving graphed-paper, over which is mounted a number of ink galvanometers. These are thin glass jets suspended in the magnetic field of the galvanometer so that fluctuations of this field - influenced by the energy content of the utterance - causes these jets to pivot in an arc, about a mean zero line. Ink is forced through these jets under high pressure and results in a stream of ink being deposited on the moving paper, writing the information contained in the utterance for immediate visual interpretation. The instruments which are connected to the mingograph are:

(a) The Pitch Meter - (marked by 'P' on the traces):

This is an instrument for converting varying frequencies into varying D.C. currents so that a visual picture can be obtained when it is linked to the mingograph. The trace is read at the bottom of the display, the lower frequencies giving a longer line and the higher frequencies a shorter one. Thus a pitch curve can be displayed which - with the aid of a transparent calibration grid - can be measured for frequency at any point in the example. The instrument also provides a DUFLEX OSCILLOGRAM, which differs from the conventional oscillogram in that the extreme high frequencies contained in the example are converted within the instrument to negative pulses, which are displayed in a downward direction below the zero line. This means that sibilants, plosives and fricatives can be more readily segmented and more accurately measured for duration.

(b) The Intensity Meter - (marked by INT. on the traces)

This instrument allows the display of total intensity, (which corresponds roughly to loudness) in decibels, in a series of 'peaks', which may be measured with the aid of the transparent grid.

(c) The Electro-Aerometer - (marked by N and M on the traces)

The instrument allows the display of volumes of air from the nose and mouth simultaneously. It consists of a face mask, which covers the front of the face completely, a foam rubber rim sealing the face from leakage of air, and a rubber seal to isolate the nose and mouth into two separate channels. The expelled air passes through rubber valves which, dependent on the volume, open up progressively to allow a beam of light from a lamp fitted on each individual valve to react on a

photo-electric cell. The degree of light intensity is converted by the electronics of the device into varying D.C. currents, which actuate the kymograph to produce 'peaks' and 'curves' of varying height, the higher peaks showing more air content. Voicing and nasality are superimposed on the trace, so that segmenting is relatively simple.

### 10.1.3 Sonagraph (sound Spectrograph)

This is an electro-mechanical device for displaying energy content over the sound spectrum between 85 to 800 Hz.

A sheet of chemically treated paper is mounted on a rotating drum which is, in turn, keyed to an oxide coated disc so that they rotate together. Sound is recorded on the edge of this disc in much the same way as on the tape of a tape recorder. This recorded sound is then fed through the electronics of the machine in a series of constant repetitions - rather like a tape loop - and a 'burning stylus' is made to travel upwards across the paper on the drum, by a lead-screw, so that each revolution of the drum finds the stylus one thread of the lead-screw higher on the paper. As a varying D.C. voltage - dependent in intensity on the energy content of the example - is fed to this stylus, a burning of the paper takes place where there is energy, the blank portions representing no energy. Frequency is displayed in the vertical plane, duration in the horizontal, and the varying intensity of the 'burned' trace - in terms of light or dark - the energy content. Frequency and duration can be measured with the aid of a transparent calibration grid.

### 10.2 Discussion of the Palatograms

Sixteen Palatograms have been included in this thesis.

Palatograms 1 - 14 are word-palatograms; 15: [p<sup>ɛ</sup>.ic k<sup>u</sup>] 'Where is the messenger?', and 16: [p<sup>u</sup>.kk<sup>u</sup>] "Where is the clean ...?", are sentence-palatograms as these were found to be more suitable than words for the purpose of palatography. The choice of sentence over word in this case is not, however, in conflict with the purpose for which these examples have been selected.

A transparent Palatogram Figure has been provided (and kept in the inside of the back cover) with the help of which each palatogram can be studied and compared with others.

The palatograms are intended to provide instrumental evidence for the following aspects which were described perceptually in the previous chapters:

1. Advanced v. back articulation of some of the contoids.
2. W- v. y- features and their significance in syllable division.
3. Long v. short contoids.

#### 10.2.1 Advanced v. Back Articulation

Palatogram 1: [c<sup>ɛ</sup>a.m] 'little', represents a monosyllable which is marked by y- features; and 2: [k<sup>u</sup>.m] 'mouth' represents a monosyllable which is marked by w- features.

Palatogram 1 shows that in the articulation of [c<sup>ɛ</sup>] at the onset of [c<sup>ɛ</sup>a.m] a wide contact is made between the tongue and the palate in the left and right zones 8, and in the left and right 1st. pre-molar zones extending beyond the 2nd molar zones, left and right. In addition a soft tongue contact can be observed in the right zone 4, as well as on the 1st molar line. Palatogram 2 shows that in the articulation of

[k<sup>4</sup>] at the onset of [k<sup>4</sup>o.<sub>2</sub>m] the tongue is not in contact with the palate, therefore, the contact must be more retracted (i.e. velar) so that only the left and right 2nd molar zones are in contact with the tongue.

Palatogram 3: [si.<sub>2</sub>m] 'silver', (a y- syllable), shows wide contact in the left and right canine zones which extends beyond the 2nd molar zones. In addition some soft contact can be observed in the right zone 4. Palatogram 4: [s<sub>2</sub>a.<sub>2</sub>m] 'proper name' (a w- syllable), shows narrow contact beginning from the back parts of the left and right canine zones and extending beyond the 2nd molar zones. In addition a soft contact can be observed in the right zone 4 which, compared to that observed in example 3, covers a smaller area.

Palatograms 1 - 4 provide instrumental support for the perceptual descriptions given in 2.3 and 3.4.2, the latter of which contain contoids in syllable onsets.

Palatogram 5: [me.<sub>2</sub>c<sup>4</sup>] 'suction' (a y- syllable) shows firm contact in the left and right 2nd pre-molar zones extending to beyond the 2nd molar zones; the left and right zones 8 are also in contact with the tongue. Palatogram 6: [p<sup>4</sup>o.<sub>2</sub>c<sup>4</sup>] 'clean' (a w- syllable), shows firm contact in the left and right 1st molar zones extending to beyond the 2nd molar zones. Unlike 5, no contact is observed in the left zone 8 in palatogram 6 and only a narrow contact is observed at the back of the right zone 8. A comparison between 1 - 2 and 5 - 6 shows that y/W- features are more clearly distinguishable at the onset than at the endings.

Palatogram 7: [bi.<sub>2</sub>d] 'willow' (a y- syllable), shows firm contact in the left and right zones 1 - 4, and wide contact

in the left and right frontal incisor zones which extends to beyond the 2nd molar zones. In Palatogram 8: [ɸu.d̥] 'being' (a w- syllable), no contact is observed in the left and right zones 1 or in the left zones 3 - 4, and the contact observed in the right zones 3 - 4, is, compared with the example 7, soft. The contact in the left and right 1st pre-molar zones, which extends beyond the 2nd molar, is also narrower as compared with example 7.

Palatogram 9: [pʰi.r̥] 'old' (a y- syllable), shows wide contact beginning from 1st pre-molar zones, left and right, and extending beyond 2nd molar zones. In addition soft contact can be observed along the canine line. Palatogram 10: [pʰu.r̥] 'son' (a w- syllable) shows narrow contact beginning also from the 1st pre-molar zones, left and right and extending beyond the 2nd molar zones. Unlike example 9 no soft contact is observed in the canine line.

Palatograms 11: [pʰi:stʰ] 'twenty' (a y- syllable), and 12: [pʰu:s:tʰ] 'skin' (a w- syllable), show much the same area of contact except that in the former the contact is wider than in the latter specially in the left zones. In addition the contact in the left and right zones 3 is more front and firm in 11 than in 12.

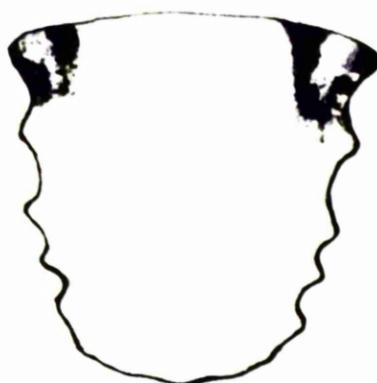
Palatograms 5 - 12 provide instrumental evidence for the perceptual description given in 2.3 and 3.4.3 to 3.4.5, the latter of certain contoids in syllable endings.

#### 10.2.2 Y- and W- Features and Their Significance in Syllable Division

Palatogram 13: [pʰe.ɪkʰu] 'where is the messenger' (a y- syllable followed by a w- syllable), shows almost the same area of contact as that observed in palatogram 1:



1. [ca·m]



2. [ka·m]



3. [a1·m]



4. [sa·m]



5. [no·δ]



6. [pa·cʰ]



7. [ḅi·ḍ]



8. [p̣u·ḍ]



9. [p̣i·ṛ]



10. [p̣u·ṛ]



11. [ḅiṣ:ṭ]



12. [p̣uṣ:ṭ]

13. [p<sup>6</sup>e·iĉk<sup>4</sup>ŭ]14. [p<sup>4</sup>a·kĉk<sup>4</sup>ŭ]15. [p<sub>ə</sub>·tj<sup>6</sup>ĉe]16. [p<sub>ə</sub>tj<sup>6</sup>ĉe]

and palatogram 14: [ p<sup>u</sup><sub>a</sub>.kk<sup>u</sup> ] shows similar contact to that seen in palatogram 2. This may be taken to prove that although no release is observed in [ -ck<sup>u</sup> ] in 13, and in [ -kk<sup>u</sup> ] in 14, yet the former is distinguished articulatorily from the latter, and this observation provides palatographic evidence for the perceptual description given in 4.1.3.

### 10.2.3 Long v. Short Contoids

Palatogram 15: [ p<sup>a</sup>.t<sup>u</sup>t<sup>u</sup>ʃel 'child', (with a long contoid), shows contact in the right zone 3, and right and left zones 4. It also shows wide contact in the left and right canine zones extending beyond 2nd molar zones. Palatogram 16: [ p<sup>a</sup>ʃel 'child', (with a short contoid), shows contact only in left and right zones 4. Unlike 15 no contact is observed in the right zone 3. In addition palatogram 16 shows narrow contact in the canine zones extending beyond 2nd molar zones, left and right. The difference observed in 15 and 16 may be said to indicate that 15 is pronounced with firmer contact and is therefore more tense. This provides palatographic evidence for the perceptual description given in 5.3.

### 10.3 Discussion of the Mingograms

The mingograms included in this thesis are of two types, each type being discussed separately.

Type one which includes 29 mingograms from 1 to 29 provides the oscillogram (osc.) of the utterance under observation, the pitch tracing (P), recorded just above the oscillogram, and the intensity line (INT.) which is recorded over the pitch tracing.

A time marker tracing (50 cycles per second) is given

below every mingogram in order to make measuring the duration of any part of the utterance possible. The parts of the utterances can be delimited by comparing the oscillogram with the intensity line and pitch tracing.

The mingograms of this type are intended to provide mingographic evidence, as far as possible, for such perceptually described features as:

- 1) Syllable length.
- 2) Voicing, voicelessness, tenseness, and laxness
- 3) Syllabification
- 4) Prominence and its underlying factors
- 5) Long contoids
- 6) The phonetic nature of glottal stop.
- 7) ?- and J junction prosodies.

### 10.3.1 Syllable length

The length of syllable is obtained by measuring the distance between the points at which some tracing is observed for the contoid at the onset, and for the final segment at the last place in the syllable. For example, in the mingogram 1, representing the utterance [d<sub>1</sub>as:t<sub>2</sub>ʔ] 'hand', the point of release of the denti-alveolar plosive [d] can be located by noting the point at which the upward movement of the intensity line from the zero level is minimal. The presence of regular wave forms with low amplitude on the oscillogram just before the release of [d] suggests that the contoid is voiced even prevoiced (see 3.4.21 - 3.4.26). This is supported by the presence of long lines on the pitch tracing at a comparable position indicating low frequency. The point of release of the denti-alveolar plosive [t] at the final place in the utterance can

also be located by observing the slight downward movement of the oscillogram from the zero level registering negative pulses which results from the presence of some degree of high frequency at the release of the contoid. This correlates with a small peak on the intensity line which indicates the presence of some degree of loudness at this position. The distance between these two points, i.e. the length of the syllable, is, on this occasion, somewhere between 56-58 centi-seconds (C.S.).

The same procedure may be used for measuring the length of any other utterance. The length of the syllables represented by the mingograms 1-11 ranges from about 54 C.S. (No. 3 [p<sup>h</sup>o:t<sup>h</sup>ɔ] hammer) to 62 C.S. (No. 8 [sɔ:ɪh] morning). These syllables are of CVCC type.

The length of the syllables represented by the mingograms 12-16 ranges from about 37 C.S. (No. 13 [xā.n] 'Khan') to about 43 C.S. (No. 15 [bɑ:ɪ] enough). These syllables are of CVC type.

The length of the syllable represented by the mingogram 17 [p<sup>h</sup>ɔ] 'foot' is about 20-21 C.S. This syllable is of CV-type.

This observation provides mingographic evidence for the perceptual description of syllable length as given in 2.2 and the subsequent prosodic statement in 6.42. (See also 10.4.4 for spectrographic findings).

A comparison between the length of the vocoids in 1 and 2 and 15 and 16 provides mingographic evidence for the perceptual description of the phonetic realization of syllable length in syllables with a voiceless fricative in the ending and in syllables with other contoids in their endings as

described in 2.2. The length of the vocoid in 1 (i.e. in [da<sub>2</sub>ːt<sub>2</sub>ʰ] 'hand' is about 18-19 C.S. The length of the vocoid in 2 (i.e. in [n̄<sub>2</sub>ːz<sub>2</sub>d<sub>2</sub>] before) is approximately between 27-28 C.S. The length of the vocoid in 15 (i.e. [ɸa<sub>2</sub>ː.] 'sufficient') is about 13-14 C.S., whereas the vocoid in 16 (i.e. [k<sup>u</sup><sub>2</sub>a<sub>2</sub>r<sub>2</sub>] 'work') is between 22-23 C.S.

The shorter vocoids in comparable syllable types are followed by a tense and long voiceless fricative (in these examples by [sː] and [s̄.], while the longer vocoids are followed by other contoids (in these examples by [-z<sub>2</sub>d<sub>2</sub>] and [r̄] which although they are voiceless in these contexts, are not as tense or as long, (see 10.3.2).

### 10.3.2 Voicing/Voicelessness, Tenseness/Laxness (h/h- features)

The min<sup>g</sup>ograms 1-11 and 15-16 are the subject of discussion. In most of these examples the vocoids may be said to end at the point where regular wave forms are no longer registered on the oscillogram. This correlates roughly with the point where the pitch tracing ends and the trace returns to the zero level, and, quite frequently, with a steep decay of the intensity line which may or may not reach the zero levels. From this point onwards to the end of the utterance, no regular wave forms can be traced on the oscillogram of any example above. This may be interpreted as indicating that all the endings in the examples above are marked by the feature voicelessness. In other words the contoids in the following endings are all voiceless: [-sːt<sub>2</sub>ʰ, -z<sub>2</sub>d<sub>2</sub>, -t<sup>u</sup><sub>2</sub>c<sup>u</sup><sub>2</sub>, -z<sub>2</sub>l<sub>2</sub>, -s<sub>2</sub>ʰ, -m̄<sub>2</sub>ʰ, -fn̄<sub>2</sub>, -bh̄<sub>2</sub>, -ʔ<sub>2</sub>d<sub>2</sub>, -r̄<sub>2</sub>d<sub>2</sub>, -hl̄<sub>2</sub>, -s̄<sub>2</sub>, -r̄<sub>2</sub>] Nevertheless, some of the endings seem to be represented by steeper downward negative pulses than certain other comparable endings. For example [-st<sub>2</sub>ʰ] in

1 and [-s<sub>1</sub>] in 5 have moved the oscillogram much further downwards from the zero level than [-z<sub>2</sub>d] in 2 and [-z<sub>1</sub>] in 4. Therefore it may be said that although voicing and laxness are completely absent in the endings, two degrees of tenseness can be distinguished, one strong to account for such examples as [-s<sub>1</sub>], and the other weak for such examples as [-z<sub>2</sub>d]. This observation is mingographic evidence for the perceptual description given in 2.4 and 3.4.31, and the subsequent prosodic statement in 6.4.4 and 6.4.42. At syllable onset, it seems, that both tenseness and voiclessness as well as laxness and voicing can be traced. But before this can be done one should accept the assumption that the vocoids begin at the point where the pitch tracing registers frequency and the intensity line begins to rise sharply to reach its highest peak in the whole utterance both of which correlate with the point on the oscillogram where regular wave forms with high amplitude are recorded. In some examples the presence of regular wave forms with considerably low amplitude just before the vocoid begins may be taken to indicate that the syllable onset is marked by voicing. Such examples generally do not show a sharp movement downwards from the zero level so that they may be said to be lax as well. The examples represented in 2 [nā; z<sub>2</sub>d] and in 15 [bas.] are of this group. The example 15 may be compared with the example 3 [p<sup>u</sup>o:t<sup>u</sup>o<sup>u</sup>]. The latter begins with irregular pulses on the oscillogram just before the regular wave forms indicate the start of the vocoid; the irregular pulses have moved the oscillogram downwards below the zero level. These pulses correlate with irregular lines registered on the pitch tracing (see also 17 [p<sup>u</sup>o] and a sudden rise and fall on the intensity

line all of which together may be interpreted as indicating that the onset in 3 is marked by voicelessness and tenseness co-occurrent with strong aspiration. Therefore, it may be said that while such contoids as denti-alveolar nasal are marked by voicelessness and some degree of tenseness in the endings (e.g. in [d̥<sub>2</sub>a<sub>2</sub>f̥<sub>2</sub>n̥<sub>2</sub>], see 7) they are marked by voicing and laxness at the onset (e.g. in [n̥<sub>2</sub>a<sub>2</sub>z̥<sub>2</sub>d̥<sub>2</sub>] as above). And some contoids such as bilabial plosive may be marked at the onset by voicing and laxness (e.g. in [b̥a<sub>2</sub>ʃ̥<sub>2</sub>] or by voicelessness and tenseness (e.g. in [p̥<sup>u</sup>o<sup>u</sup>:t̥<sup>u</sup>c̥<sup>u</sup>] as above). The observation above provides mingographic evidence for the description in 3.4.2 - 3.4.5 and the phonological statement in 7.4.1-7.4.4.

### 10.3.3 Syllabification

The mingograms 18-23 are selected for the discussion of syllabification. 18 and 19 represent [g<sub>o</sub>.l̥] 'flower', and [ʔ<sub>a</sub>.b̥] 'water' which have, on this occasion, the approximate duration of 37 and 40 respectively, this is to say, that although they do not have exactly the same length, they may be said to have two variants of the length generally observed in syllables of CVC-types (see 10.3.1). The mingogram 20 represents the compounded forms of 18 and 19, namely [g<sup>o</sup>-l̥a.b̥] 'rose-water' and it has the approximate duration of 53 C.S. The compounded form of the words may, therefore, be said to have a shorter duration than the total sum of the lengths of the words as pronounced separately.

But of the two components only the first one, namely, [g<sub>o</sub>.l̥], has been subject to reduction, and the latter, namely: [ʔ<sub>a</sub>.b̥], has not been reduced. That is [g<sub>o</sub>.l̥] has been reduced from about 37 C.S. to 12-13 C.S. while [ʔ<sub>a</sub>.b̥] has

remained approximately of the same length. Therefore, the compounded form of [go.ɫ̥] has a shorter length than any example of the syllables of CVC-type. In fact it has shorter duration than that generally observed among the syllables of CV types (see 10.3.1), and it may be concluded that the compounded form of 18 in 20 is no longer a CVC syllable, but a CV.

Furthermore, the denti-alveolar lateral contoid which is marked by voicelessness and some degree of tenseness in 18, is marked by voicing and laxness in 20. These observations provide mingographic evidence for the description of syllabification as given in 4.2.2.

The mingograms 21 and 22 represent the preposition and prefix [da.r̥], and the word [h̥ē.-ʏī.-ʏa.t̥] 'truth'; and the former has a duration of about 35 C.S. in 21. But in 23 (i.e. in [da.r̥.-h̥ē.-ʏī.-ʏa.t̥] 'in fact'), [da.r̥] has a duration of about 24-25 C.S. Furthermore the alveolar rolled contoid is marked by voicelessness and some degree of tenseness in 21, while it is marked by voicing in 23 and has a vocoid-like tracing on the oscillogram and on the intensity line.

[da.r̥] in 23 is subject to less reduction than [go.ɫ̥] in 20, because the latter is reduced from 35 to 12-13 C.S. while the former from 35 to 24-25 C.S. in addition the intensity line in 20 rises sharply after [ɫ̥] leaving no tracing to indicate the presence of any contoid following. But in 23 the intensity line registers a very slow decay after [r̥] which correlates with the appearance of long lines on the pitch tracing and regular wave forms of low amplitude on the oscillogram at almost the same position. These extra tracings in the mingogram 23 suggest the presence of a contoidal element

after [r] which may be regarded as [h].

Thus it seems that unlike the example in 20, no syllabification has occurred in 23, and the reduction in the length of the syllable in 23 may be a feature of compounding and, perhaps of connected speech as opposed to words in isolation. This observation may be regarded as a mingographic support for the description of non-syllabification, and also for the presence of some pre-glottal stricture at this place in the utterance as described in 5.2.

#### 10.3.4 Prominence and Its Underlying Factors

The mingograms 21-27 are chosen for the discussion of prominence. The pitch tracing in 21 starts with shorter lines registered further up from the zero level than those following. The lines are increasingly lengthened at the lower ends, as the articulation of the utterance goes on, until finally they disappear and the tracing reaches the zero level where no further tracing is registered. The whole picture suggests the presence of a falling pitch (i.e. a change from high to low level). All other monosyllabic words whose mingograms are included in this thesis have, more or less, the same display of pitch tracing.

In 22 the final syllable: [-ya.t<sup>h</sup>] has a pitch tracing of a very similar pattern to that in 21. The first syllable: [h<sup>h</sup>,-] also has a descending pitch pattern which, compared with that of the second syllable [-y<sup>h</sup>i-], is registered further up from the zero level. The increase in the size of the lines in the first syllable, compared with those observed in the last syllable, or in 21, is not so significant, and it may be regarded as a glide to reach the level required for the

second syllable. Therefore, it may be suggested that the first syllable has mid-level pitch which is higher than that of the second syllable. The second syllable has low level pitch which is lower than that of the first syllable.

When the prefix [da.r-] is affixed to a word, as in 23, it no longer has changing pitch, rather it has mid-level pitch and the first syllable of the stem [həx-] also no longer has mid-level pitch, instead it has low level pitch (cf. mingograms 21-23). Thus final syllable which was described as most prominent (4.4 and 8.6.41) is shown to have changing pitch.

The mingograms 24 and 25 represent the complex words {dane.s mandan'e} 'scholarly', and {xodə'ji} 'Godly', respectively. In both examples the changing pitch is observed in the last syllable (i.e. on -ne in 24, which is a form of the relative suffix {-?e}, and on -ji in 25, which is a form of the relative suffix {-?i} (see 8.4.22).

In the mingograms 26 and 27 which represent the pieces: {xodə'pi} 'a God' {xodəjam} 'my God', the changing pitch is observed in the penultimate syllables (which are in fact the last syllable of the words, the following syllable being excluded from the structure of the words and regarded as the particles {?i} and {?am} see 9.6.1 and 9.6.6).

All the observations above provide mingographic evidence for the description of prominence perceptually given in 4.4 - 4.4.74 and the statement of accent given in 8.6 - 8.6.7 based on the description of the former.

#### 10.3.5 Long Contoids

The mingograms 28-29 are selected for the discussion of long contoids. In 28 the tracing on the oscillogram for the

prepalatal affricate -tʃ<sup>c</sup>] is twice the length of that in 29. The negative pulses are also represented by deeper and longer decay on the oscillogram than that found in 29. This may be taken to indicate that the long contoid is tenser than the comparable contoid which is not long in the sense used in this thesis. The vocoid preceding the long contoid in 28 is approximately between 10-11 C.S. while the vocoid preceding [tʃ<sup>c</sup>] in 29 is approximately between 8-9 C.S. Thus there seems to be greater duration in vocoids preceding a long contoid.

These mingographic findings provide instrumental evidence for the description of long contoids perceptually given in 5.3 and the phonological statement made in 8.8.

#### 10.3.6 The Phonetic Nature of Glottal Stop

The mingograms 6, 9, 19 and 26 are selected for the discussion of glottal stop. The mingogram 19 represents [sa<sub>g</sub>ɔ<sub>g</sub>] with glottal stop at its onset. No tracing is observed on the oscillogram, pitch tracing, or on the intensity line which may be regarded as a mingographic evidence for glottal stop at the syllable onset although it is auditorily clearly perceptible.

The mingogram 9 represents [sa<sub>g</sub>ɔ<sub>g</sub>] with a checked glottal trill at the first place in its ending. The presence of some negative pulses which immediately follow the regular wave forms on the oscillogram suggests that voicing has been replaced by glottal trills just before the articulation of the following contoid, namely [ɔ<sub>g</sub>]. The latter is represented by straight line along the zero level both on the oscillogram and on the intensity line followed by a low peak on the intensity line and weak negative pulses on the oscillogram which mark its release.

A comparison between 9 and the mingogram 10 which represents the monosyllable [sa.rd] 'cold' reveals that the vocoid [a:] is shorter in 9 (about 22 C.S.) than in 10 (about 30 C.S). This also may be interpreted as that in 9 voicing has been replaced by glottal trill while in 10 voicing continues to the articulation of the following contoids (i.e. [-rd]).

This last point is in disagreement with the description of post-vocalic glottal stop by Rastorgueva (A Short Sketch of the Grammar of Persian, 1964, p. 9) and by C.T. Hodge (Some Aspects of Persian Style', 1957, p. 358), who have stated that glottal stop in final position is represented by the lengthening of the preceding vowels. But it supports the description in 2.6 and 3.8.12 that vocoids in ?-syllables are partly replaced by glottal trills.

The mingogram 6 represents [ʃamʔ] 'hearing', with a glottal stop at the second place in its ending. [ʔ] is represented by straight lines on the oscillogram and on the intensity line followed by a low peak on the latter and weak displacement of the former at a comparable place.

The mingogram 26 represents [xod̥i] 'a God' with a glottal trill following the [d̥] in the penultimate syllable and preceding [i] in the final syllable. The presence of a glottal trill at this position may be said to have been marked by a change in wave forms of the oscillogram between the stretches corresponding with vowels and a low decay on the intensity line correlating with disturbed vertical lines on the pitch tracing.

All these observations can be regarded as mingographic support for the perceptual description of glottal feature and

glottal contoids in 2.6, 3.3.12, 5.1.1.

### 10.3.7 ?- and J- Junction Prosodies

A comparison between 26 above and the mingogram 27 representing [xõdajam] 'my God', reveals that the final syllable in the former has a glottal contoid at its onset while the latter has no tracing for glottality at the onset of its final syllable. In 27 regular wave forms are registered throughout on the oscillogram except at the start of the utterance, and the wave forms are not disturbed as in 26. The intensity line at 27 has also not been interrupted by any such low decays as observed in 26. Therefore it may be said that the onset of the final syllable in 27 is occupied by a frictionless continuant.

This is a mingographic support for the prosodic statements given in 9.6.1 and 9.6.6.

### 10.3.8 Nasality and Glottal Feature and Glottal Contoids

Type two mingograms which includes 7 mingograms from 30 to 36 provides oscillogram (OSC.) pitch tracing (P.), intensity line (INT.), nasal tracing (N.), mouth tracing (M.) and a time marker tracing (also 50 cycles per second).

The mingograms of this type are intended to provide mingographic evidence for the feature nasality and 'glottal contoid.

The mingogram 30 represents [nã:hã] 'stream', with a denti-alveolar nasal at its onset. The nasal tracing in this mingogram has registered nasality throughout the syllable and shows that N- feature runs through the syllable almost parallel with voicing.

The mingogram 31 and 32 represent [sõ:n?] 'creation'

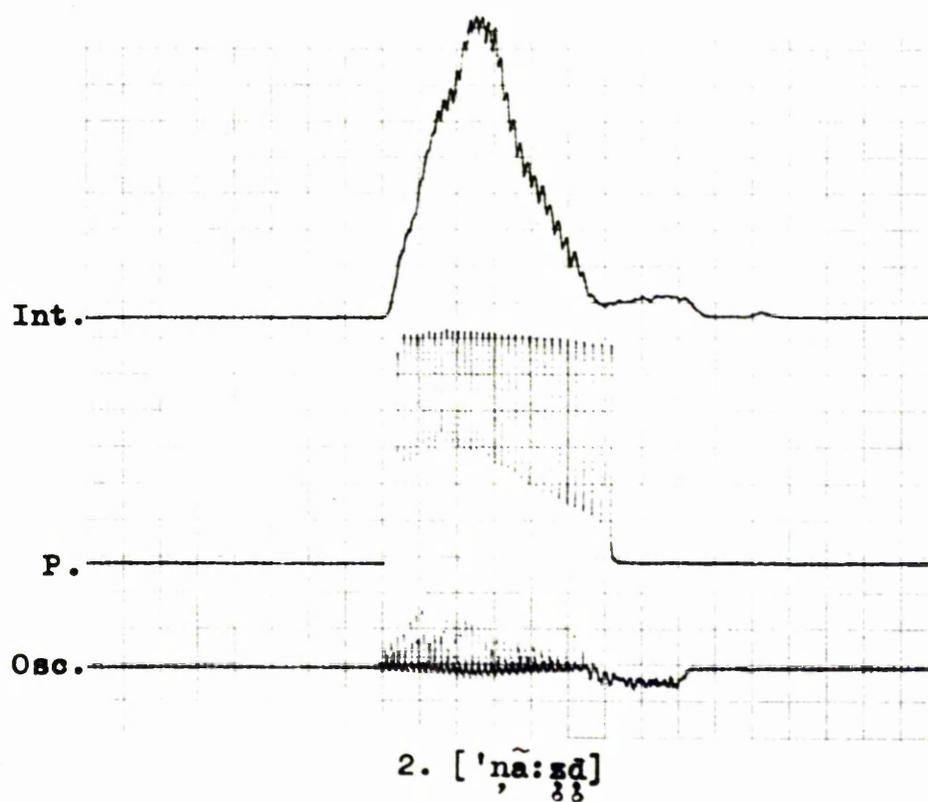
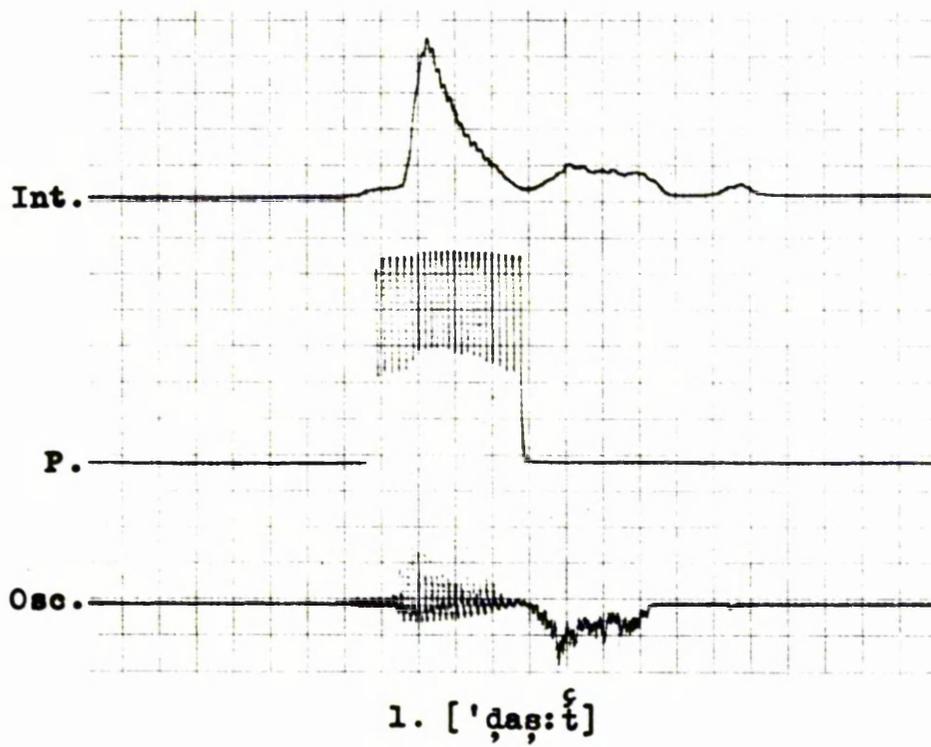
and [xã·n̥] 'khan' respectively, both having a denti-alveolar nasal immediately following their syllabic elements. The nasal tracing in 31-32 has also registered nasality throughout the syllable and shows that N- feature runs through the syllable parallel with voicing.

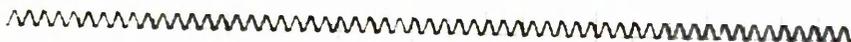
The mingograms 33-34 represent [s̥a:m̥] 'hearing', and [x̥a.m̥] 'bend' respectively, both having a bilabial nasal immediately following their syllabic elements. In 33 the nasal tracing has registered some weak degree of nasality somewhere between the syllabic element and the following nasal segment. The nasality in 33 may not even run through the whole bilabial nasal segment at this place.

The mingograms 35-36 represent [t̥eã·n̥] 'ridicule', and [d̥eã·n̥] 'feast', both having a denti-alveolar nasal segment at the last place in their complex endings. In both cases the nasal tracing has registered the release of velic closure after the articulation of the preceding contoids and the subsequent outflow of airstream through the nasal cavity. The velic release is shown to have taken place more vigorously in 36 than in 35. This is in harmony with the perceptive feeling that one has of the release of velic closure after a voiceless segment.

The mingograms 30-36 provide mingographic evidence for the description given in 2.5 which is based on perceptual analysis.

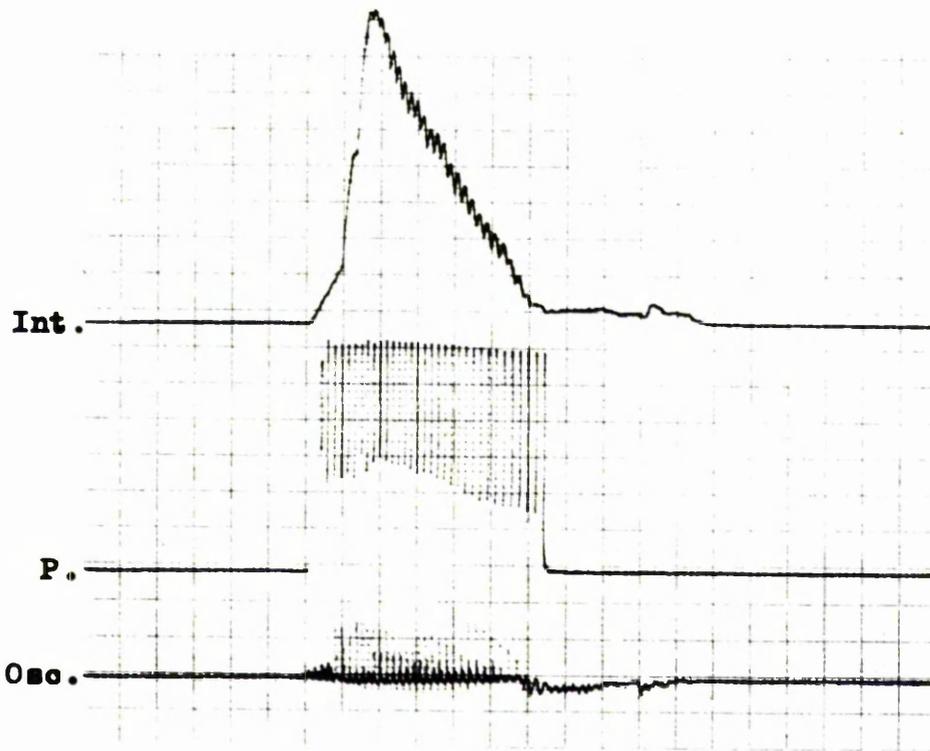
In addition the mingograms 31 and 33, representing [s̥ã·m̥] 'creation' and [s̥a:m̥] 'hearing' respectively, both give mingographic evidence for the presence of glottal stop at the second place of the complex ending by registering weak peaks



50 Hz. 

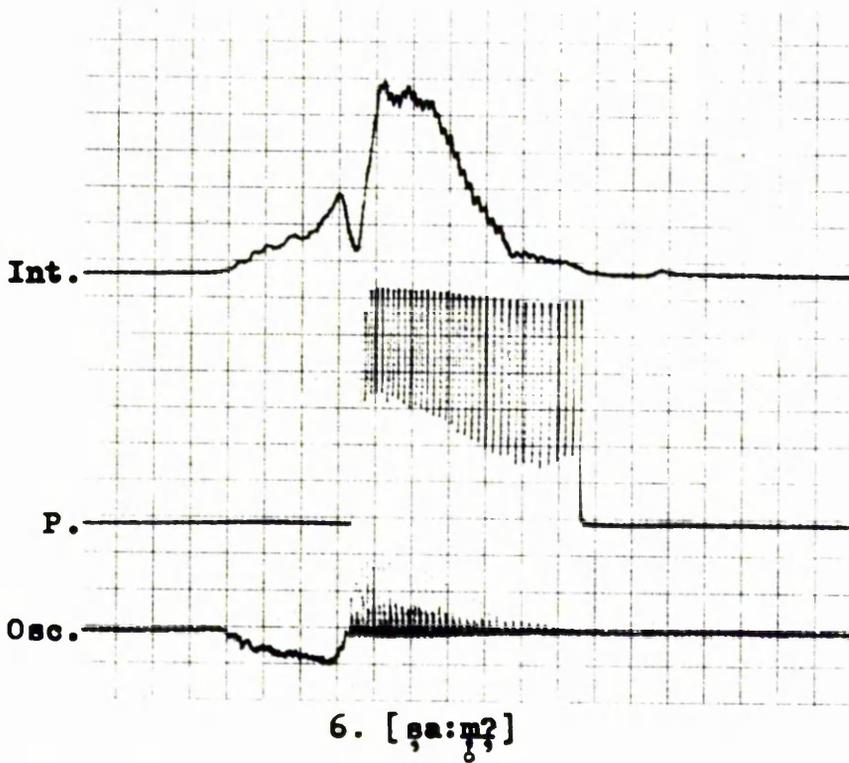
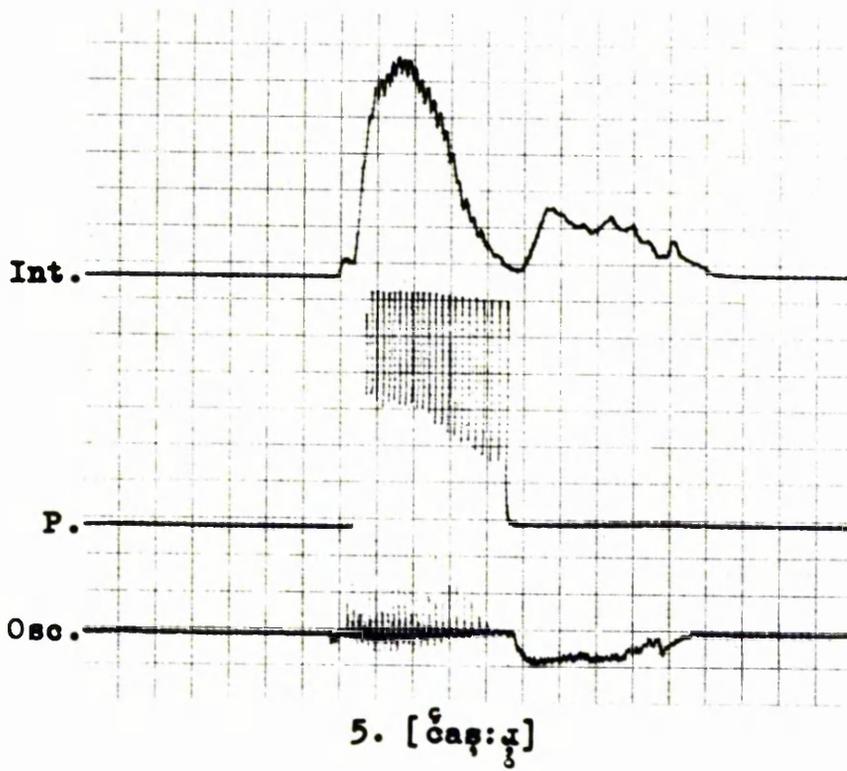


3. [põ:tc̣]

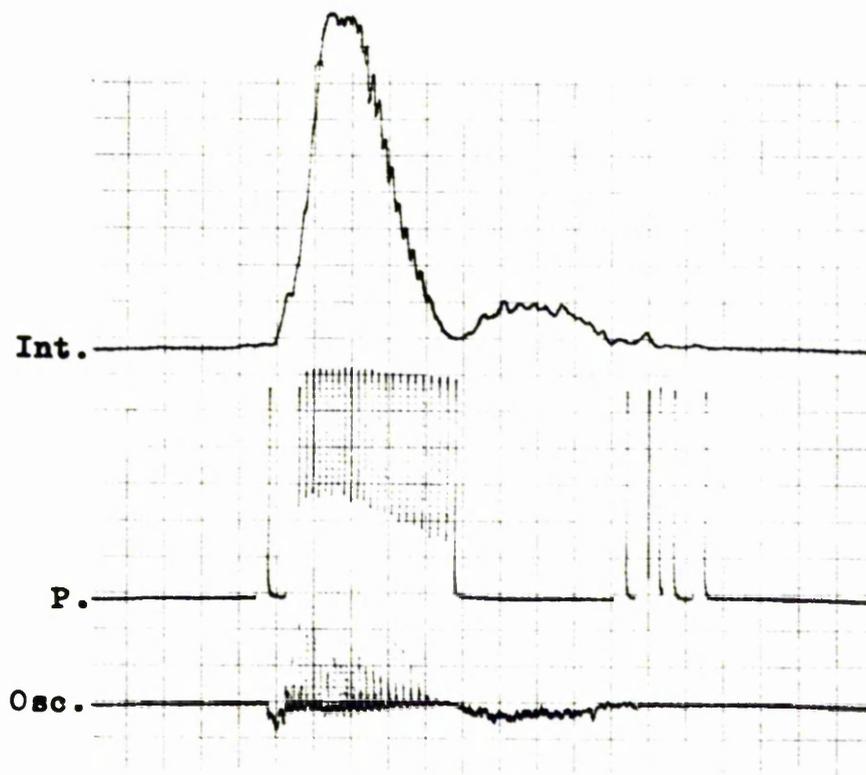


4. [nã:ẓɪ]

50 Hz.



50 Hz. 

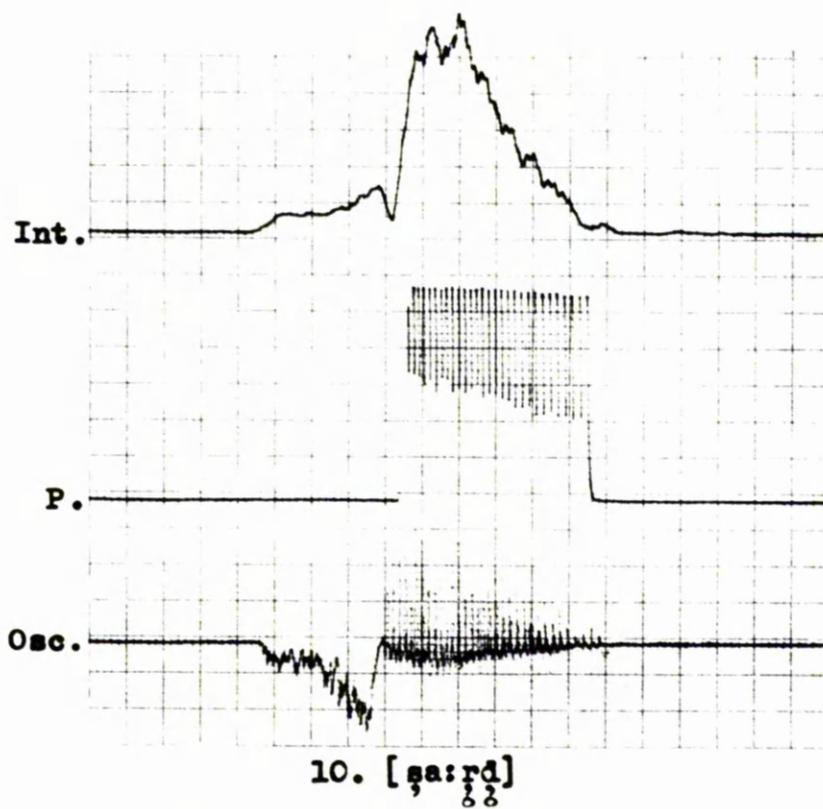
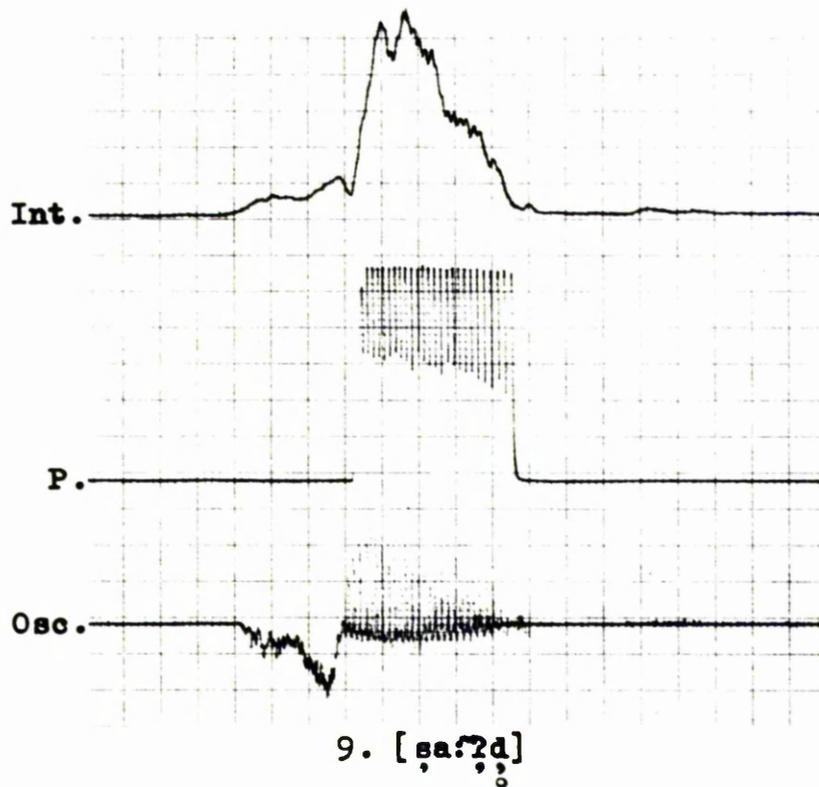


7. [d<sub>3</sub>a<sub>3</sub>f<sub>3</sub>:n<sub>3</sub>]



8. [s<sub>3</sub>o<sub>3</sub>:b<sub>3</sub>h<sub>3</sub>]

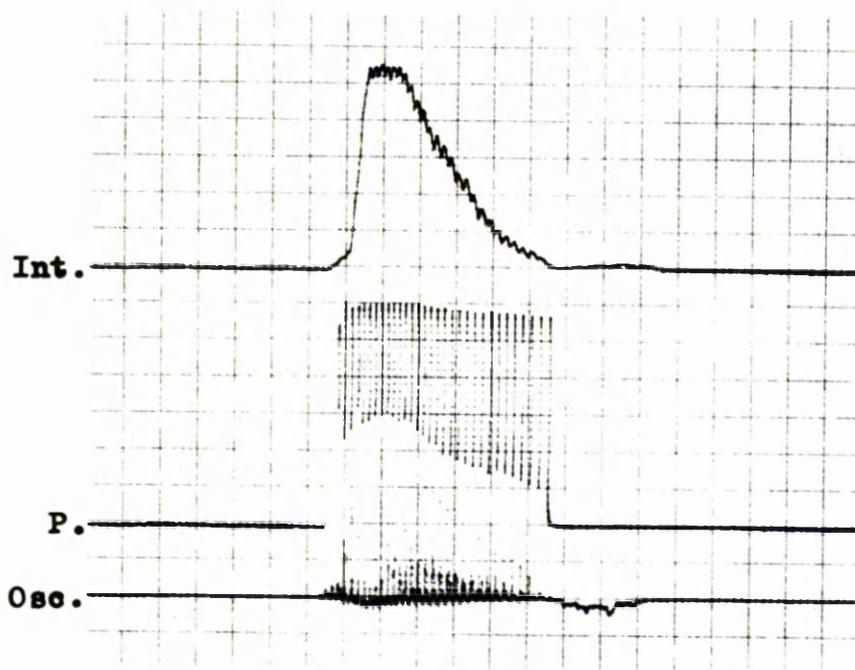
50 Hz.



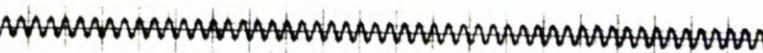
50 Hz.

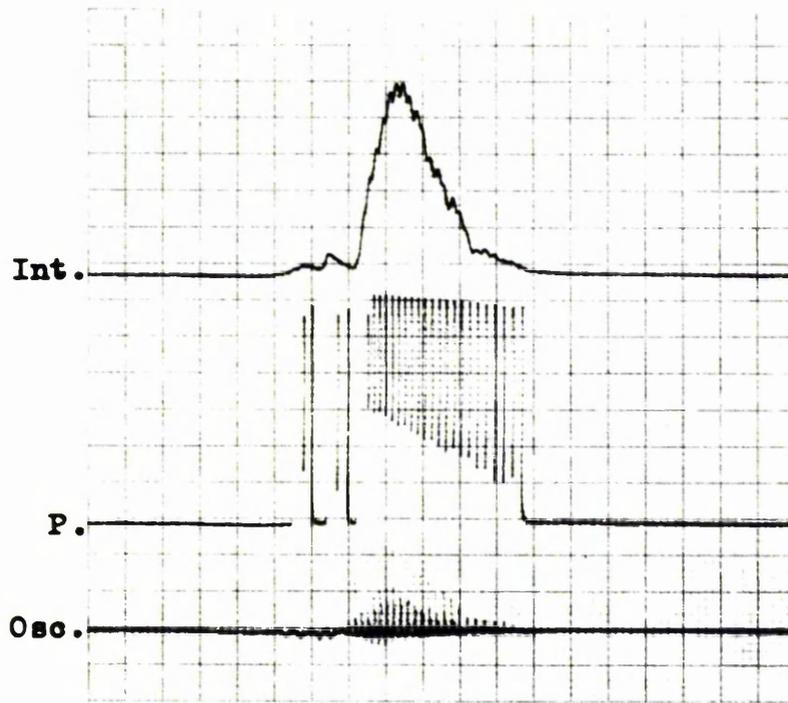


11. [mo:h<sub>3</sub>]

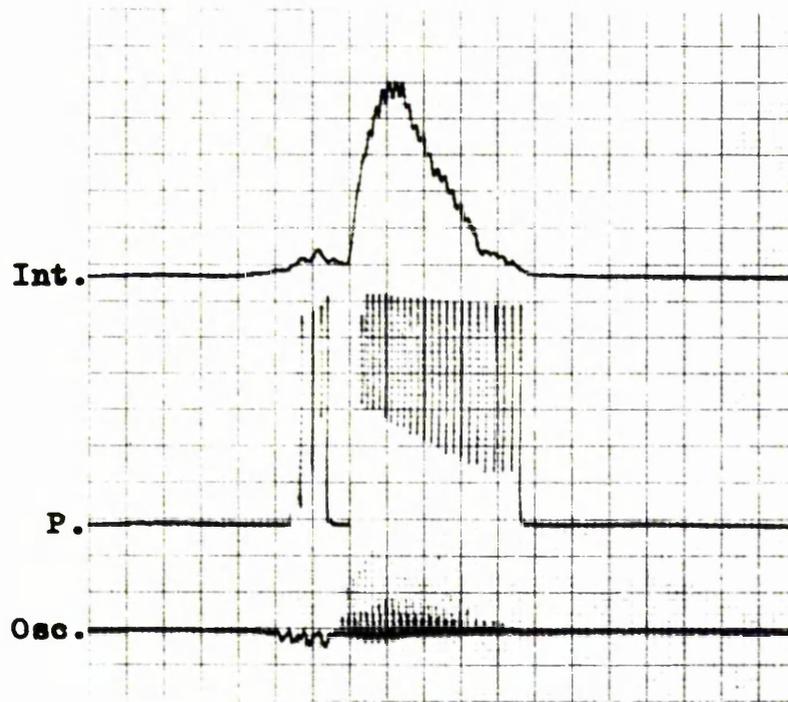


12. [pa·s]

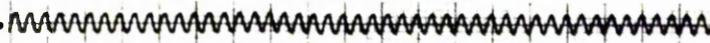
50 Hz. 

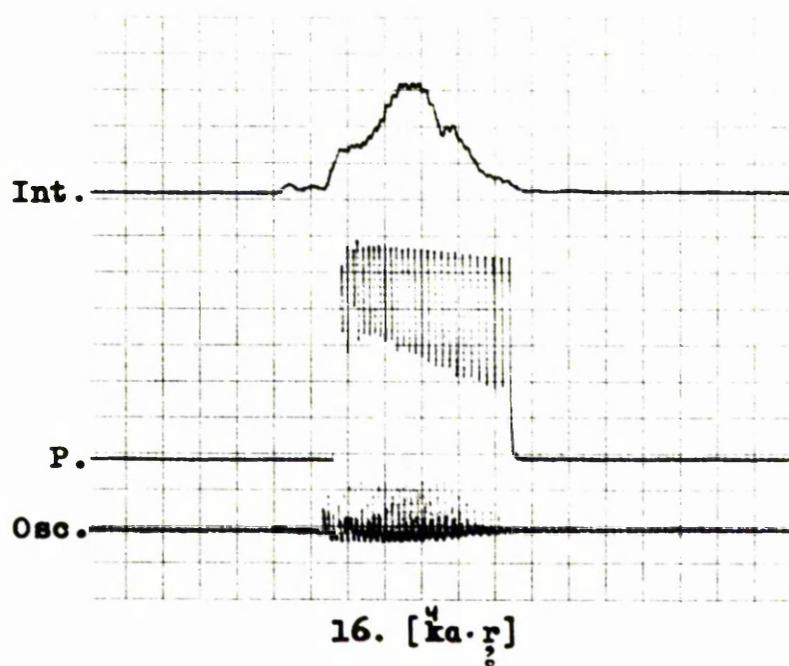
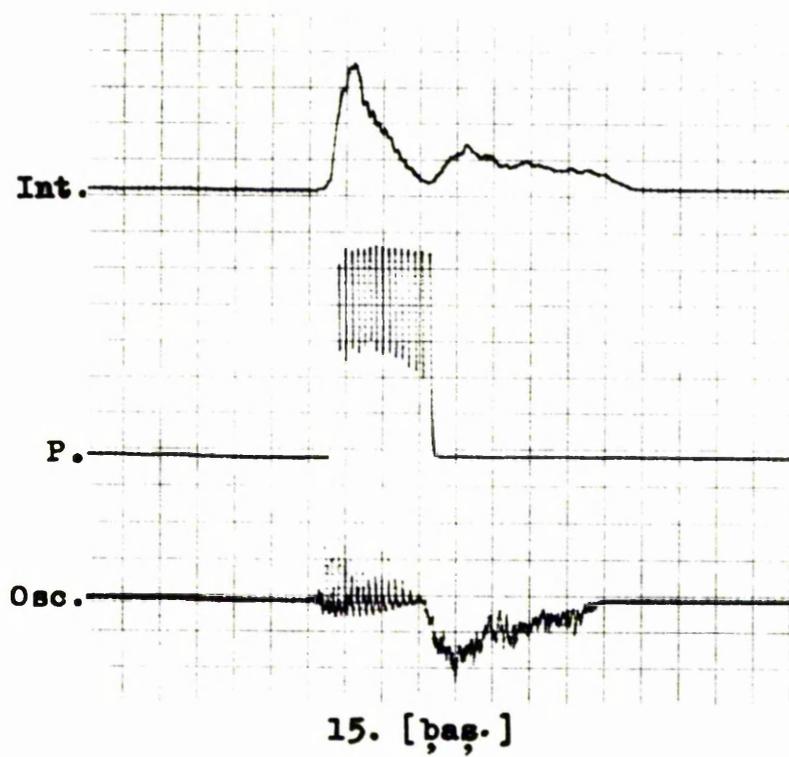


13. [ $x_d \cdot n$ ]

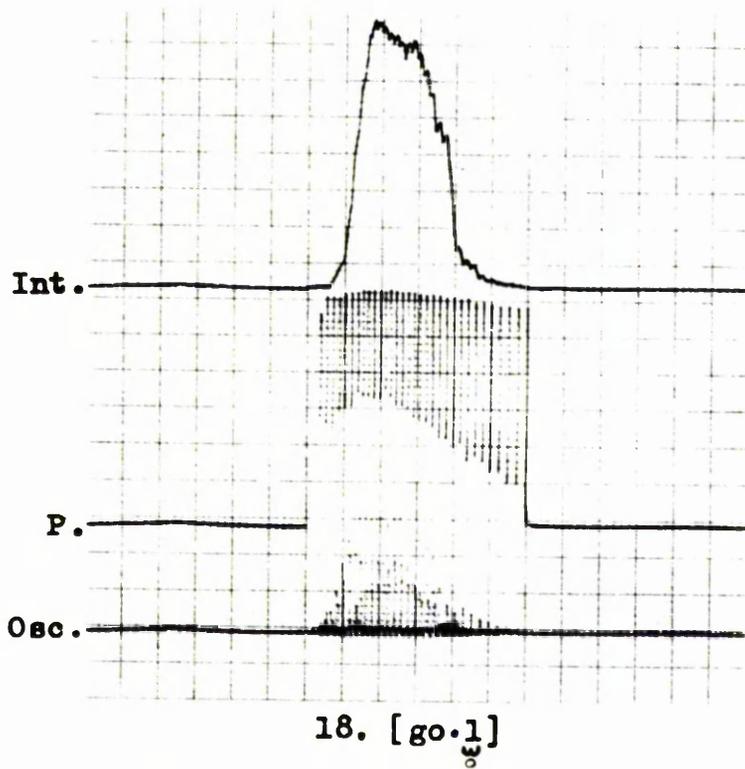
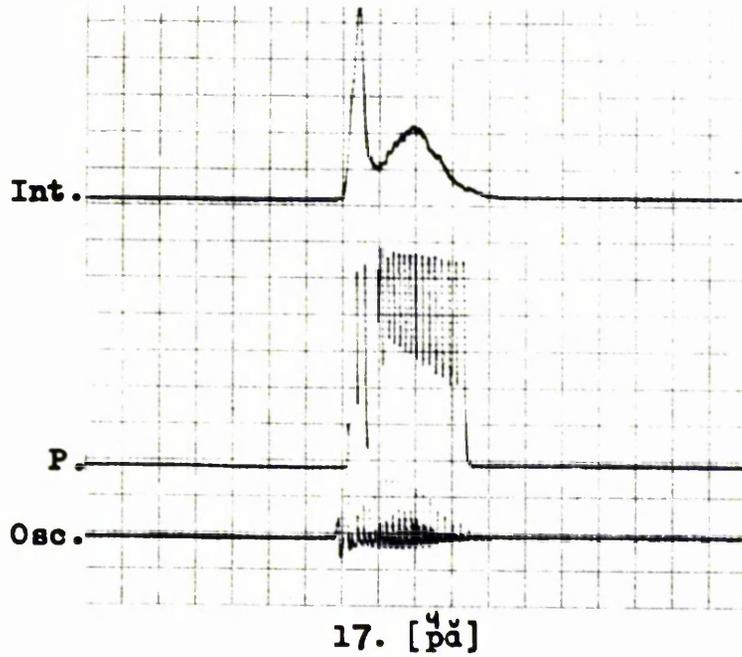


14. [ $x_a \cdot m$ ]

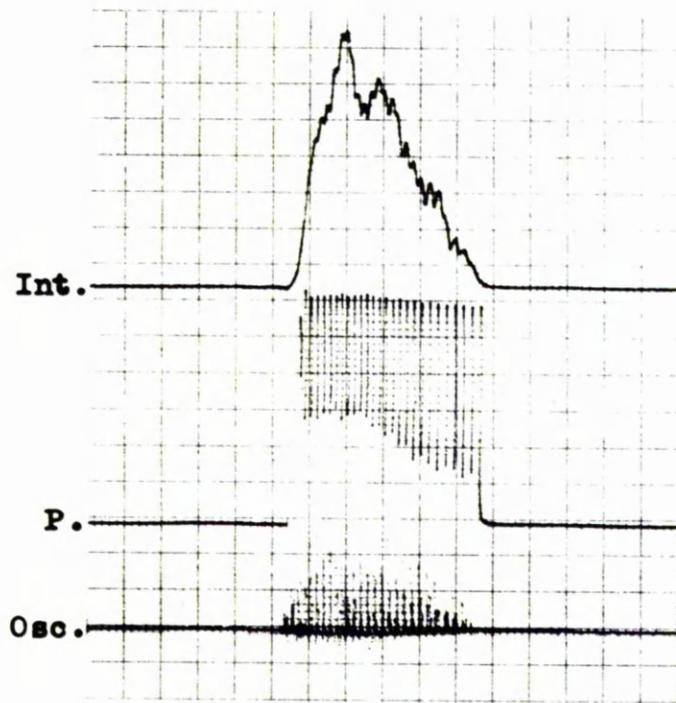
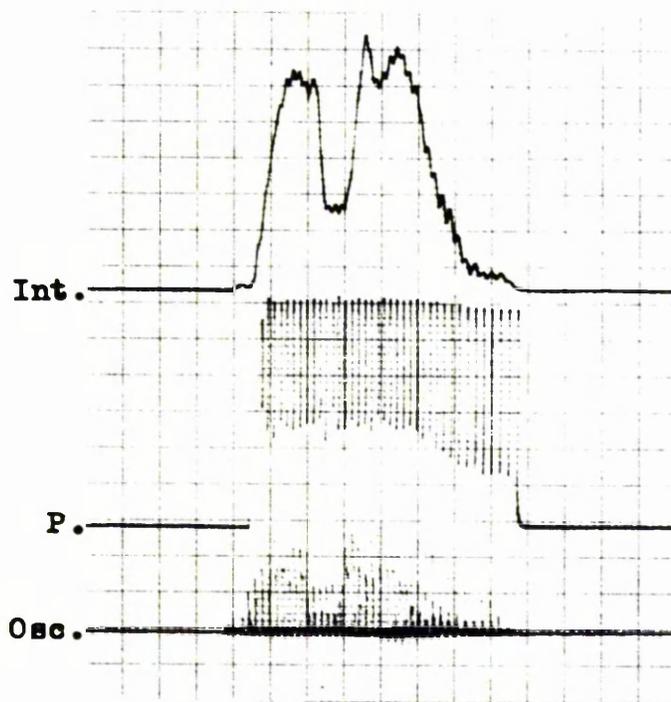
50 Hz. 



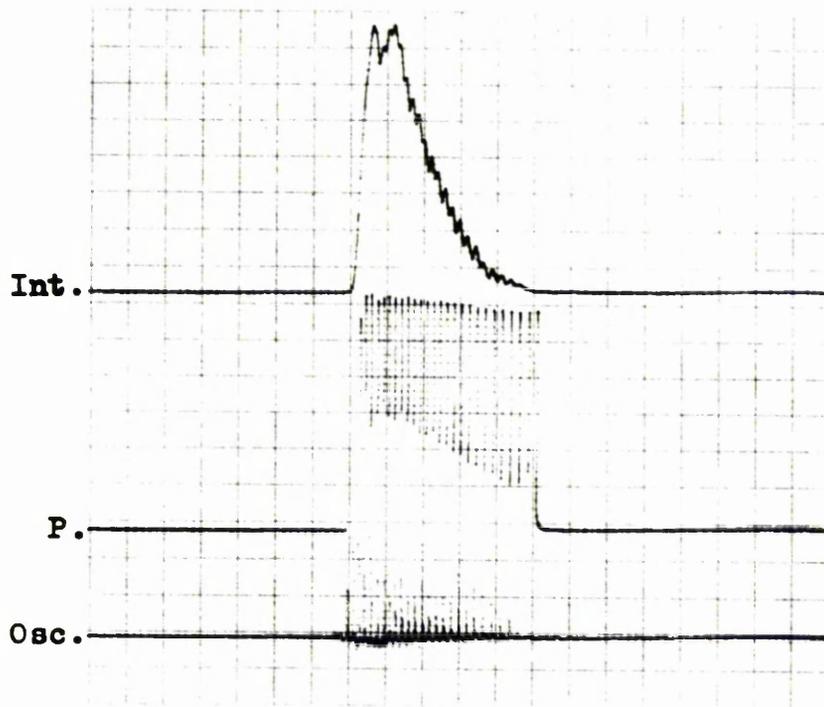
50 Hz.



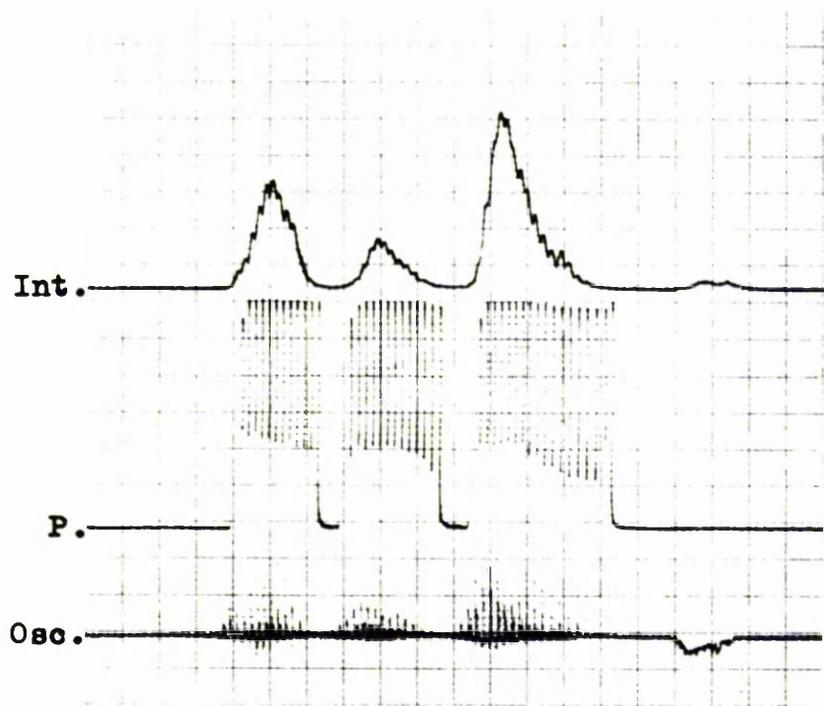
50 Hz.

19. [ $\underset{\cdot}{z}a\text{-}\underset{\cdot}{b}$ ]20. [ $g\ddot{o}\text{-}\underset{\cdot}{l}a\text{-}\underset{\cdot}{b}$ ]

50 Hz.



21. [da.r̥]

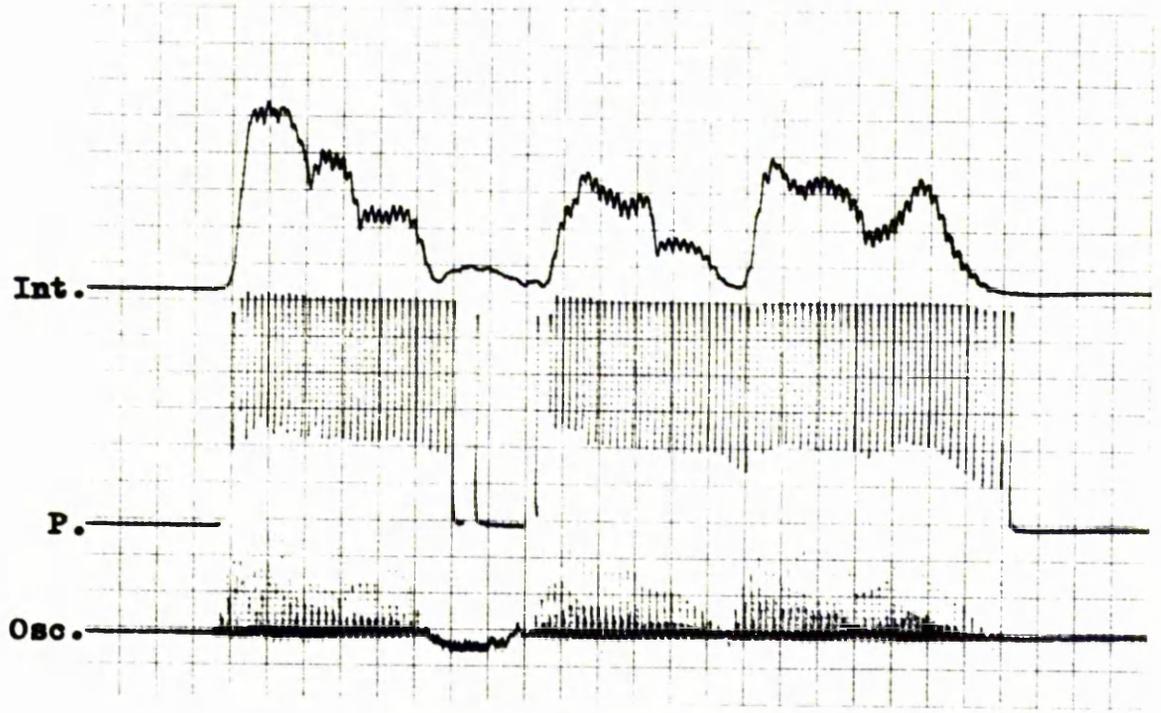


22. [h̥r̥i-ɾa.t̥]

50 Hz.



23. [da-ʔ-ʔə-ʔi-ʔa.t̪]

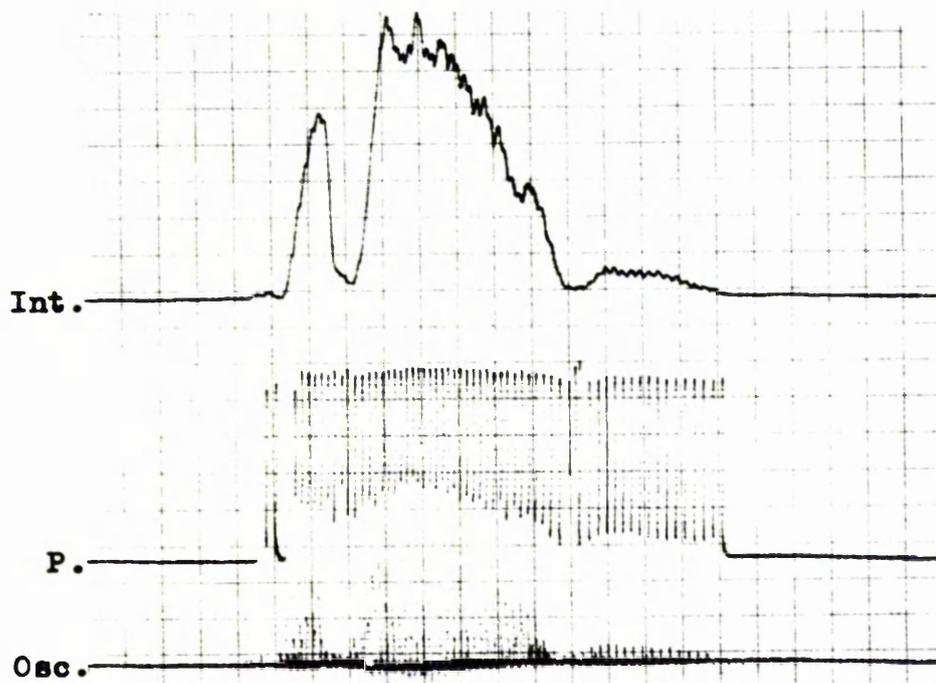


24. [daneʃmanda'ne]

50 Hz. ~~~~~

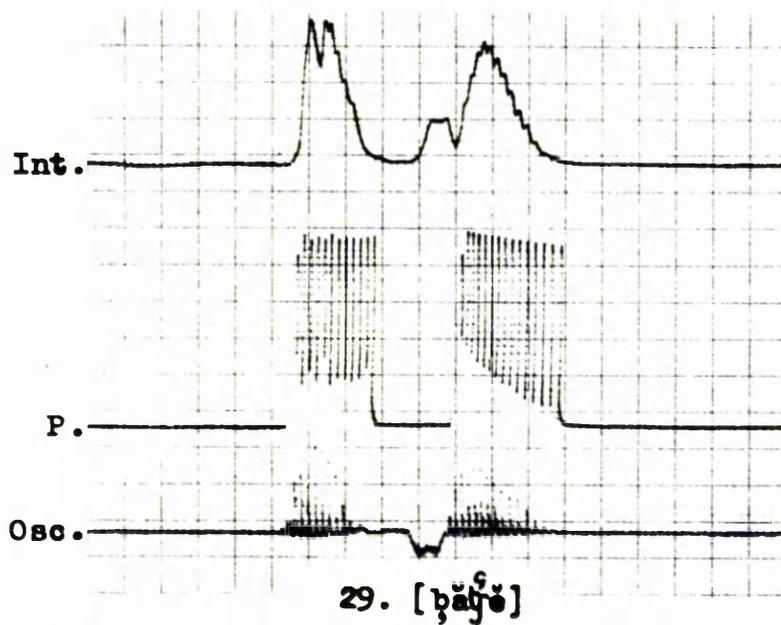
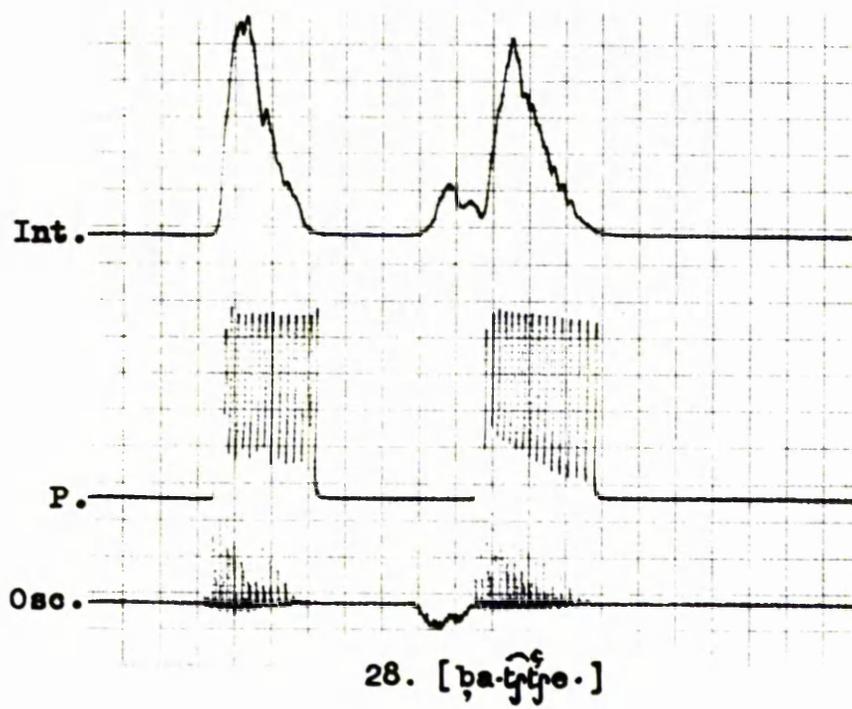
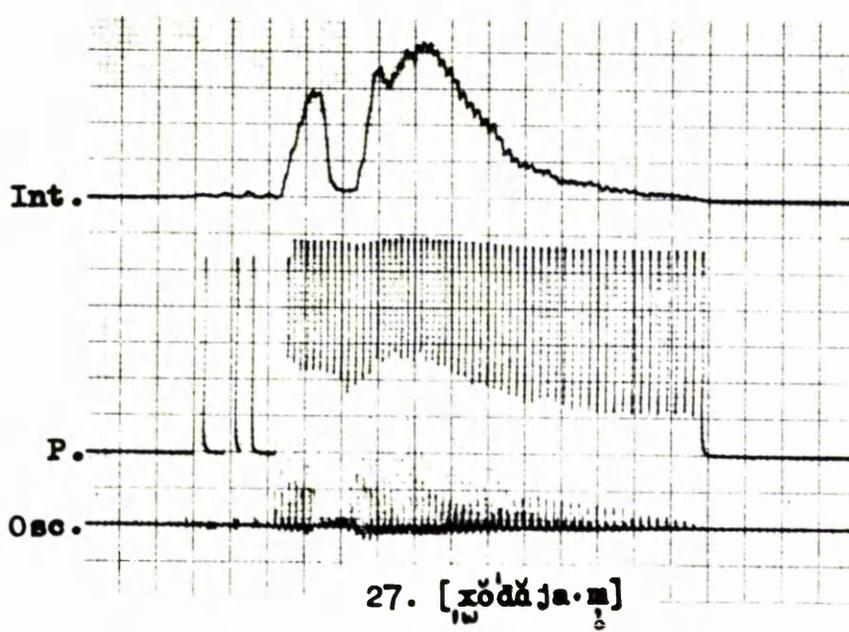


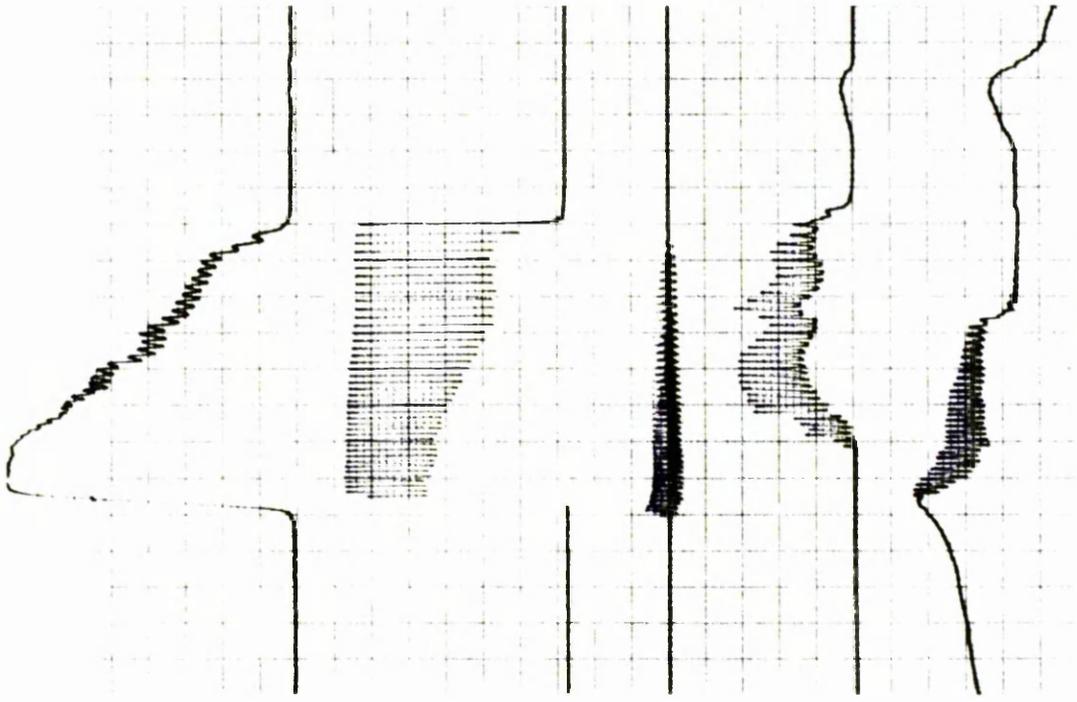
25. [xõđđ'jı]



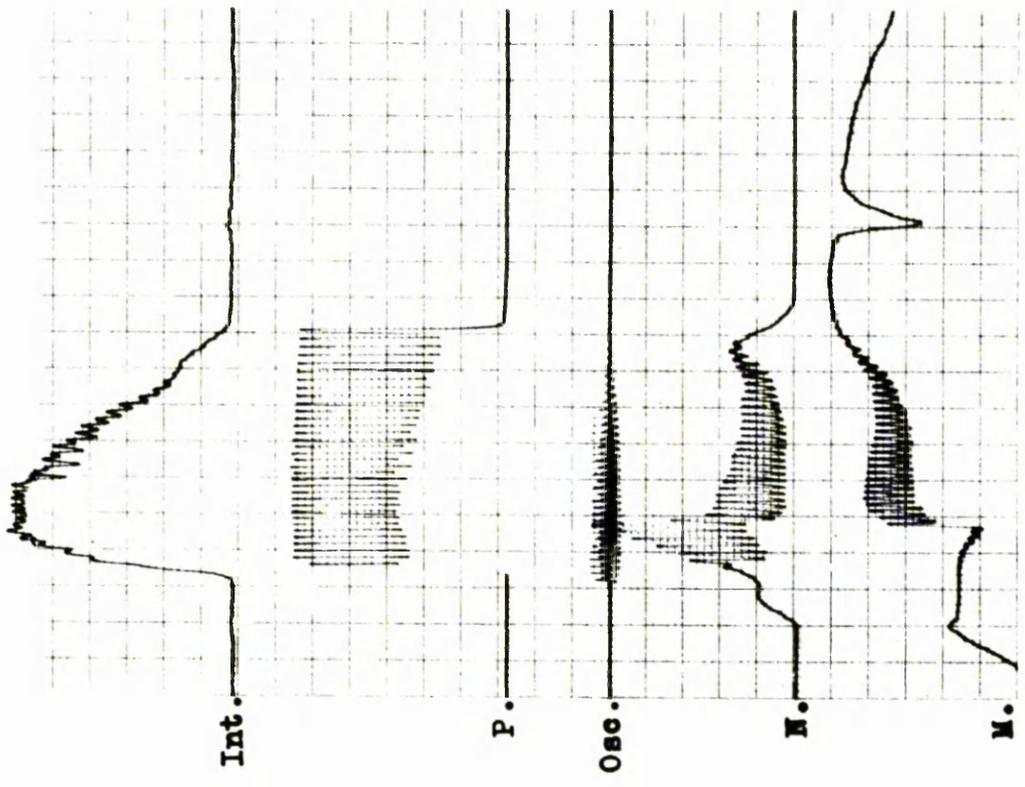
26. [xõđđ'ı]

50 Hz. ~~~~~



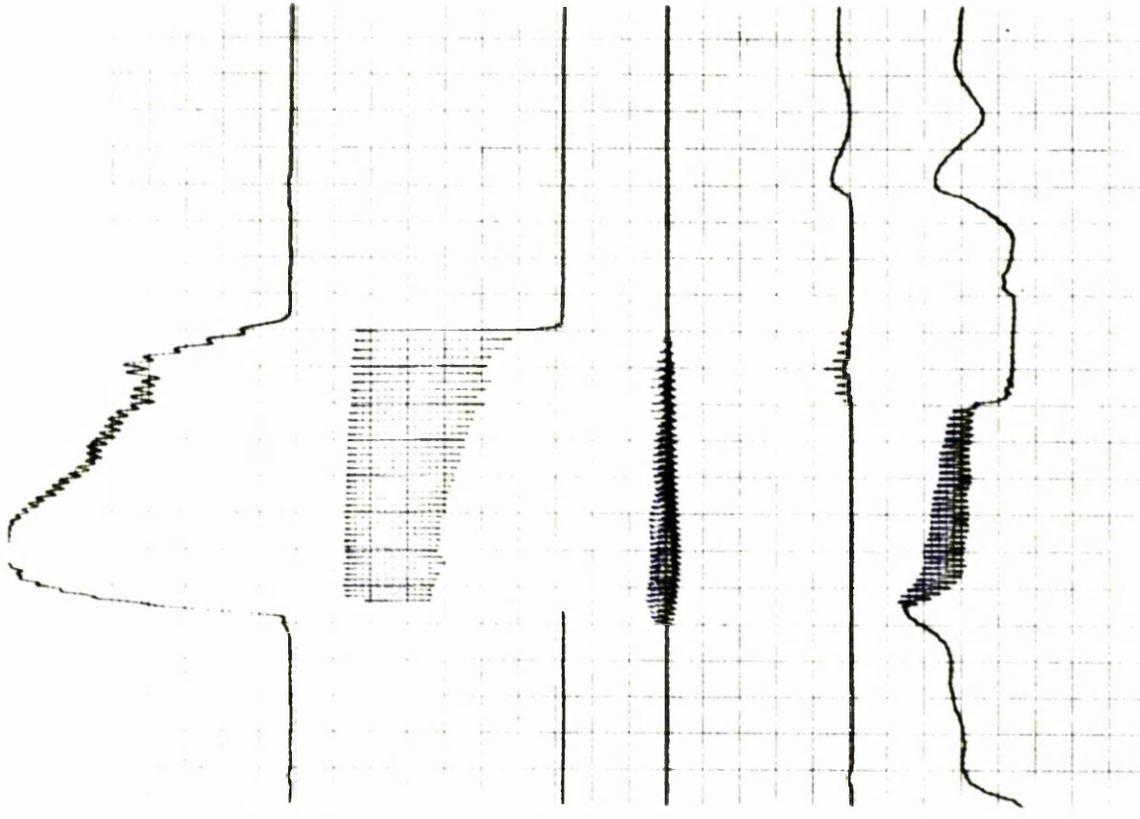


31. [sõ:ɯ̃]

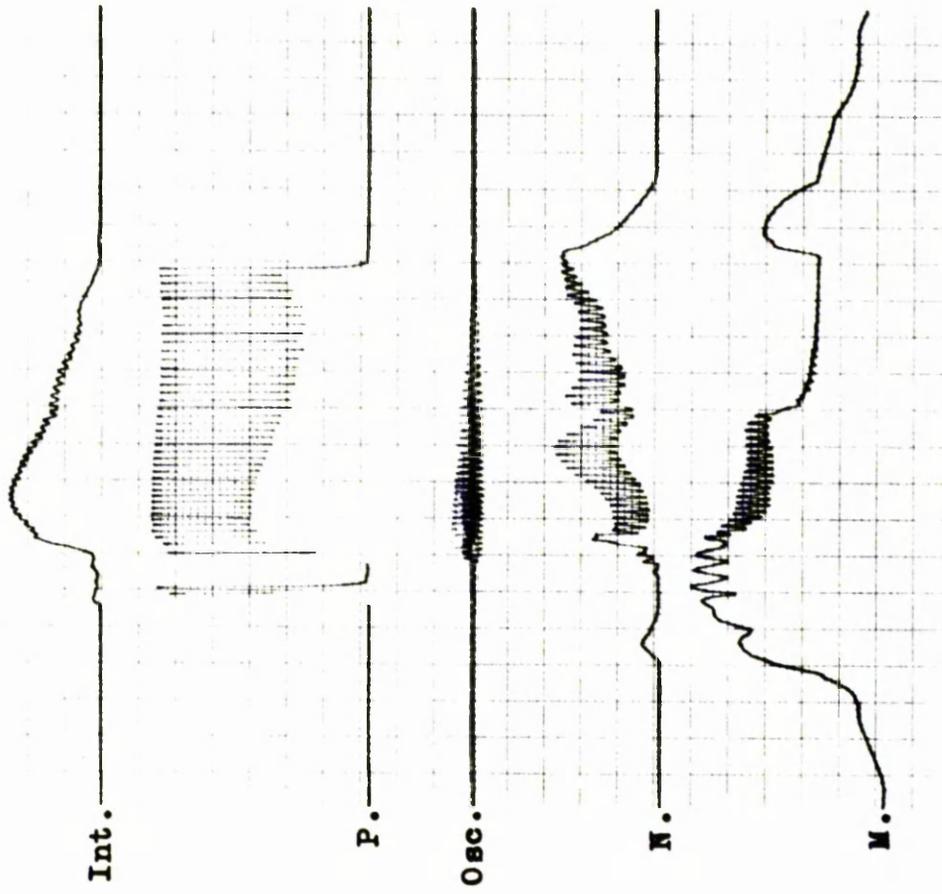


30. [nã:ɲ̃]

50 Hz. ~~~~~

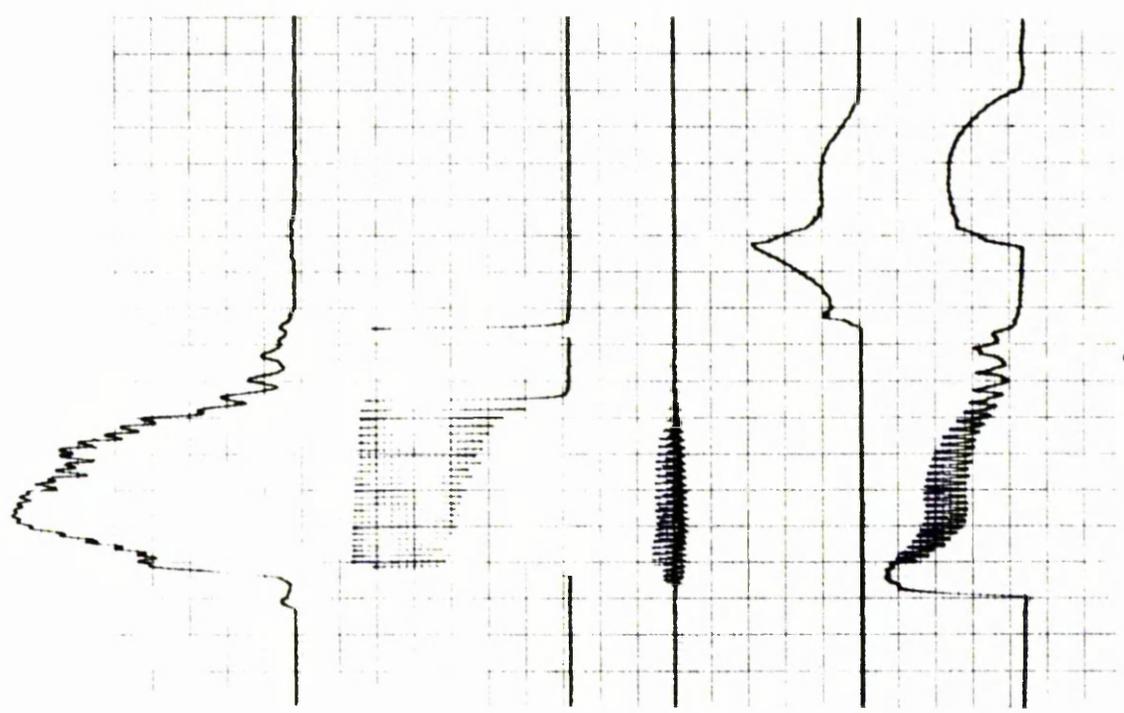


33. [ae:m?] ]

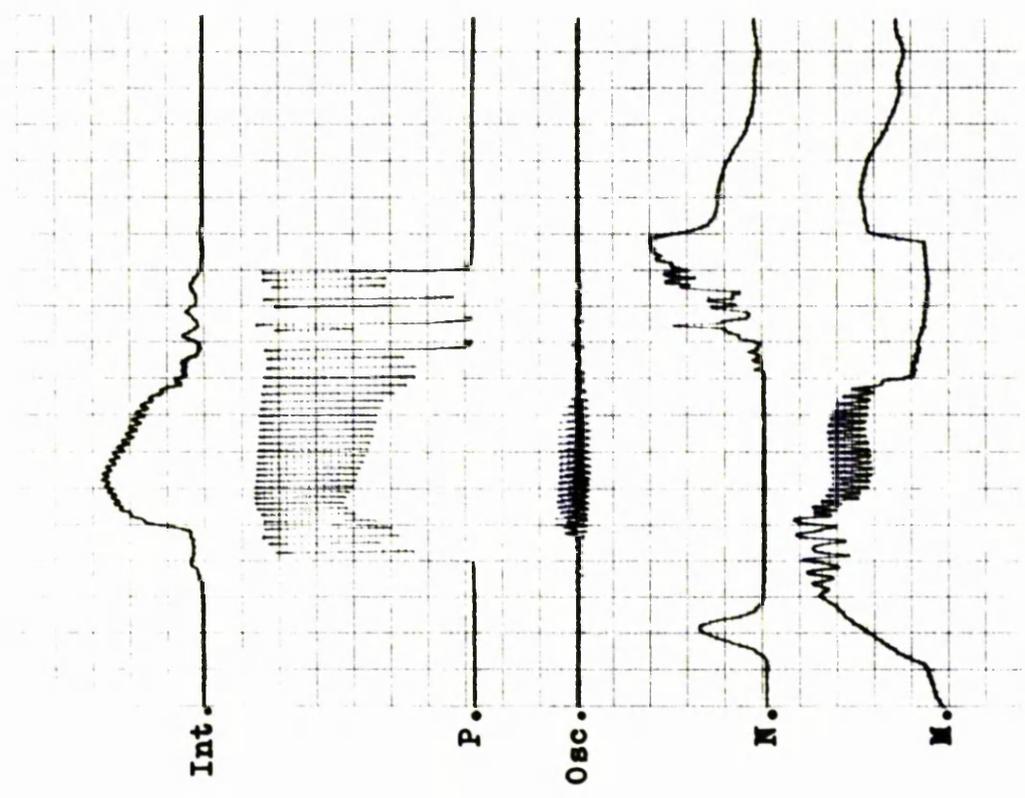


32. [xã-ñ] ]

50 Hz. [A continuous high-frequency oscillation line]

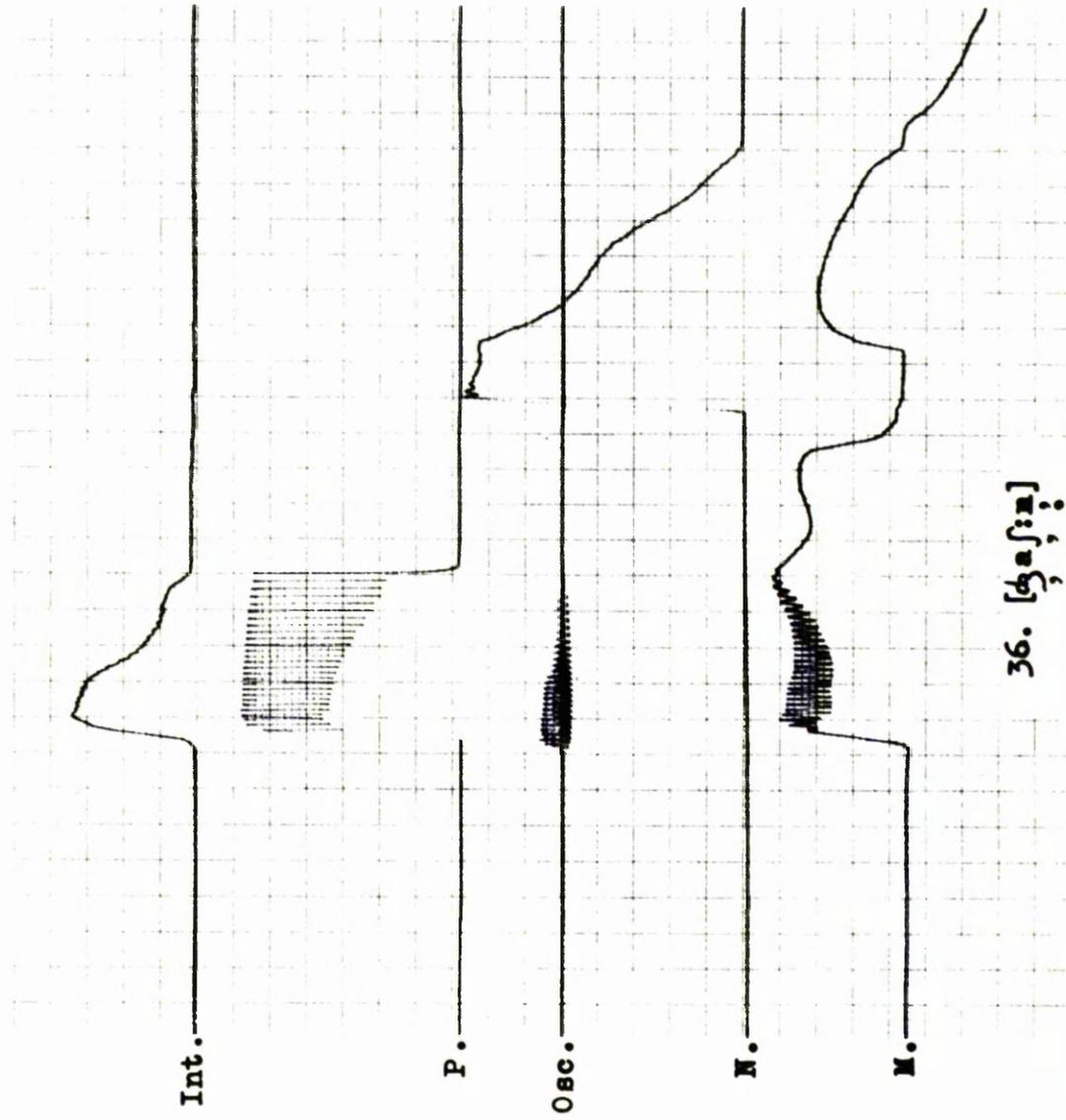


35. [Ia:2n]



34. [Ia:m]

50 Hz. ~~~~~



50 Hz. 

on the mouth and nose tracings and on the intensity line at places corresponding to the end of the utterances. The mingogram 35 [tʰaʔn] 'ridicule', also indicates the presence of a glottal trill at the first place in the complex ending by registering wave forms on the mouth tracing which are much wider apart from one another than those preceding, and by the absence of nasality at the place which corresponds with the syllabic part, and by the absence <sup>of</sup> wave forms on the nasal tracing.

#### 10.4 Discussion of the Spectrograms

Fourteen spectrograms are included in this thesis, and they are intended to provide spectrographic evidence, as far as possible, for the following features, which were perceptually described in the preceding chapters:

- 1) W- and y- features
- 2) h- and h- features
- 3) Harmony
- 4) Syllable length and inherently long and short vocoids

##### 10.4.1 W- and y- Features

The spectrograms 1-4 are chosen for the study of the features. They represent [ɸu.d] 'existence', [ɸi.d] 'willow', [zi.r] 'beneath', and [zu.r] 'force' respectively. Attention is focused on the position of the formants 1 and 2 (F1 and F2) on the frequency scale, and their relations to each other. Although F1 and F2 are most clearly registered at places that correspond with the syllabic parts of the utterances, they can be, to a lesser degree, traced at places that correspond with the articulation of contours. In w- syllables F2 is at a lower position on the frequency scale and nearer to F1 than in y-

syllables where F1 and F2 are wide apart. Furthermore, F2 in w- syllables has a downward glide at the onset of the syllable and an upward glide at the syllable ending while in y- syllables it has an upward glide at syllable onset and a downward glide at syllable ending. These differences may be easily studied by the help of the transparent calibrated grid provided for this purpose and kept in the inside of the back cover. The differences in the F1 and F2 of these spectrograms provides instrumental evidence for the presence of w- features in 1 and 4 and y- features in 2 and 3 which support the description based on perceptual observations and given in 2.3.

#### 10.4.2 h- and h- Features

The spectrograms 5-8 are selected for the discussion of h- and h- features. They represent [ri.ɸ] 'pebble', [ri.ɸa.ɸ] 'pebbled (place)', [xu.ɸ] 'good', and [xu.ɸrũ] 'pretty', respectively. The presence of regular wave forms on the voice bar at the lower end of the frequency scale suggests voicing, and the absence of regular wave forms on the voice bar corresponds to voicelessness. No regular wave forms are traced on the voice bar in 5, 6 and 7 at places that correspond with the contoids [ɸ] in 5, [ɸ] in 6, and [ɸ] in 7. This supports the perceptual description of contoids at word final simple and complex endings as given in 3.4.3 - 3.4.37 and 3.4.4 - 3.5.6. On the other hand, regular wave forms can be traced in 6 and 8 at places corresponding with the contoids [ɸ] and [ɸ]. This supports the perceptual description of contoids at word non-final endings as given in the same sections as above.

#### 10.4.3 Harmony

The spectrograms 9-14 are selected for the discussion

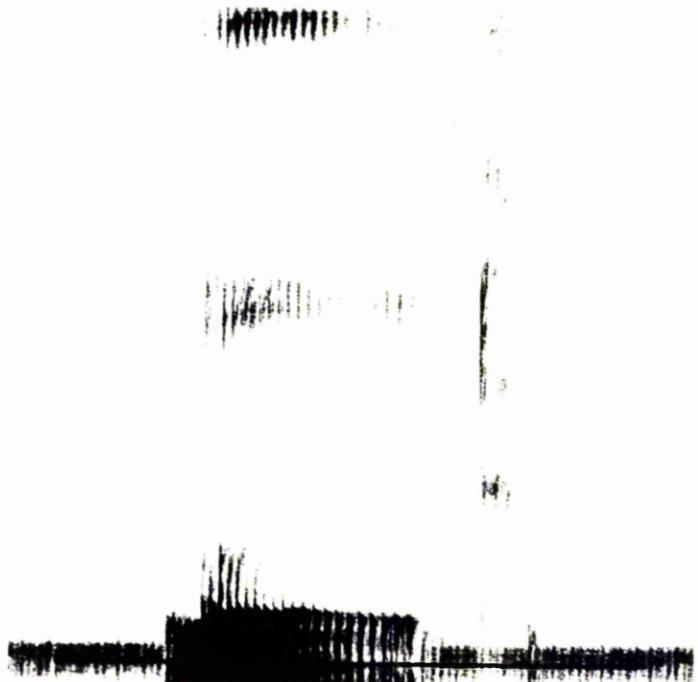
of harmony. They represent [ʃẽːa.r̥] 'slogan', [ʃɔ̃kʷa.h̥] 'glory', [nĩʃĩn̥] 'precious stone', [ʃĩkʷa.r̥] 'pray', [ʃä̃ːe.r̥] 'poet', and [dĩva.r̥] 'wall' respectively.

Harmony may be said to be represented on the spectrograms by similarities between the positions and relations of F1 and F2 in the syllables of a word - spectrograms 9-11 show such similarities; the syllables in each one of them may, therefore, be said to have harmonized with one another in the features which determine the position of F1 and F2 along the frequency scale, and their relation with one another.

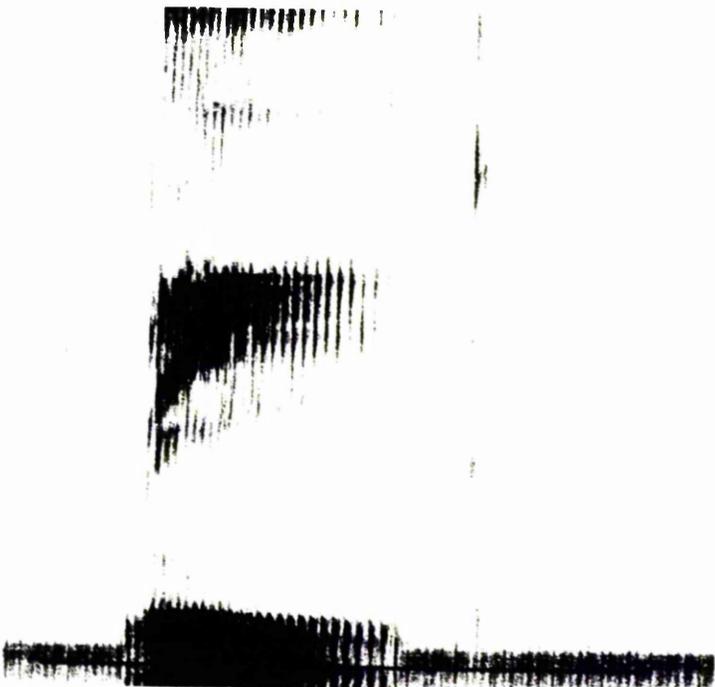
Spectrograms 12-14 do not show such similarities between F1 and F2 in the syllables of each word; they may, therefore, be said not to have harmonized with one another. This observation supports the perceptual descriptions given in 4.2.5, 8.7.

#### 10.4.4 Syllable length and Inherently long and short vocoids

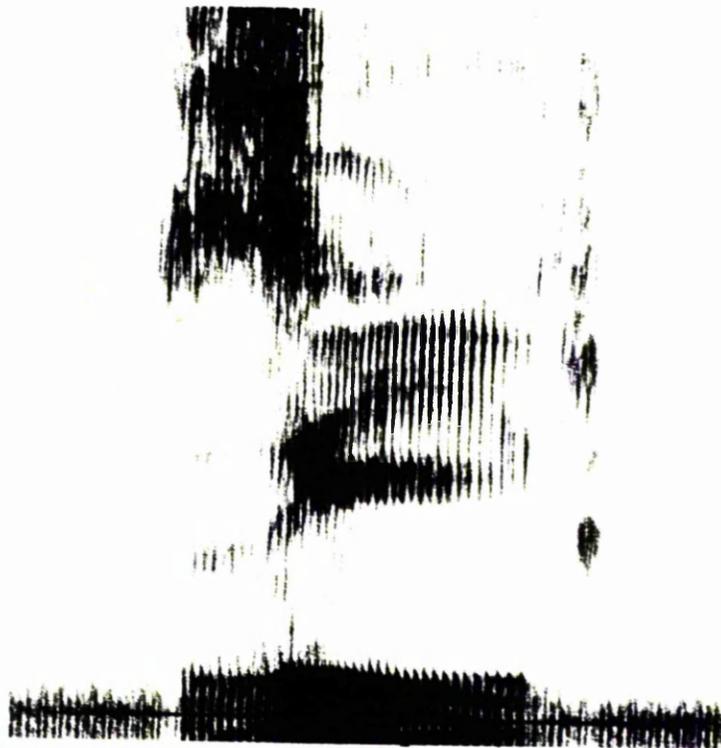
All the spectrograms support, to a lesser or greater degree, the perceptual description of syllable length (see 2.2) and inherently long and inherently short vocoids (3.3.13 - 3.3.14). But spectrograms 10, 12, 13 and 14 are more illustrative for this point than others. All the examples are of the syllable type CV - CVC. The first syllables in spectrograms 10 [ʃɔ̃kʷa.h̥] and 12 [ʃĩkʷa.r̥] contain inherently short vocoids, and in both cases [ɔ̃] and [ĩ] are considerably shorter than [e.] in 13 [ʃä̃ːe.r̥], as shown in spectrogram; [e.] is also an inherently short vocoid; but since it appears in a CVC syllable, it is longer than [ɔ̃] in 10 and [ĩ] in 12 which appear in CV syllables. The first syllable in spectrograms 13 [ʃä̃ːe.r̥]



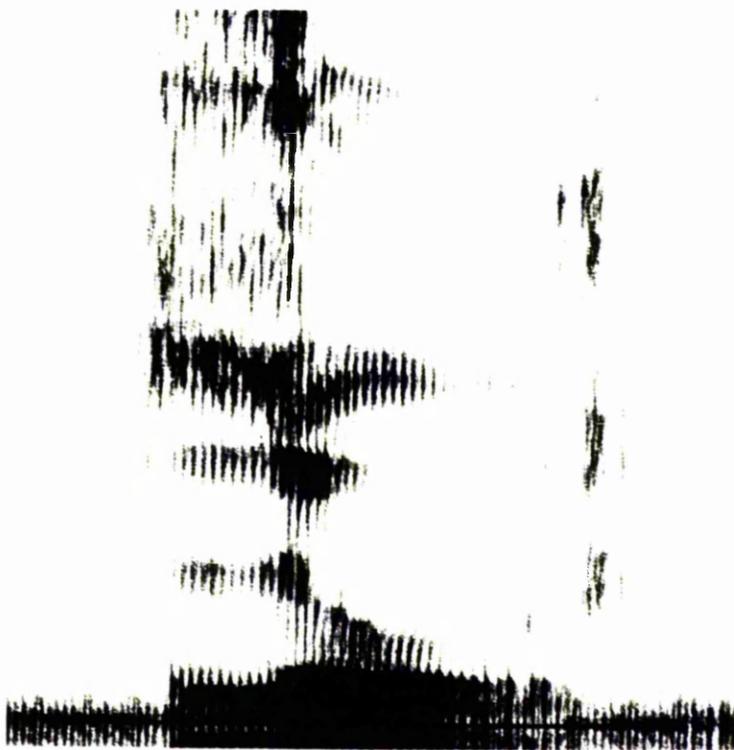
1. [b<sub>u</sub>-d]



2. [b<sub>1</sub>-d]



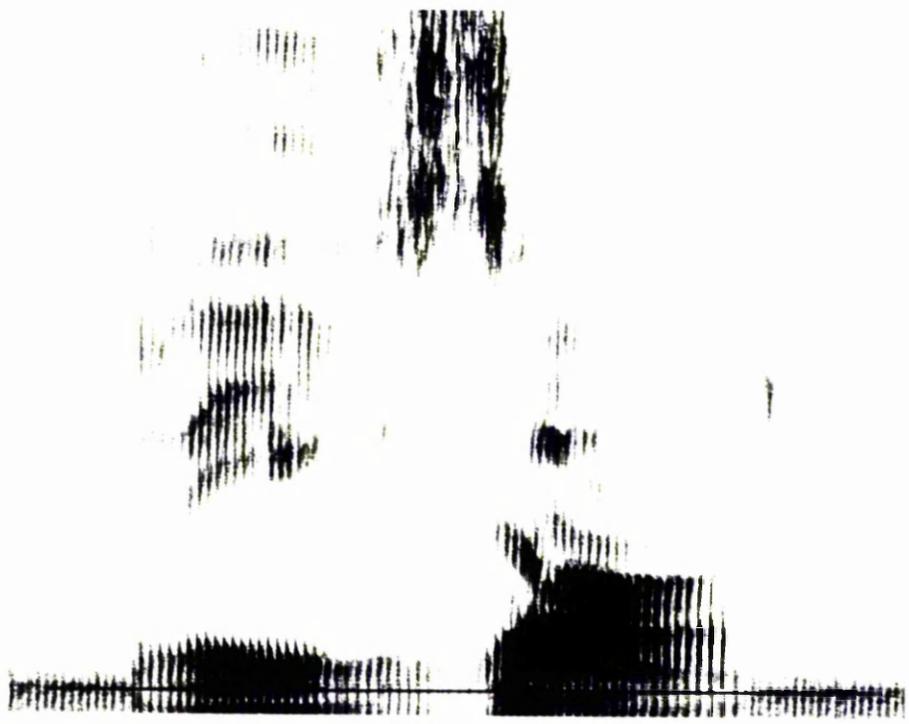
3. [z1·r]  
<sub>3</sub>     <sub>0</sub>



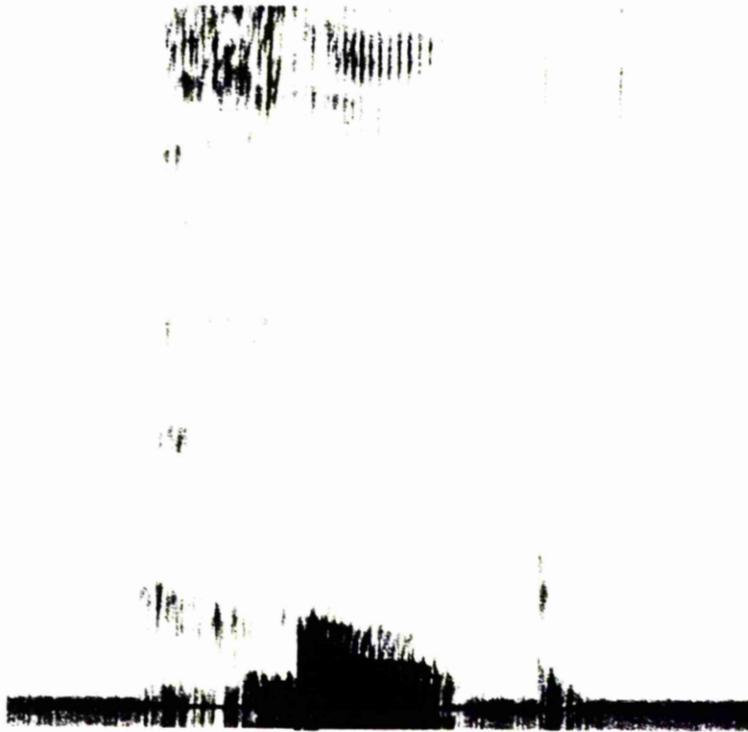
4. [zu·r]  
<sub>3</sub>     <sub>0</sub>



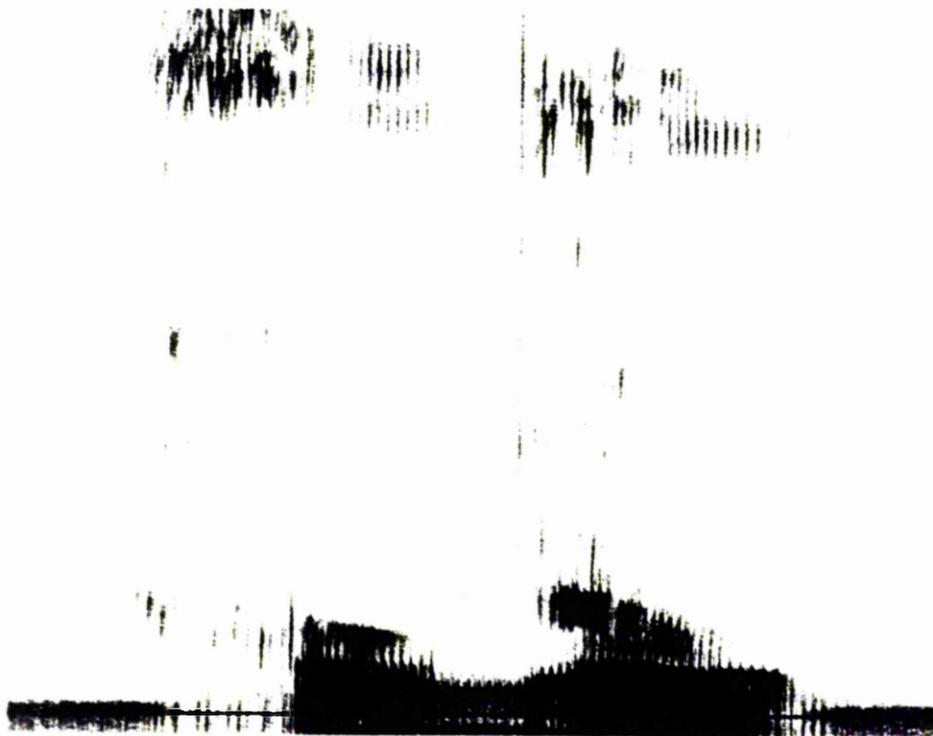
5. [r̥i·ɪ̥]



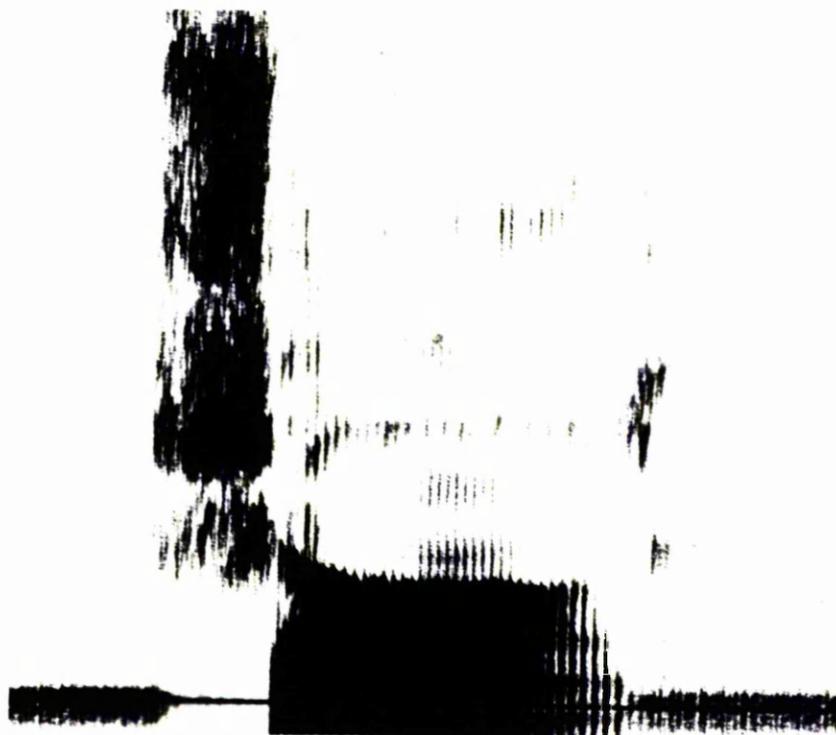
6. [r̥i·ɪ̥z̥a·ɾ̥]



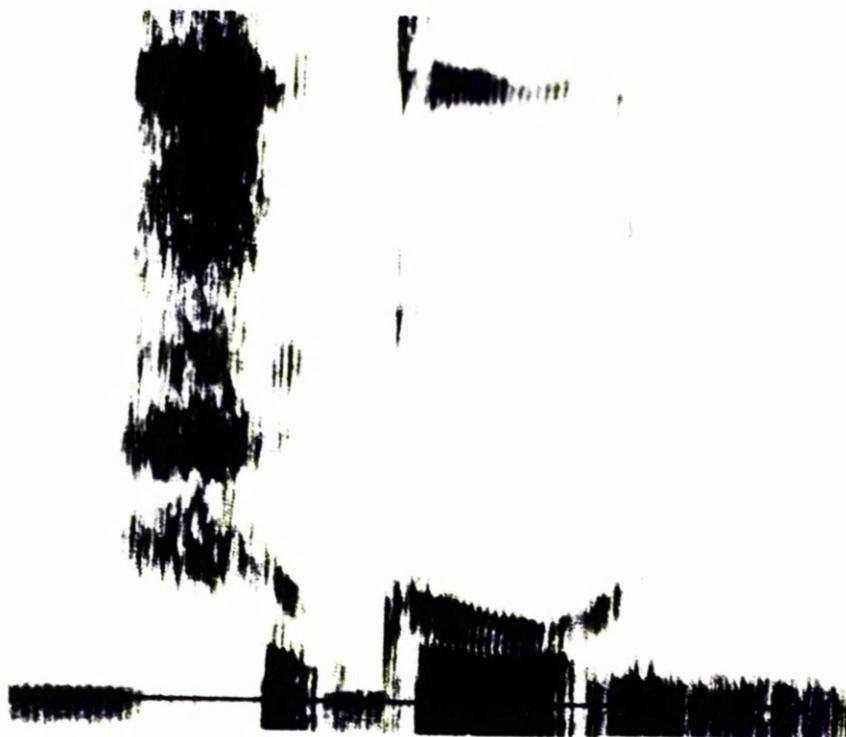
7. [xu·b̥]



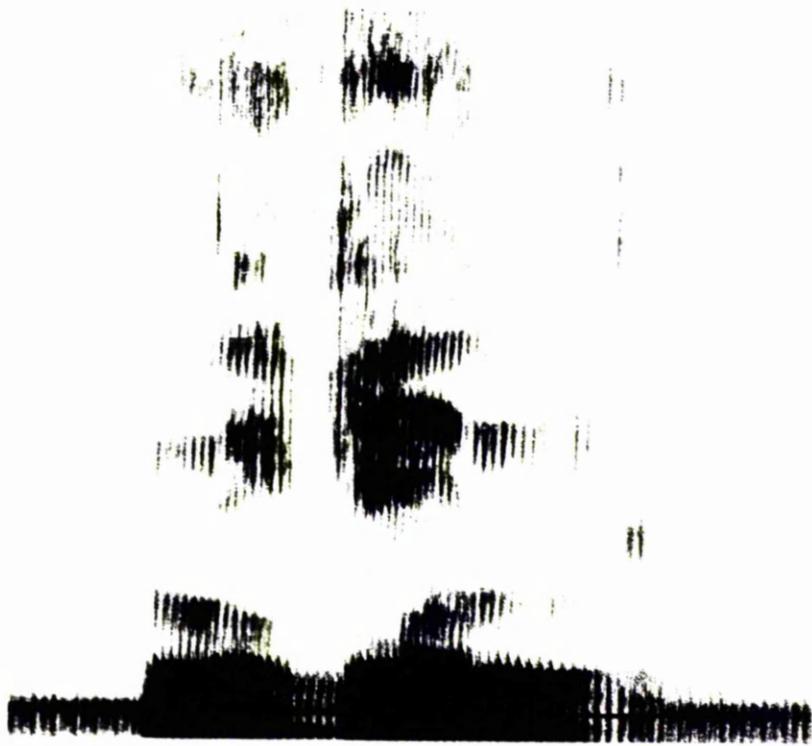
8. [xu·br̥ü]



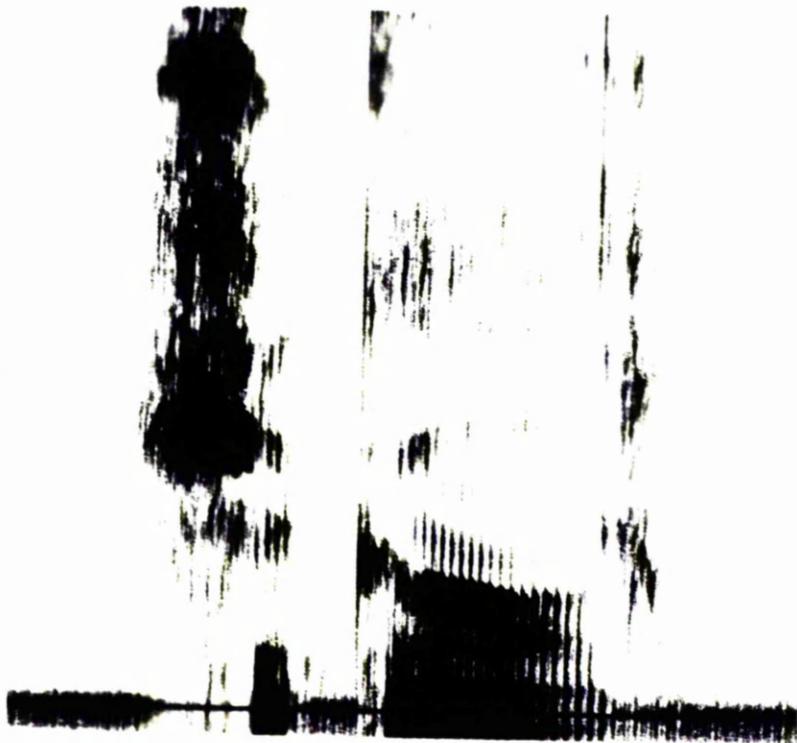
9. [ʃ<sup>u</sup>ʌ̃<sup>u</sup>a·r]



10. [ʃ<sup>u</sup>aku·h]



11. [nĩĩĩ·ñ]



12. [ʃĩkĩ·ŋ̃]



13. [ʃä̃e.ɾ]



14. [d̥i̯a.ɾ]

and 14 [d<sup>h</sup>i<sup>h</sup>vɑ<sup>h</sup>.r] contain inherently long vocoids, and in both cases [ǎ] and [ĩ] are considerably shorter than [ɑ.] in 14 [d<sup>h</sup>i<sup>h</sup>vɑ<sup>h</sup>.r] as shown in the spectrogram; [ɑ.] is also an inherently long vocoid; but since it appears in a CVC syllable, it is longer than [ǎ] in 13 and [ĩ] in 14 which appear in CV syllables. The observation above provides spectrographic evidence for the perceptual description given in 2.2, 3.3.13, and 3.3.14.

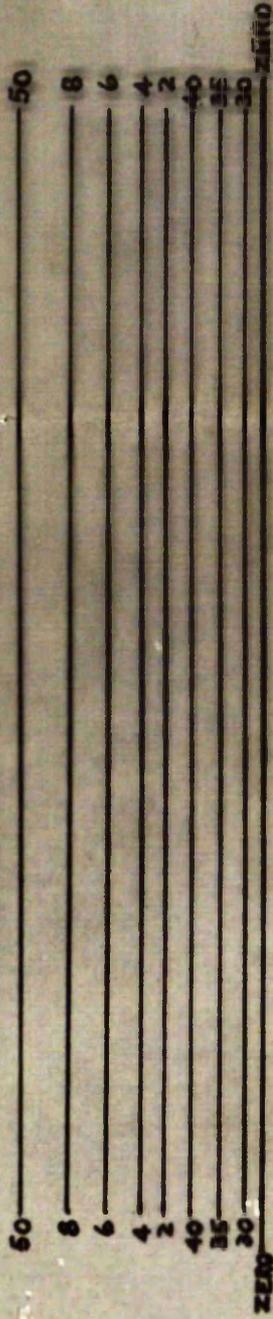
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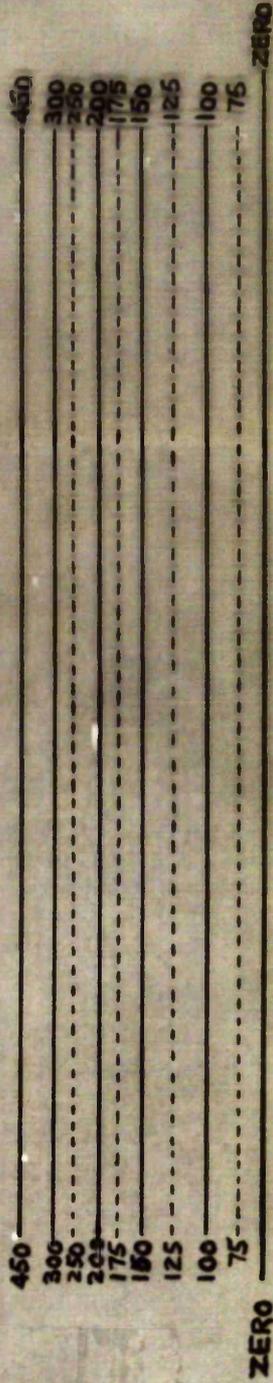
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Intensity calibration in Decibels

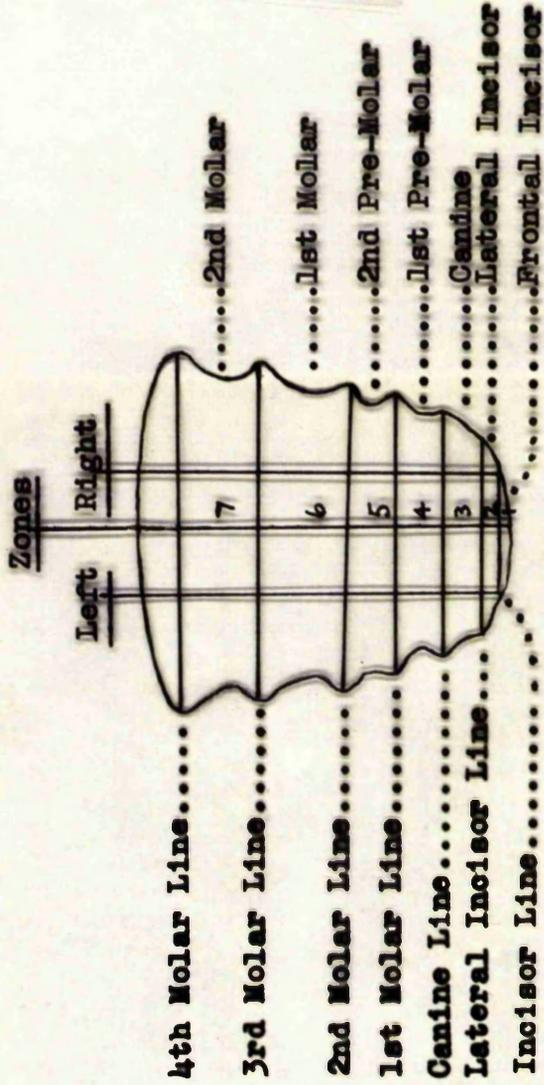


Pitch calibration in Hertz

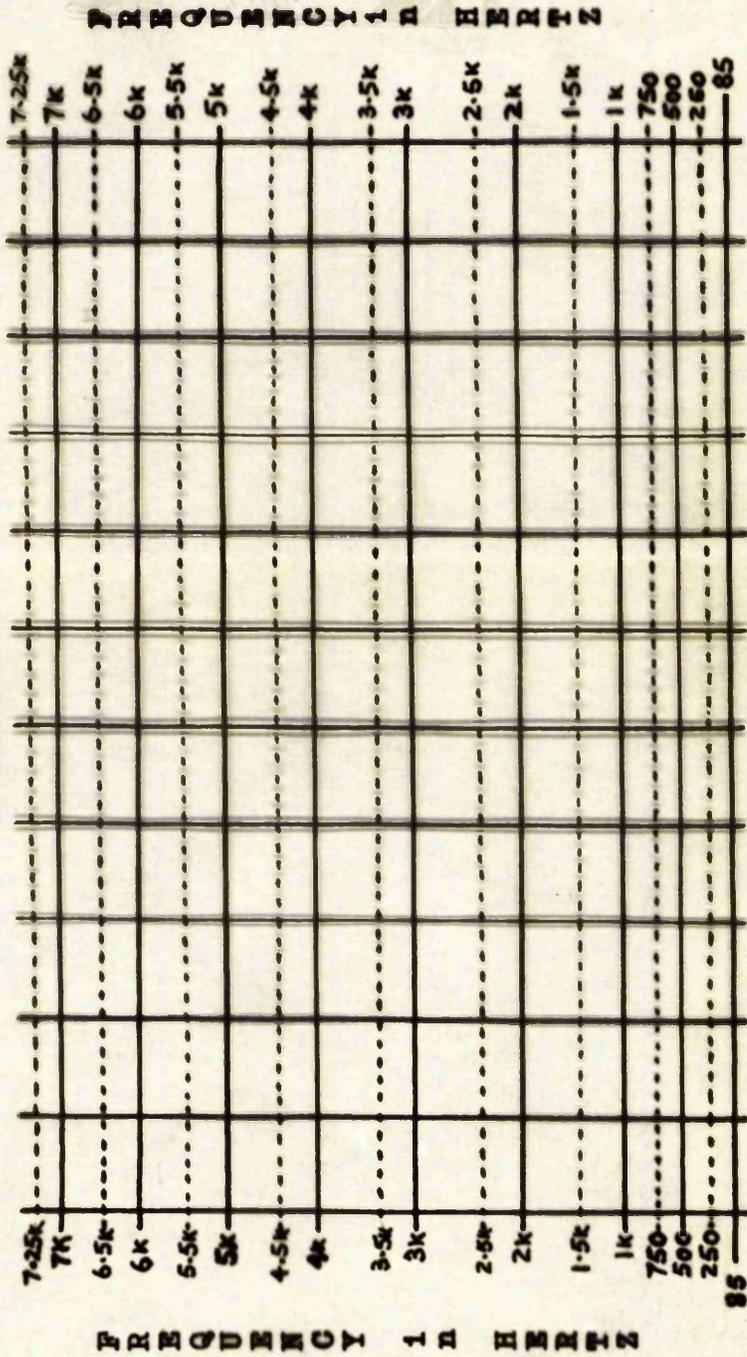
A.M. Haghshenas Lari

The Palatogram Figure

A.M. Egghshenas Ler1



SONAGRAPH GRID



TIME in 0.10 Seconds