72-14,991

SHARIFI, Hassan, 1938-
A GENERATIVE APPROACH TO THE DEVELOPMENT OF AVESTAN AND OLD PERSIAN CONSONANTS.

The University of Michigan, Ph.D., 1971
Language and Literature, linguistics

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A GENERATIVE APPROACH TO THE DEVELOPMENT OF AVESTAN AND OLD PERSIAN CONSONANTS

by

Hassan Sharifi

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Linguistics)
in The University of Michigan
1971

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To my father

and the memory of my mother

TABLE OF CONTENTS

Page

LIST OF CHARTS vii

PART I. OLD IRANIAN PHONOLOGY: THE TRADITION

CHAPTER

1 BARTHOLOMAE. 1

1.1 Introduction 1
1.2 Proto-Indo-European. 3
1.2.1 Assimilatory changes 5
1.2.2 Obstruents 7
1.2.2.1 Stops. 7
1.2.2.2 Fricatives 8
1.2.2.2.1 Nonsibilants 9
1.2.2.2.2 Sibilants. 11
1.2.3 Nonobstruents. 13
1.2.3.1 Liquids. 13
1.2.3.2 Nasals 14
1.2.3.3 Vowels 14
1.2.4 Summary of the changes 15
1.3 Proto-Indo-Iranian 18
1.3.1 Obstruents 19
1.3.1.1 Stops. 19
1.3.1.2 Fricatives 21
1.3.1.2.1 Nonsibilants 21
1.3.1 2.2 Sibilants. 22
1.3.1.3 Consonant cluster simplification 23
1.3.1.3.1 Stops. 23
1.3.1.3.2 Fricatives 24
1.3.2 Nonobstruents. 27
1.3.2.1 Liquids. 27
1.3.2.2 Nasals 27
1.3.2.3 Vowels 28
1.4 Sandhi 28
1.4.1 Proto-Indo-European. 29
1.4.2 Proto-Indo-Iranian 30

CHAPTER Page

1

1.4.3 Proto-Iranian. 31
1.5 Summary. 33
FOOTNOTES TO CHAPTER ONE. 37

2 BARTHOLOMAE CONTINUED. 40

2.1 Introduction 40
2.2 Writing system 41
2.3 Avestan and Old Persian consonants 42
2.3.1 Stops and affricates 44
2.3.1.1 Avestan. 44
2.3.1.2 Old Persian. 44
2.3.1.3 Examples 45
2.3.2 Fricatives 48
2.3.2.1 Avestan. 48
2.3.2.2 Old Persian. 49
2.3.2.3 Examples 52
2.3.3 Liquids. 60
2.3.3.1 Avestan. 60
2.3.3.2 Old Persian. 60
2.3.3.3 Examples 61
2.3.4 Nasals 62
2.3.4.1 Avestan. 62
2.3.4.2 Old Persian. 63
2.3.4.3 Examples 63
2.3.5 Vowels 64
2.3.5.1 Examples 64
2.4 Anaptyxis. 65
2.4.1 Avestan. 65
2.4.2 Old Persian. 66
2.5 Sandhi 67
2.5.1 Avestan. 67
2.5.2 Old Persian. 68
2.6 Conclusion 70
FOOTNOTES TO CHAPTER TWO. 73

3 POST-BARTHOLOMAEAN SCHOLARS. 75

3.1 Introduction 75
3.2 Proto-Indo European sound inventory. 77
3.2.1 Obstruents 78
3.2.1.1 Stops. 78
3.2.1.1.1 Palatals 78

CHAPTER Page

3

3.2.1.1.2 Velars 79
3.2.1.1.3 Labiovelars. 79
3.2.1.1.4 Discussion 79
3.2.1.2 Fricatives 80
3.2.1.2.1 Sibilants. 81
3.2.2 Nonobstruents. 82
3.2.2.1 Liquids. 83
3.2.2.2 Nasals 83
3.2.2.3 Semivowels 83
3.2.2.4 Discussion 83
3.2.3 Summary. 85
3.3 Changes in Proto-Indo-European 85
3.3.1 Assimilatory changes 85
3.3.2 Obstruents 87
3.3.2.1 Stops. 87
3.3.2.1.1 Palatals 87
3.3.2.1.2 Velars 90
3.3.2.1.3 Labiovelars. 90
3.3.2.2 Sibilants. 91
3.3.3 Nonobstruents. 92
3.3.3.1 Liquids. 93
3.3.3.2 Nasals 94
3.3.3.3 Semivowels 95
3.4 Proto-Indo-Iranian 95
3.4.1 Stops. 98
3.4.1.1 Dental stops 99
3.4.1.2 Velars 102
3.4.1.3 Palatals 102
3.4.2 Sibilants. 109
3.4.3 Resonants. 109
3.4.4 Summary. 109
3.5 Proto-Iranian. 110
3.5.1 Avestan. 113
3.5.2 Old Persian. 121
3.5.3 Conclusion 127
FOOTNOTES TO CHAPTER THREE. 130

PART II. OLD IRANIAN PHONOLOGY: A GENERATIVE VIEW

4 FROM PROTO-INDO-EUROPEAN TO PROTO-IRANIAN 131

4.1 Introduction. 131
4.1.1 The model 132

CHAPTER Page

4

4.2 Proto-Indo-European 135
4.2.1 Palatals. 137
4.2.2 Sibilants 141
4.2.3 Liquids 146
4.2.4 Voiceless stops 147
4.2.5 Assimilatory changes. 148
4.2.6 Nonobstruents 150
4.3 Proto-Indo-Iranian. 153
4.3.1 Sibilants 154
4.3.2 Palatals. 161
4.3.3 Velars. 164
4.3.4 Stops 166
4.3.5 Dentals 173
4.4 Summary 177
FOOTNOTES TO CHAPTER FOUR. 179

5 FROM PROTO-IRANIAN TO AVESTAN AND OLD PERSIAN . . 180

5.1 Introduction. 180
5.2 Obstruents. 181
5.2.1 Stops 183
5.2.2 Fricatives. 187
5.2.2.1 Sibilants 187
5.2.2.2 Nonsibilants. 194
5.2.3 Consonant cluster simplification. 195
5.3 Nonobstruents 197
5.3.1 Liquids 199
5.3.2 Nasals. 203
5.3.3 Glides. 204
5.4 Summary 206
5.5 Avestan 207
5.6 Old Persian 209
5.7 The antiquity of Avestan and Old Persian. . . . 210
FOOTNOTES TO CHAPTER FIVE. 222

BIBLIOGRAPHY 223

LIST OF CHARTS

CHART		Page
1.	Indo-European Phonetic Chart	16
2.	Proto-Indo-Iranian Phonetic Chart	17
3.	Proto-Iranian Phonetic Chart	34
4.	Chart of Avestan Consonants	71
5.	Chart of Old Persian Consonants	72
6.	Proto-Indo-European Sound Chart	86
7.	Proto-Iranian Phonetic Chart	111
8.	Proto-Indo-European Systematic Phonemes	138
9.	Proto-Iranian Systematic Phonemes	182

CHAPTER 1

BARTHOLOMAE

1.1 Introduction

The main purpose of this dissertation is to reanalyze the sound changes involved in the development of Old Persian (OP) and Avestan (Av.) consonants within the framework of Generative Phonology. Through the application of the devices available in the generative approach to the attested historical data, I intend to demonstrate the contribution of this theoretical framework to our understanding of the kinds of sound changes involved. At the same time the data will act as a testing ground for some of the claims of the theory of Generative Phonology.

Part one of this study is a historical survey of the most important literature relevant to the development of Old Persian and Avestan consonants. In it I will show how various scholars have explained the development of these consonants from earlier sounds belonging to the successive stages of the Indo-European (IE) language.

This survey will begin with a comprehensive outline of Christian Bartholomae's major contributions to the study of the phonology of Old Iranian (OIr.) languages. For this I will choose his two works which appear in Grundriss der

Iranischen Philologie, volume 1, edited by Geiger and Kuhn (1895-1901), namely: (a) "Vorgeschichte der Iranischen Sprachen" (1894) and (b) "Awestasprache und Altpersisch" (1895). The first study deals with the changes that Indo-European sounds undergo in their transition to the linguistic stage which he calls "Uriranisch," and which shall henceforth be referred to as Proto-Iranian (PIr.). In the second study he describes Avestan and Old Persian, side by side, and shows how these two languages are derived from Proto-Iranian, the stage of language development with which he ended the first study.

These two works by Bartholomae are the first comprehensive studies to appear in the field of comparative Iranian linguistics. In them he synthesizes and improves his own as well as other scholars' earlier studies in the field, expanding and at times revising such works as Brugmann's Grundriss der Vergleichenden Grammatik der Indogermanischen Sprachen (1886) and his own Handbuch der Altiranischen Dialekte (1883). Nearly all of the later studies in the field are related to, if not based on, Bartholomae's work.

In the present chapter I will discuss Bartholomae's phonological description of the prehistory of Old Iranian languages according to the following outline:

1. Consonants from Proto-Indo-European (PIE) to

Proto-Indo-Iranian (PIIr.).

2. Consonants from Proto-Indo-Iranian to Proto-Iranian.

3. Sandhi in Proto-Indo-Iranian and Proto-Iranian.

1.2 Proto-Indo-European

"Vorgeschichte der Iranischen Sprachen," in which Bartholomae describes the development of the Iranian languages, begins with the Indo-European language at the time when it was "disintegrating" and splitting into different languages.[1] Bartholomae investigates and traces the various changes that occurred in the language to give rise to the Old Iranian languages (Avestan and Old Persian).

For the Indo-European language at the time of its "disintegration," Bartholomae posits an inventory of thirty-nine possible segments that can function or become consonantal sounds. Included in this list are two kinds of sound units: (a) those that appear in a position without restriction, e.g. b d g, etc. and (b) those whose occurrence is conditioned by other sounds in their environment, e.g. k' g', etc. This inventory of PIE sounds is established by Bartholomae on the basis of two considerations: (a) the acceptance of some fundamental sounds in Proto-Indo-European phonology, e.g. s k t p, etc. and (b) sounds that come about as a result of the application of certain sound laws within

the Indo-European language, e.g. sh θ šh, etc. Some of these latter sounds, not all of them attested, can be considered as variants of the former ones. It is clear that Bartholomae's inventory of IE sounds consists of all the possible phonetic units which he could find in a synchronic description of the language.

Bartholomae's thirty-nine IE phonetic segments form the basis for his study of the development of the later stages of the language, including Proto-Indo-Iranian, Proto-Iranian, and so forth. He does not present a phonetic chart of the PIE sounds, nor does he give the number of the total IE segments. The number "thirty-nine" represents the sum of all the consonantal sounds that are mentioned in the course of his presentation under "Geschichte der Laute." These sounds consist of two major groups, that is, Gerauschlaute and Sonorlaute. Gerauschlaute[2] are sounds that never function as syllabic nuclei, i.e., stops and fricatives. Sonorlaute are the sounds that can and do function as vocalic nuclei, that is, nasals, liquids, and vowels.

Bartholomae discusses the sound changes first under the classes of obstruent and non-obstruent sounds and then according to other kinds of sound changes, namely, Satzphonetik and Ablaut. Each individual class of sound is traced from the Proto-Indo-European basic form to the Proto-Iranian stage. For instance, he follows the development of

all the stops from Indo-European times, through Proto-Indo-Iranian, to Old Indic or Proto-Iranian. He then describes the development of fricatives, nasals, and so forth. Although Bartholomae reconstructs the sound units belonging to the Proto-Indo-Iranian and Proto-Iranian stages, he does not do any actual reconstruction of words, stems, or suffixes except for a few scattered examples.

This survey of Bartholomae's work will deviate from his format. I will first show the development of the PIIr. sounds, class by class, according to the kind of change that occurred. Then in the same way I will trace the development of the Proto-Iranian stage. In each stage of the language development I will try to preserve the order of the rules as presented by Bartholomae. There is no explicit statement that his rules are always chronologically ordered, but in certain places the ordering is obvious. The numbers assigned to each rule here do not have any chronological implications; rather, they serve as easy points of reference.

1.2.1 Assimilatory changes

The following sound changes are clearly assimilatory in nature, all of which, according to Bartholomae, were operative in the Proto-Indo-European period. Rule (1), which accounts for the postulation of his palatal stop series, appears early in the description of PIE stops. Rules (2-5)

are added as an appendix to his description of the obstruents. Although Bartholomae does not explicitly state when these rules apply in relation to the other sound changes, one can infer from his examples that they must come early in the chronological order of rules. It is for this reason that I state them at such an early point.

(1) Velar stops k kh g gh become palatal ḱ ḱh ǵ ǵh when they appear before PIE i ī e ē y[3] sounds.

(2) Voiceless obstruents become voiced when they occur before a voiced obstruent.

(3) Voiced obstruents become voiceless when they occur before a voiceless obstruent.

(4) In obstruent clusters an aspirate transfers its aspiration to the right-most obstruent of the cluster, e.g.

ph + t (th) ⟶ pth ph + s ⟶ psh

(5) In obstruent clusters a voiced aspirate transfers its aspiration to the right-most obstruent while simultaneously making it voiced.

bh + t (th) ⟶ bdh bh + s ⟶ bzh

This rule is just the opposite of general rules (2) and (3) with respect to voicing. The application of rules (2-5) greatly changes the phonological structure of PIE morphemes and words. On the one hand, distinct morphemes

become identical, while on the other, single morphemes acquire variant forms according to their environments. These changes are furthered still more by various analogical and leveling trends operating in the language over a long period of time. The result is not only the presence of alternates for some forms, but the impossibility of discovering the underlying phonological form. For example, on the basis of the forms: Greek astemphḗs, Sanskrit stabhnáti, Greek stémbō̃, Old High German stampfōn, it is not clear which of the following is the original IE form: IE *stembh or *stemb 'trample.'

1.2.2 Obstruents

1.2.2.1 Stops

Proto-Indo-European at the time of its "disintegration," as posited by Bartholomae, contains the following stops which remain unchanged in Proto-Indo-Iranian.

Labials	Dentals	Palatals	Velars
p	t	k'	k
ph	th	k'h	kh
b	d	g'	g
bh	dh	g'h	gh

This inventory of four series of stops posited by Bartholomae for the Proto-Indo-European language differs

from that postulated by other Indo-Europeanists in several ways. It does not, for instance, include the labiovelar series reconstructed by Brugmann and others. The absence of this series can perhaps be explained by assuming that the above chart represents a late stage of Proto-Indo-European. This is, perhaps, what Bartholomae means when he states that his description accounts for the Indo-European language just before its "disintegration" into different dialects. However, it is also possible that Bartholomae believed that Proto-Indo-European never had such a series of unitary labio-velar stop sounds (see page 79 for further discussion).

A second point of difference is the status of the palatal series. For Bartholomae, k'-sounds[4] represent the allophones of the (velar) k-series and occur only before IE i ī e ē y. This was explained by rule (1). This limitation on the environment of k'-sounds differentiates them from Brugmann's palatal k̂-sounds. In all probability, these are comparable to the palatal stops that are produced by the so-called "secondary palatalization." I shall point out later that the postulation of these sounds for the Proto-Indo-European period is not correct (see page 164ff. for further discussion).

1.2.2.2 Fricatives

Bartholomae posits two groups of PIE fricatives which I call sibilant and nonsibilant.

1.2.2.2.1 Nonsibilants

Nonsibilant sounds include:

Velar	x	xh	ɣ	h
Palatal			j	

The velar x-sounds correspond to Brugmann's palatal stop k̂-series, Hubschmann's k_1-series and Fick's palatal fricative š-series. For Bartholomae the velar fricatives are the basic series of sounds which distinguish the two major dialect groups of the early Indo-European language family. In one group these velar fricatives change their manner of articulation to become velar stops (k-sounds), as in Latin centum; in the other group they change their places of articulation to become nonvelar sibilants, as in Av. satəm, Sanskrit (Skt.) šatam.

In positing velar fricatives instead of the more accepted stop series, Bartholomae does not depart from basic assumptions about the common Indo-European language which were accepted by his contemporaries. Brugmann, while positing the palatal stop k̂-series, hypothesizes that at one point in the Proto-Indo-European period, a part of the speech community replaced k̂-sounds with a non-stop series of sounds, perhaps velar fricatives. This simultaneous occurrence of

stops and fricatives in proto-language is also accepted by Bartholomae. In fact, in section 54 he explicitly acknowledges this dialectal variation and holds it responsible for the alternation of k- and x-sounds in a number of words. Dialect mixture, according to him, has affected all the various stages of language development.

If the assumption of the co-existence of stops and fricatives in such an early stage is accurate, one must also postulate an even more primitive, single series of sounds underlying them. Brugmann considers the stops to be this underlying series (cf. Brugmann, 1930ed., volume 11: 543ff). Bartholomae avoids any discussion of the problem and simply posits the velar fricatives to be the underlying sounds responsible for the proto-language dialect differentiation.

The PIE velar fricatives whose occurrences are not restricted undergo the following changes by Proto-Indo-Iranian times:

(6) Before stops x and ɣ become dental s̆ and z̆.[5]

(7) Before sibilants x and ɣ are retained unchanged.

(8) Elsewhere, velars change into palatal s̡ sounds, s̡ s̡h z̡ z̡h.

Bartholomae adds a palatal j sound to the nonsibilant PIE fricatives on the basis of the distinction of Greek (Gk.)

ʃ and ʒ . He says that i can be identified, morpheme initially, before a vowel; however,

(9) PIE i merges with the PIE y in Proto-Indo-Iranian times.

1.2.2.2.2 Sibilants

Bartholomae admits that there is no definitive agreement about the number of PIE sibilants and that regardless of whether one posits one sound, s, or two, s z, many problems still remain unsolved. He posits the following ten sibilants for the Proto-Indo-European language:

	Vl.		Vd.	
	Unasp.	Asp.	Unasp.	Asp.
θ-sounds	θ	-	ð	-
s-sounds	s	sh	z	zh
ṣ-sounds	ṣ	ṣh	ẓ	ẓh

IE θ and ð sounds are voiceless interdental fricatives, and Bartholomae classifies them as sibilants. They do not have aspirated counterparts and appear as variants of t and d only when they appear before dental stops followed by a syllabic sound. Their appearance in Proto-Indo-European is therefore the result of a synchronic rule which can roughly be symbolized as:

(10) PIE $\begin{bmatrix} t \\ d \end{bmatrix} \longrightarrow$ IE $\begin{bmatrix} \theta \\ \eth \end{bmatrix} / \_\_ \begin{bmatrix} t(h) \\ d(h) \end{bmatrix}$ + [syllabic]

Bartholomae bases his IE s-sounds on a two-way comparison of PIIr. xš[6] (Ir. š) with the Gk. (ξ) ks and (κτ) kt. This s-sound, which he considers a dental, occurs only after PIE velar consonants and corresponds to Brugmann's þ þh ḍ ḍh (cf. Brugmann, 1904:207).

The basic PIE s and z are reconstructed, even though z is rare before syllabics. Bartholomae is forced to reconstruct the aspirated sibilants sh zh šh žh (all dental) on the basis of synchronic rules (4) and (5), which are operative in the Proto-Indo-European period, even though he cannot attest the occurrence of some of them, for example, sh.

Bartholomae's ten PIE sibilants undergo only one change in Proto-Indo-Iranian:

(11) s-sounds become š-sounds when they occur after i- and u-vowels, liquids, and velars. Elsewhere they remain unchanged.

Bartholomae's phonetic description of s-[7] and š-sounds is not clear. He describes them as dental in contrast to interdental θ and ð, as well as in contrast to the palatal ś-sounds of the later Proto-Indo-Iranian stage. In

spite of his difficulty in establishing the phonetic distinction between s and š, he maintains that they represent two different sounds etymologically.

1.2.3 Nonobstruents

PIE sounds that can function as vocalic nuclei in a syllable are liquids, nasals, and vowels. The members of these classes can function both as consonantal and as vocalic units, with the exception of the a-vowels. That is, the nasals m n ñ ŋ, the liquids r l, and the glides y w (i̯ u̯) correspond to the long or short vowels m̥ n̥ ñ̥ ŋ̥, r̥ l̥, and i u. Since this study is only concerned with consonants, I will not discuss the a-vowels which function solely as vowels.

1.2.3.1 Liquids

Proto-Indo-European has two liquids, l and r, which function both as syllabics and as consonants. As syllabics they appear long and short, i.e. r̥ r̥̄ l̥ l̥̄.

(12) PIE l and r merge into r.

This merger happened early, but because of the later contacts of Indo-Iranian with non-Indo-Iranian languages, Indo-Iranians borrowed words containing the PIE l. Thus the Proto-Indo-Iranian language possesses an r corresponding to the PIE r and l, and an l corresponding to the PIE l. In

spite of this description of the development of PIE l and r, Bartholomae (in section 56.4 and in his list of sounds, pages 45-47) assigns to Proto-Indo-Iranian only r r̥ r̄ as liquid sounds.

1.2.3.2 Nasals

Nasals also function both as syllabics and as consonants. There are four different nasals which correspond to the four points of articulation of the obstruents, m n ñ ŋ. Before stops and fricatives, only homorganic nasals appear. The ñ and ŋ are etymologically the same; and while ñ appears before palatals (k-sounds), ŋ appears before velars. Nasals in their function as consonants remain unchanged in Proto-Indo-Iranian, except:

(13) Before sibilants only n appears, (ns for *ms).

In their function as syllabics, nasals appear both short and long (m̥ m̄, and so forth).

(14) PIE long and short syllabic nasals become PIIr. ā and a respectively.

1.2.3.3 Vowels

Bartholomae divides the PIE vowels into two groups: (a) i- and u-vowels and (b) a-vowels and ə which is etymologically related to a.

a. PIE i- and u-vowels, like nasals, function as syllabics as well as consonants. As syllabics they appear long and short. The i- and u-vowels function as consonants when they occur before syllabics and also as the second component of true diphthongs. Hereafter I transcribe the latter as y and w.

b. The a-vowels and ə function without exception as syllabics. Since I am not concerned with the development of the IE vowels, the a-vowels will not be discussed any further.

The PIE i- and u-vowels are generally retained unchanged in Proto-Indo-Iranian.

1.2.4 Summary of the changes

In this section (pages 16-17) I will tabulate within semiphonetic charts the PIE sounds and the PIIr. sounds resulting from the operation of the above diachronic sound changes. A comparison of PIE and PIIr. sound systems will reveal the following differences:

a. Four new palatal fricatives appear in Proto-Indo-Iranian. They are the result of the operation of rule (8) on the velar fricatives, i.e. x-sounds.

b. The following PIE consonants do not appear in Proto-Indo-Iranian due to the operation of

CHART 1

INDO-EUROPEAN PHONETIC CHART
RELEVANT SOUNDS ABSTRACTED FROM BARTHOLOMAE

				Labial	Inter-dental	Dental		Pala-tal	Velar
Obstruents	Stops	Vl.	Un-asp.	p		t		k'	k
			Asp.	ph		th		k'h	kh
		Vd.	Un-asp.	b		d		g'	g
			Asp.	bh		dh		g'h	gh
	Fricatives	Vl.	Un-asp.		θ	s	š		x
			Asp.			sh	šh		xh
		Vd.	Un-asp.		ð	z	ž	j	ɣ
			Asp.			zh	žh		ɣh
Sonorants	Nasals	Conso-nants		m		n		ñ'	ŋ
		Syl.	Sht.	m̥		n̥		ñ̥	ŋ̥
			Lg.	m̥̄		n̥̄		ñ̥̄	ŋ̥̄
	Nonnasals	Conso-nants		u̯		r	l	i̯	
		Syl.	Sht.	u		r̥	l̥	i	
			Lg.	ū		r̥̄	l̥̄	ī̥	

CHART 2

PROTO-INDO-IRANIAN PHONETIC CHART
RELEVANT SOUNDS ABSTRACTED FROM BARTHOLOMAE

				Labial	Inter-dental	Dental		Pala-tal	Velar
Obstruents	Stops	Vl.	Un-asp.	p		t		k'	k
			Asp.	ph		th		k'h	kh
		Vd.	Un-asp.	b		d		g'	g
			Asp.	bh		dh		g'h	gh
	Fricatives	Vl.	Un-asp.		θ	s	š	ś	x
			Asp.			sh	šh	śh	xh
		Vd.	Un-asp.		ð	z	ž	ź	ɣ
			Asp.			zh	žh	źh	ɣh
Sonorants	Nasals	Conso-nants		m		n		ñ	ŋ
		Reso-nants		w		r		y	
		Syl.	Sht.	u		ṛ		i	
			Lg.	ū		ṝ		ī	

certain rules:

i. PIE voiced palatal fricative ǰ merges with the PIE y sound (rule 9).

ii. The syllabic nasals both short and long are replaced by a and ā (rule 14).

iii. l l̥ l̄ merge with r r̥ r̄[8] (rule 12).

The rest of the PIE sound segments remain the same in Proto-Indo-Iranian. There is, then, altogether a loss of eight sound segments between Proto-Indo-European and Proto-Indo-Iranian. The number of nonobstruent sounds which have syllabic counterparts is now limited to r y w. The fricative class of sounds acquires a palatal series and constitutes the fifth series of sounds, i.e. ś-sounds.

1.3 Proto-Indo-Iranian

The Proto-Indo-Iranian language is a hypothetical construct. The phonological system that is postulated for it is the result of the application of the fourteen rules described in the previous sections. Indo-Europeanists have reconstructed this stage because from this point in the history of the language one can show the separate development of the Indic and Iranian languages. For Bartholomae Proto-Indo-Iranian seems to have many characteristics of a real language. For instance, he posits a detailed inventory

of sounds as well as certain phonological sandhi rules dealing with sounds occurring in the environment of morpheme boundaries.

Proto-Indo-Iranian undergoes further changes and, according to the types of change, gives rise to different language groups. Certain types of sound changes lead to that linguistic form called Indic and certain other types of sound changes produce the language called Iranian. Bartholomae describes the development of Indic sounds along with those of Proto-Iranian. However, in the following sections only those sound changes that lead to the appearance of Proto-Iranian will be discussed.

1.3.1 Obstruents

1.3.1.1 Stops

The PIIr. stops undergo the following changes by Proto-Iranian times:

(15) PIIr. aspirated voiceless stops, ph th k'h kh, change to:
   a) PIr. voiceless fricatives, f θ š x, except
   b) after sibilants and nasals where they lose their aspiration and become PIr. p t c k.

(16) PIIr. aspirated voiced stops, bh dh g'h gh, lose their aspiration and become PIr. b d ǰ g.

(17) PIIr. unaspirated voiced stops, b d g' g, when they occur before a PIIr. sibilant, become PIr. voiced fricatives v^{9} z (instead of ð) ɣ. Otherwise they remain unchanged.

(18) PIIr. unaspirated voiceless stops, p t k' k change to PIr. voiceless spirants, f θ š̓ x, except before syllabics or after a sibilant where they remain unchanged.

The exceptions to rules (15) through (18) involve the behavior of t-sounds and k'-sounds.

(19) PIIr. t-sounds become s (rather than θ) when they occur before IE k'- and s-sounds.

(20) PIIr. palatal stops, k' k'h g' g'h, become:

a) affricates č ǰ where in the other series stops are found, and

b) fricatives š̓ ž̓ where in the other series fricatives appear.

It should be noted that according to rule (1), PIE palatal stops could appear only before PIE y i ī e ē. Rule (20) can derive the PIr. š̓ from PIIr. k' only before y and from k'h before i ī e ē y if not preceded by PIIr. sibilants. It is obvious that the distribution of PIr. š̓ and č from the palatal stop k'-series is very limited.

It is also known that PIr. $\underline{\overset{\vee}{c}}$ as a reflex of the PIE or PIIr. k'-sound can appear only before y i ī e ē and PIr. k as a reflex of PIE or PIIr. k appears everywhere else. However, Bartholomae points out that because of some type of sound leveling, which he does not explain, there is an alternation between k and $\underline{\overset{\vee}{c}}$ in Proto-Iranian which favors the appearance of the $\underline{\overset{\vee}{c}}$-sound.

One should also note the tremendous amount of alternation between the different kinds of stops due to the application of rules (2-5).

1.3.1.2 Fricatives

Proto-Indo-Iranian has a larger number of fricatives than Proto-Indo-European. Keeping in line with Bartholomae's classification of the fricatives, velar nonsibilants and sibilants will be discussed.

1.3.1.2.1 Nonsibilants

(21) PIIr. velar x-sounds are lost in Proto-Iranian.

The only environment in which x-sounds appear in Proto-Indo-Iranian is before sibilants.

(22) PIIr. palatal $\underline{\overset{\vee}{s}}$-sounds lose their aspiration and are reduced to PIr. $\underline{\overset{\vee}{s}}$ and $\underline{\overset{\vee}{z}}$.

(23) The resulting PIr. $\underline{\overset{\vee}{s}}$ and $\underline{\overset{\vee}{z}}$[10] change to:

a) $\underline{\overset{\times}{s}}$ and $\underline{\overset{\vee}{z}}$ after labials,

b) but merge to $\underline{\overset{\vee}{s}}$ when occurring before $\underline{n}$, and

c) elsewhere they become $\underline{s}$ and $\underline{z}$.

1.3.1.2.2 Sibilants

The PIIr. sibilants, all of which are reflexes of PIE sibilants, undergo the following changes in reaching the Proto-Iranian stage:

(24) PIIr. $\underline{\theta}$ and $\underline{\overset{\times}{\delta}}$ become PIr. $\underline{s}$ and $\underline{z}$.

These $\underline{\theta}$ and $\underline{\overset{\times}{\delta}}$ sounds, whose occurrence is limited to places before PIE -$\underline{t(h)}$ and -$\underline{d(h)}$, are transmitted unchanged from Indo-European to Proto-Indo-Iranian.

(25) PIIr. $\underline{s}$-sounds and $\underline{\overset{\vee}{s}}$-sounds lose their aspiration and become PIr. $\underline{s}$ $\underline{z}$ and $\underline{\overset{\vee}{s}}$ $\underline{\overset{\vee}{z}}$ respectively.[11]

(26) PIIr. dental $\underline{\overset{\vee}{s}}$-sounds[12] become PIr. $\underline{s}$-sounds when occurring between a velar and an $\underline{r}$.[13] Otherwise they remain the same.

(27) PIIr. $\underline{s}$-sounds change to PIr. $\underline{\overset{\times}{s}}$-sounds when they occur after $\underline{p}$ and $\underline{b}$.

(28) PIIr. $\underline{s}$-sounds remain unchanged when appearing before a voiceless stop or $\underline{n}$ or after $\underline{t}$ and $\underline{d}$.

(29) Elsewhere PIIr. $\underline{s}$-sounds change to PIr. $\underline{h}$.

There are a few other changes in sibilants which occur after

the above changes have taken place.

(30) The š from rule (27) later changes to s when it occurs between f[14] and r.

(31) PIIr. z changes to PIr. s when it occurs before n.

Bartholomae's specification of rule (28) seems to be correct only for the voiceless s member of the s-sounds because z does not appear before n. The reason for the absence of PIr. zn cluster is explained by rule (31) which changes it to sn. Nevertheless, he has a footnote to this rule in which he states that PIE sh is not at all attested while z and zh occur only in the environment of voiced sounds.

In spite of elaborate systems of sibilants, Bartholomae clearly shows his acceptance of the widely held view that Proto-Indo-European had only one sibilant s with a voiced conditional variant z. This interpretation of Bartholomae is supported by the fact that his treatment of the PIE z sound is not complete. He does not give an equivalent of rule (29) for PIE z, and the readers are left to wonder whether z becomes h or something else.

1.3.1.3 Consonant cluster simplification

1.3.1.3.1 Stops

Very early in Proto-language, according to Bartholomae, stops in strong[15] clusters were lost. The examples that he provides demonstrate only the loss of t th d k.[16] Here we shall take Bartholomae's general statement and restate it in the following rule.

(32) A stop in a cluster of three or more consonants is lost.

PIE neptsu PIIr. napsu GAv. naf̌šu 'with the grandson' cf. LAv. napto 'grandson'

PIE -pstn- PIIr. -psn- LAv. ərədvaf̌šnyā 'high-breasted' cf. LAv. f̌štāma 'breast'

PIE -sth+t -stth LAv. -šťarəm 'to war'

PIE -sktim GAv. astīm 'follower' cf. GAv. āskəitim

PIE -zdn- PIIr. -zn- GAv. asnā̊t̰ 'from near' cf. LAv. nazdyō 'nearer'

1.3.1.3.2 Fricatives

PIE fricatives in clusters with other fricatives and consonants are lost as the language changes. Bartholomae has lumped all of these losses together and presented them in the following manner:

(33) PIE ss and š̌s clusters appear in Proto-Iranian respectively as s and š̌.

PIE es-si PIr. asi Av. ahī 'you (sg.) are'

PIE aŋɣhes-su > PIIr. aŋ̌žhesu > Av. ązahu
'in need'
PIE us-sxh- > IE -usxh- > Av. usatim

(34) PIE s z are lost in Proto-Indo-Iranian before the x-sound.

Bartholomae claims that the change takes place in this manner: sx > sš̌ > š̌š̌ > PIIr. š̌. This loss makes it impossible to decide with complete certainty whether a word initial PIIr. š̌ represents sx or x. The same is also true for xsxh clusters.

PIE sxuptis > LAv. suptīm
cf. Skt. šuptiṣ̌
PIE sisxhidiēt > LAv. hisiðyāt
cf. Skt. chin
PIE zɣhust > GAv. zazənti
cf. Skt. sāhwān
PIE pṛxsxheti > LAv. pərəsaiti > OP aparsam

(35) PIIr. xš̌ and ɣž̌ are reduced to š̌ and ž̌ when occurring before t-sounds.
PIE prexšto- > PIIr. prašta > GAv. fraštā

PIE texštom PIIr. taštam LAv. taštəm

PIE -γǰždh- *tu̯arǰdhu̯am > GAv. θvaroǰdūm

The above losses of consonants are also described by Reichelt (1909:82). Although he rearranges the order of presentation according to chronological considerations, his description illustrates the types of inadequacies that are characteristic of Bartholomae (1894) and other philologists. They postulate each of the above as sound changes independent of the rules given for individual sounds. Rule (35) is not a new sound change. It is the result of the application of general sound changes described earlier by both Reichelt and Bartholomae. I represented them by rules (7) and (21). The clusters to which rule (34) applies have also been subject to other earlier sound changes: sx(h) is changed to sš̌(h) by rule (8), to sš̌ by rule (22), and to ss by rule (23c). Thus the result of these changes makes the PIE sx(h) resemble the input of rule (33) above. Only in rule (33) do we see a real loss of a sibilant which has not been treated elsewhere in Bartholomae's and Reichelt's studies. To make this loss more precise, we shall reinterpret it.

(36) In a cluster of two sibilants, the second sibilant is lost, i.e. šs > š.

This rule, which is very tentative, accounts for the examples under (33) as well as the result of operation of our rules

(8), (22), and (23c), i.e. sx and xsx(h) clusters.

1.3.2 Nonobstruents

1.3.2.1 Liquids

Bartholomae states that Proto-Indo-Iranian has only one liquid, r, because of the merger of PIE r and l, and that later l comes into Indo-Iranian languages by borrowing from non-Indo-Iranian languages of the Indo-European family. In his explanation of the development of the liquids into Iranian, he claims that while the New and Middle Iranian languages have two liquids, l and r, Old Iranian languages have only one, i.e., r. He also cites the possibility of Indo-Iranian retaining the l in different dialects throughout language development. Nevertheless, he goes on to posit only PIIr. r r̥ r̥̄. In Proto-Iranian, r remains unchanged, but r̥[17] and r̥̄ undergo the following changes:

(37) PIIr. r̥ becomes PIr. a before r.

(38) PIIr. r̥̄ becomes PIr. ar.

1.3.2.2 Nasals

The PIIr. nasals are limited to a small number of consonantal elements. Bartholomae states that new nasalized elements are developed in Iranian as well as in Indic. The changes of PIIr. nasals include the following:

(39) PIIr. ñ becomes PIr. n.

(40) PIIr. syllabics plus nasal consonants before a fricative change into corresponding nasalized syllabics while the nasal consonants drop out, i.e. a i u r̥, etc. become PIr. ã ĩ ũ r̥̃, etc.

This means that perhaps the nasals, after nasalizing the syllabics, drop out and leave behind only nasalized syllabics.

1.3.2.3 Vowels

PIIr. syllabics remain unchanged in Proto-Iranian except for the following changes in w (< PIE u̯).

(41) PIIr. w becomes p or b when it occurs after Iranian s or z which are derived from PIIr. ś-sounds.

(42) PIIr. w drops out after Iranian f and b which are derived from PIIr. p ph b bh.

1.4 Sandhi

Bartholomae's "Geschichte der Laute" ends with a somewhat detailed description of a phonological process he calls Satzphonetik or Sandhi. This involves sound changes that occur across morpheme and word boundaries. Many of these changes have already been described before, but there are some new rules in the Proto-Indo-European, Proto-Indo-Iranian, and Proto-Iranian stages whose effects are related directly to the different Iranian languages. From the standpoint of the sound inventories for each stage, these

changes produce only two new sounds, $\underline{t}$ and $\underline{x^w}$, by Proto-Iranian times (see rules 52 and 56).

Bartholomae's major sandhi rules are enumerated below, as well as a few additional rules that I believe should have been classified in this section.

1.4.1 Proto-Indo-European

PIE sandhi's effects on Iranian languages are represented by the following:

(43) PIE $\underline{s}$ is lost when it is added to a final $\underline{s}$ or $\underline{š}$.
PIE keis+s > *keis > coiš 'thou promisest'

This rule involves a possible assimilation as well as a loss of one of two identical segments (for further discussion see page 195).

(44) A stop or an $\underline{x}$-sound is lost when appearing sentence initially before a stop.

This rule was posited on the simultaneous occurrence of LAv. $\underline{tū^{i}ryo}$ and $\underline{axtū^{i}rīm}$, GAv. $\underline{tā}$ and $\underline{p^{a}tā}$, and LAv. $\underline{pita}$.[18]

(45) PIE obstruent (clusters) becomes voiceless sentence finally (cf. rules 2 and 3).
PIE dhruks > LAv. druxš 'demon' while PIE dhugh+es > LAv. druǰō.

(46) A PIE nonobstruent becomes:

a) a consonant when preceded by a consonant and followed by a syllabic, and

b) a syllabic and a related consonant when followed by a cluster of two consonants.

(47) PIE nonobstruents are lost when preceded by long vowels in a closed syllable.

The result of the partial operation of rule (47) is explained in the sections dealing with the nasals and liquids (cf. 1.2.3.2 and 1.3.2.1). The environment in which this general rule operates is not very clear. It might have been operative in Proto-Indo-Iranian times.

1.4.2 Proto-Indo-Iranian

The above IE sound change continues to operate throughout the development of Proto-Indo-Iranian. The only new sound changes have to do with morpheme final units.

(48) PIIr. t is lost after n.
PIE bheront > LAv. barəṇ 'they carry'

(49) Final PIIr. s is lost after syllabic a and before a voiced sound. (This loss is accompanied by some compensatory changes in the syllabic a.)
LAv. yō nō daδa : Skt. yé nō dadhā́u
LAv. yas(ə)te : GAv. yastə̄m : Skt. yás tē,

yás tám.

The number of consonants that are found word finally in Proto-Indo-Iranian is very small. They are:

(50) Consonants: r m n t š (ç)[19]

(51) Clusters of two or three consonants each having as their final unit s, š, or t.

The absence of the other PIIr. consonants perhaps seemed to Bartholomae to be a matter of phonetic structure of words, (phonotactics), and for this reason it could be assumed he did not mention this fact in the PIIr. sandhi rules.

1.4.3 Proto-Iranian

Bartholomae postulates a number of sandhi rules for the Proto-Iranian language. Among the most important of these are as follows:

(52) PIr. word initial h (< PIE *s) is lost when followed by m or r.

LAv. mahi ; Skt. smasi 'we are'

LAv. ruždi ; OP rautah ; Skt. srótas 'river'

(53) PIr. initial cluster dw (< PIE dhu̯ du̯) becomes b.

LAv. ba ; Skt. due 'two'

(54) PIr. initial cluster hw (< PIIr. sw) becomes x^w (labialized voiceless velar). This x^w sound

later changes to f in Old Persian.

Solely on the basis of this f, Bartholomae posits for Proto-Iranian a x^w sound coexistent with the cluster hw. It is comparable to Lt. f in formus, Skt. gharmas, which can be traced through x^w and kh from gh.

(55) PIr. sentence initial sy (< PIIr. $\overset{\downarrow}{s}y$ $\overset{\downarrow}{s}hy$) and $\overset{\downarrow}{s}y$ (< PIE ky khy) lose their y.

LAv. saēnō ; Skt. syenas 'eagle'

LAv. samahe ; Skt. syamas 'black'

In Proto-Iranian, where the common Indo-Iranian final consonants seem to be preserved very closely, only a few changes are found.

(56) Final t becomes fricative $\underset{\sim}{t}$ in Proto-Iranian.

This fricative $\underset{\sim}{t}$ is different from PIr. θ. In Avestan one finds a special sign for this $\underset{\sim}{t}$, ( ), which phonetically is described as representing both a voiced and voiceless fricative very similar to Av. θ and $\overset{\times}{\delta}$. The status of this PIr. $\underset{\sim}{t}$ is not very clear. While it is not listed in the columns of correspondances (Bartholomae, 1894:45-47) to demonstrate its exact origin, it is listed in the inventory of PIr. sounds under the label sibilant along with θ (Bartholomae, 1894:47-48). Its occurrence is limited to final position.

Examples:

Av. barat̰ 'he carries', staot̰ 'he praised'

Skt. bhárat̰ 'he carries', staut̰ 'he praised'.

The changes of consonant clusters in Proto-Iranian are few.

(57) Final t̰ was lost after an s̰ preceded by a vowel.

PIIr. *āst > LAv. ās 'he was'

(58) Final s̰ was lost after an n̰ preceded by a vowel.

PIIr. *dans > LAv. dəng 'houses'

PIIr. *yáns > GAv. yəng LAv. yą 'which'

1.5 Summary

In this section I will summarize the major sound changes that, according to Bartholomae, affected the PIIr. sounds to produce PIr. sounds. I will present an inventory of the PIr. sounds in a semiphonetic chart similar to those for Proto-Indo-European and Proto-Indo-Iranian. A comparison of this PIr. consonant chart with the chart of the previous stage of the language, that is, Proto-Indo-Iranian (page 17), will reveal the following changes:

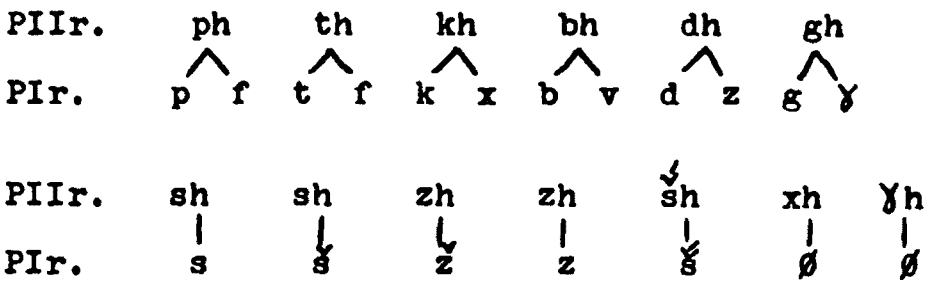
a. Changes in the manner of articulation:

1. PIIr. aspirated obstruents lose their aspiration and in Proto-Iranian become either simple obstruents or fricatives:

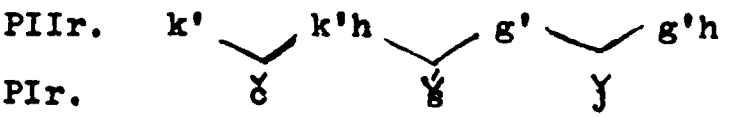
CHART 3

PROTO-IRANIAN PHONETIC CHART
RELEVANT SOUNDS ABSTRACTED FROM BARTHOLOMAE

			Labial	Inter-dental	Dental	Pala-tal	Velar	Velar Lab.
Obstruents	Stops	Vl.	p		t	č	k	
		Vd.	b		d	ǰ	g	
	Fricatives	Vl.	f	θ t̰	s š	ś	x	x^w
		Vd.	v		z ž			
Sonorants	Nasals		m		n			
	Resonants		w		r	y		h
	Syl.	Nas.	$u_{\subset}$		$r_{\subset}$	$i_{\subset}$		
		Vow.	u		r̥	i		



ii. PIIr. palatal stops become either affricates or fricatives:



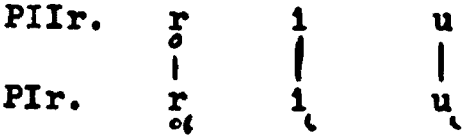
Bartholomae does not include the logical counterpart of s̈ (i.e. z̈) because of the absence of attested forms.

iii. PIIr. dental s changes to what I call a resonant h. When this h appears before a w, it changes to a labialized voiceless velar fricative x^w.

PIIr. s > PIr. h

PIr. hw > PIr. x^w

iv. In certain environments PIIr. syllabics become nasalized.



b. Changes in place of articulation:

1. PIIr. voiced interdental fricative ð̈ becomes

dental:

PIIr. $\underline{\overset{\times}{\delta}}$ > PIr. $\underline{z}$

ii. PIIr. palatal nasal becomes dental:

PIIr. $\underline{\tilde{n}}$ > PIr. $\underline{n}$

iii. PIIr. voiced palatal fricative $\underline{z}$ becomes dental while losing its voicing:

PIIr. $\underline{\overset{\vee}{z}}$ > PIr. $\underline{\overset{\times}{s}}$

This inventory of PIr. consonants differs from those of other scholars. In part these differences are due to the fact that Bartholomae traces the development of the phonetic reflexes of the PIE sounds, while other scholars employ other methodology. The exact nature of these differences between Bartholomae and his competitors will be discussed as I later survey these other treatments of the subject matter.

CHAPTER 1

FOOTNOTES

[1]For the sake of clarity, I will refer to this stage of the language as Proto-Indo-European since Bartholomae seems to consider it as a unified language.

[2]Bartholomae's definition of Gerauschlaute conforms to that of "obstruent" of the generative phonologists. In this study the term "obstruent" is used in distinction to "consonant ," which includes all sounds that function as consonants, namely segments with the following specifications: [+obstruent, +consonantal].

[3]In the transcription used here, y will be used as a consonantal sound traditionally transcribed with i̯.

[4]In this study the terms "k-sounds" and "k-series" are used interchangeably for the purpose of referring to the class of k kh g gh sounds. The same convention holds for other sounds, that is, "s-sounds" refer to s sh z zh, "p-sounds" refer to p ph b bh, and so forth.

[5]Bartholomae refers to PIE s̆-sounds as dental sibilants, the same phonetic term with which he characterizes the PIE s-sounds. Except for the implicit etymological factors, he does not explain why such identical phonetic sounds are symbolized differently. The absence of phonetic differentiating criteria for PIE s- and s̆-sounds makes Bartholomae's description confusing.

[6]In this study, reconstructed forms that are identified by a preceding title indicating the linguistic stage will not be marked by an asterisk (*).

[7]In accordance with the convention stated in footnote 4, s- and s̆-sounds represent the four different members of each particular class.

[8]Even though l was borrowed into Proto-Indo-Iranian, Bartholomae does not include it in his list of PIIr. sounds.

[9]One major deviation of this study from the tradi-

tional practice of Iranists is the modernization of the symbols for the labial fricative v (a counterpart of f) and the labial semivowel w. In the literature, the former is symbolized as w and the latter as v, a practice which is unfamiliar to a student of general linguistics.

[10]The environment in which ś and ź (from PIE x-sounds) could appear at this stage excludes places before sibilants (rule 8) and before stops (rule 6). But ś and ź could occur only before nonobstruents--i.e. vowels, liquids, nasals, and glides--and before pauses. Other PIr. ś and ź sounds are derived from PIE k-sounds through rule (20).

[11]Bartholomae describes the loss of aspiration for ś-sound in a separate statement from that for the s-sound. Here they are described together. The subsequent changes of sibilants depend upon the application of rule (25).

[12]s-sounds and ś-sounds henceforth refer to the output of rule (25), namely, s z and ś ź. The same is true for all series that lose their aspiration.

[13]PIE ś-sounds appear only after PIE k- and x-series; thus the s from PIE ś (rule 26) has a very limited distribution.

[14]This PIr. ś, according to rule (27), can only appear after p and b. In order for rule (30) to operate, p and b must change to f, perhaps by rules (3) and (15).

[15]Bartholomae's term "strong consonant cluster" is replaced in Reichelt's Awestisches Elementarbuch by "clusters of three or more consonants."

[16]Reichelt (1909:36) adds dh to this list while omitting examples for k.

[17]In individual languages--perhaps with the exception of Old Persian which could have an r--the PIIr. r corresponds to short vowel plus r (v+r) or an r plus a short vowel (r+v).

[18]The abbreviations used here have the following values: Av. = Avestan, GAv. = Gatha Avestan, and LAv. = Late Avestan (cf. Chapter Two, section 1).

[19]The ç stands for a hypothetical sound, intermediate between s and h, and which is lost in Proto-Iranian. The ç will be excluded from our discussion because Bartholomae's description of it is unclear. He does not list it either in

his columns of correspondences as a Proto-Iranian unit or in his inventory of PIr. sounds. In terms of this study, the exclusion of ǧ will have no consequence.

CHAPTER 2

BARTHOLOMAE CONTINUED

2.1 Introduction

In "Awestasprache und Altpersisch," his second study in Grundriss der Iranischen Philologie, Bartholomae presents parallel descriptions of Avestan and Old Persian as direct descendents of Uriranish, the stage of language development with which he concludes his first study.

Avestan is the language of the Avesta, the holy books of the Zoroastrians. It shows two distinct stages of development. The most ancient part is written in the so-called "Gatha Avestan" language. This part includes the seventeen songs, the "Yasna Haptanghaiti," believed to be composed by Zarathustra, and some holy prayers. The less ancient part is written in the so-called "Young Avestan" language. This part of the Avesta includes writings which come to us from various later times and places.[1]

Old Persian refers to the language of the cuneiform inscriptions of the Achaemenians. They are usually accompanied by Elamite and Akkadian translations. Some of the Old Persian inscriptions of Darius I and Xerxes I also show some elements borrowed from Median.

A major task of any scholar dealing with written

records of a language no longer spoken is to assign correct phonological values to the observably different written symbols. The extent of his accuracy in this task determines the degree of correctness of any phonological description of the language as it was once actually spoken. The study of any written records involves at least two basic questions: (a) How systematically did the writing system represent the sound system of the language? and (b) How can the relationship between the available written records and the phonological system of the language it represents be discovered by the linguist?[2]

2.2 Writing system

Bartholomae in his study "Awestasprache und Altpersisch" deals with two different types of writing systems. The Avestan writing system has forty-nine letters and three ligatures. These characters which are employed in both Gatha and Late Avestan are written from right to left and include fourteen vowel signs and thirty-eight consonant signs.

The Old Persian inscriptions are in cuneiform. The script includes thirty-six characters, three of which represent the vowels i u a and the rest, syllables, that is, combinations of a consonant plus a vowel.

While Bartholomae emphasizes the importance of the

correct understanding of the writing systems of Avestan and Old Persian, he indicates that much is unknown about Old Persian writing because of the limited number of texts available. When the text is obscure or when multiple interpretations are possible, Bartholomae determines the phonological transliteration of words with the aid of grammatical and etymological clues.

Bartholomae's main goal in this study is to describe the changes that affected the sounds and forms of the Proto-Iranian linguistic data which he postulated in the previous study and which developed into Avestan and Old Persian. In this survey I will deal only with the consonants, avoiding discussion of orthography as much as possible.

2.3 Avestan and Old Persian consonants

Bartholomae's description of the sound changes with which this study is concerned deals only with the changes that affected the Proto-Iranian reflexes of PIE and PIIr. sounds. It does not deal with the PIr. sounds which appear unchanged in Old Persian and Avestan. In this chapter the rules will conform to Bartholomae's format, but the examples are taken from a variety of sources. They are arranged in such a way in order to illustrate all the earlier sources from which OP and Av. sounds are derived. For this reason, each group of examples will be identified, whenever possible,

by two series of rules. Each series is marked first by the number of the chapter in which the change is described which is then followed by the number of the rule which describes the change in that chapter. For example, "1(12, 15b)" means "Chapter One, rules (12) and (15b)" and "2(1b, 5ac)" means "Chapter Two, rules (1b), (5a), and (5c)."

In many instances the PIr. sounds have more than one reflex in Avestan, one in Gatha Avestan and one in Late Avestan. Considering that the magnitude of the difference between Gatha Avestan and Late Avestan is comparable to that between Avestan and Old Persian, it is unclear why Bartholomae does not posit three descendent languages--Gatha Avestan, Late Avestan, and Old Persian--from Proto-Iranian, rather than the two--Avestan and Old Persian. Furthermore, if Late Avestan is of more recent origin, one would presume that it might be derived from the older Gatha Avestan. But Bartholomae does not draw this conclusion. In fact, his rules, as will be seen shortly, derive Late Avestan and Gatha Avestan (wherever they are different) directly from Proto-Iranian just as they do Old Persian. The survey in the following sections, however, does not deviate from Bartholomae's study.

In the description, the examples following each class of sounds are presented in order to demonstrate the changes that each consonantal sound has undergone between Proto-Indo-

European and the particular language. The correctness of the vowels is not vouched for and the length is not marked at all.

2.3.1 Stops and affricates

PIr. stops and affricates are reflexes of PIE and PIIr. aspirated and unaspirated stops. The only exception is PIr. p b from PIIr. w (Chapter 1, rule 41).

2.3.1.1 Avestan

(1) a. PIr. voiceless stops and affricates p t č k remain unchanged in Avestan, except

b. t in rt cluster at times changes to š-sound.

(2) a. PIr. voiced stops and affricates b d j g remain unchanged in Gatha Avestan, but

b. in Late Avestan they become voiced fricatives v^{3} β δ ž γ in word medial position.

c. Also, LAv. g becomes γ word initially before a nasal, but

d. it is lost after a vowel and before w or ŋ.

e. Otherwise, b d j g remain unchanged in Late Avestan when they occur after nasals, sibilants, and in sentence initial positions.

2.3.1.2 Old Persian

(3) PIr. voiced and voiceless stops and affricates

remain unchanged in Old Persian.

2.3.1.3 Examples

Examples for 1(15b,18) and 2(1a,3):[4]

(PIE p ph > PIIr. p ph >) PIr. p > OP p : Av. p

PIE	OP	GAv.	LAv.	
pəter	pita-	pita		'father'
apo	apa-	apa-		'away'
spax-		spas-		'spy'

(PIE u̯ > PIIr. w >) PIr. p > OP p[5] : Av. p

u̯ixu̯o-	vispa	vispa		'all'
exu̯os	aspa-	aspo		'horse'

(PIE t th > PIIr. t th >) PIr. t > OP t : Av. t

tu̯om	tuwam	twəm	tum	'you'
eti	atiy	aiti		'beyond'
kr̥ta-	karta-	kərəta-		'made'
esti	astiy	asti		'is'
stha-	sta-	sta-		'stand'

(PIE k' kh > PIIr. k kh >) PIr. č > OP č : Av. č

k'i̯id[2]	(kʷid)	čiy	čit	'what'
ke	(kʷe)	-ča	-ča	'and'

(PIE k kh > PIIr. k kh >) PIr. k > OP k : Av. k

kos	(kʷos)	kas	kat	'who'

The aspirated voiceless stops appear only in the Indo-Iranian branch of the Indo-European languages, and, even there, very few of them can be proved to be Proto-Indo-European with any certainty. Bartholomae, along with many other Indo-Europeanists, posits them for Proto-Indo-European, but it is very difficult to find solid examples, even in Indo-Iranian.

Examples for 2(1b):

PIE	OP	GAv.	LAv.	
r̥ta-	arta-	aša-		'justice'
mort-io-	martiya-	mašya-, also marəta		'man'

Rule (2b) does not always apply, which results in the presence of alternate forms: mašya- and marəta- (see page 199ff.).

Examples for 1(16,17) and 2(2ae,3):

(PIE b bh > PIIr. b bh >) PIr. b > OP b : Av. b

bhendh-	band-	band-	band-	'bind, tie'
bhrate	brata-	brata-	bratar	'brother'

(PIE u̯ > PIIr. w >) PIr. b > OP b : Av. b

xhu-	zba-	zba-	zba-	'proclaim'

There are no sure examples of IE b before the application of Grassmann's law.

(PIE d dh > PIIr. d dh >) PIr. d > OP d : Av. d

PIE	OP	GAv.	LAv.	
dus-	duš-	duš-	duš-	'ill, evil'
u̯ind-	windafarna (PN)	wind-	wind-	'find'
aδda-	azda-	azda-	azda-	'known'

(PIE g' g'h > PIIr. g' g'h >) PIr. ǰ > OP ǰ : Av. ǰ

g'iu̯- (g^{w}iu̯-)	ǰiw-	ǰiwai	ǰiwa	'live'
ghen- (g^{w}hen-)	ǰan-	ǰan-	ǰan-	'kill'
tuaŋǰh+sk-			θvaz̥ǰo-	'become oppressed'

(PIE g gh > PIIr. g gh >) PIr. g > OP g : Av. g

gu̯o- (g^{w}o-)	gaw-	gau-	gaw-	'cow'
		zgad-	zgaθ-	'swim away'
gem- (g^{w}em)	gam-	gam-	gam-	'come'

Examples for 1(16,17) and 2(2b,3):

(PIE b bh > PIIr. b bh >) PIr. b > OP b : GAv. b : LAv. w

obhi-	abhiy	aibi	aiwi	'to'
ap+bhis > abbhis	abis	aibyo	aiwyo	'water'

(PIE d dh > PIIr. d dh >)PIr. d > OP d : GAv. d : LAv. δ

ped-	pada-	pada-	paδd-	'foot'
e-dhe-	ada-	ada-	aδa-	'he creates'

(PIE g gh > PIIr. g gh >)PIr. g > OP g : GAv. g : LAv. ɣ

PIE	OP	GAv.	LAv.	
dl̥gho-	darga-	darəga-	darəɣa-	'long'
bhago-	baga-	baga-	baɣa-	'god, lord'

Examples for 2(2c):

(PIE g gh > PIIr. g gh >) PIr. g > OP g : GAv. g : LAv. ɣ

gəna-	ɣna-		'girl'

Examples for 2(2d):

(PIE g gh > PIIr. g gh >) PIr. g > OP g : GAv. g : LAv. ǵ

dhrougho-	drauga-	drəgwa-	drwa-	
	Margam		mourum	proper name

2.3.2 Fricatives

PIr. fricatives are reflexes of PIE and PIIr. stops and fricatives. Each of these PIr. sounds comes from various sources, and I shall attempt to show each source with at least one example. The development of the fricatives is one of the most complex areas of PIr. phonology and Bartholomae's description is in general unclear. I shall follow his outline as much as possible and allow for subsequent comments and criticism.

2.3.2.1 Avestan

(4) PIr. fricatives v ɣ x x^w š ž š̌ θ remain unchanged, although the graphic difference between PIr. š š̌ š

(from PIr. rt, rule 1b) is obliterated in the Avestan writing system.

(5) a. PIr. f remains unchanged, except

b. it changes to v, a voiced fricative, when it occurs after θ, and

c. it changes to a p if it occurs before t.

(6) a. PIr. θ remains unchanged, except

b. it becomes voiced $\overset{x}{\text{ð}}$ when occurring after f or x.

(7) a. While PIr. z remains unchanged in Gàtha Avestan,

b. in Late Avestan it becomes voiceless s before m.

(8) a. PIr. s remains unchanged, but

b. at times in Late Avestan it changes to θ when occurring before vowels or r.

(9) a. PIr. h remains unchanged in Avestan, but

b. at times it changes to an ŋh cluster, and

c. very rarely before y it becomes h'.

2.3.2.2 Old Persian

(10) PIr. v ɣ x^w do not appear in Old Persian.

(11) PIr. f x $\overset{x}{\text{s}}$ remain unchanged.

(12) PIr. $\overset{x}{\text{s}}$ changes to $\overset{x}{\text{s}}$.

(13) a. PIr. θ remains unchanged, except

b. it becomes <u>c</u> in a <u>θr</u> cluster with a subsequent loss of <u>r</u>, and

c. it becomes <u>š</u> when it occurs before <u>y</u>.

(14) a. PIr. <u>z</u> remains unchanged before voiced stops, but

b. it alternates with a <u>d</u> before syllabics.

(15) a. PIr. <u>s</u> remains unchanged before nasals and voiceless stops; elsewhere

b. it changes to <u>š</u> when it occurs before <u>č</u>; otherwise

c. it alternates with <u>θ</u>.

(16) a. PIr. <u>h</u> remains unchanged, except

b. it is lost when it occurs before <u>m</u>.

In the above rules it is important to notice that the phrase "at times" in rules such as (8b) and (9b) refers to the absence of any environmental or other conditioning factors under which the purported sound change takes place. Bartholomae generally attributes some of these changes (8b and 14b) to be the results of dialect mixture--a phenomenon that is not explicitly described in his study. Sometimes he refers to other possible explanations. For example, in a footnote he describes <u>θ</u>, the output of (8b), as an intermediate sound in the change of <u>s</u> to <u>h</u>, which also occurs in later stages of Iranian languages.

In the earlier study (Bartholomae, 1894) Bartholomae did not describe the phonetic value of most of the sounds discussed in the earlier stages of language development. In the present study, which deals with historically attested data, the phonetic values of different letters and graphs are explained mostly by comparing them to his contemporary European languages. There are a number of ambiguities in Bartholomae's phonetic specification--especially for Av. š š́ š̀, rule (4)--which are claimed to be pronounced differently. He also makes a distinction between the pronunciation of Av. s in asti and in masya (from PIIr. *matsya, 1(19)). The latter s in masya is claimed to be longer. This claim seems to be unwarranted since the majority of Av. s sounds are derived from sources other than PIE s. Some of these ambiguities are dealt with in Morgenstierne (1942a) with a great deal of success.

There is an alternation between Av. s (from the PIE x-sound, rule (8)) and θ, and OP z and d (rule 14). Bartholomae considers this OP d to be phonetically pronounced as [ð]. Rule (10) deals with v γ x^w, which are the output of 1(17,48). The absence of these sounds in Old Persian can be explained in two ways. Either they are not present in Proto-Iranian times, in which case their reflexes in Old Persian should be the sounds to which 1(17,52) apply; or the limitation on the amount of Old Persian text could be responsible

for their absence. As a matter of fact, the former reason seems to be the correct answer (see 3.5 for further discussion).

2.3.2.3 Examples

Examples for 1(17) and 2(4,10):

(PIE b > PIIr. b >) PIr. v > OP β : Av. v

PIE	PIIr.	OP	GAv.	LAv.	
	dibzha-		divžaidyai		'he deceits'

(PIE g > PIIr. g >) PIr. ɣ > OP : Av. ɣ

	augža-		aoɣža-		'thou sayst'

The above examples are the only ones available for PIr. v and ɣ.

(PIE su > PIIr. sw >) PIr. hw > OP f[6] : Av. x^w

suel-nos		x^warnah		'royal splendor'
	windafarna	windix^warnə		proper noun

(PIE s > PIIr. s >) PIr. š > OP - : Av. s

ap-s		afš-		'water'
	psarmas		fšarəmat	'shame'
			drafšo	'flag'
	nap(t)-su-		nafšu	'descendent'

(PIE s > PIIr. š >) PIr. š > OP š : Av. š

PIE	OP	GAv.	LAv.	
xeus	dauštа-	zuštа-	zaoštа-	'friend'
sed- s	hadiš-	hadiš-		'seat'
dhrs-	darš-	dərəš-		'dare'
kex-s-	čašam	čašman		'eye'
aug-s	uvaxš-	uxš-		'grow'

(PIE š šh > PIIr. š šh >) PIr. š > OP š : Av. š

texš-	us-tašana 'staircase'		tašan	'he has erected'
kšei-	xšay-		xša(y)-	'rule'

(PIE x > PIIr. š́ >) PIr. š OP š : Av. š

uex-	wašna-	wašna-	wašna-	'favor, will'
		frašno		'question'
	fšuma-			'shepherd'

(PIE ɣ ɣh > PIIr. ž žh >) PIr. š > OP š : Av. š

ɣno-	xšna-	xšna-		'to know'
ɣhn-	baršan-	barəza- ~ barəšn-		'mountain height'

(PIE x xh > PIIr. š šh >) PIr. š > OP š : Av. š

oxta-			ašta	'eight'

(PIE k' k'h > PIIr. k' k'h >) PIr. š > OP š : Av. š

k'ieu-	šiyaw-	šyaw-	šaw-	'set forth'
sak'hi-			haše	'friend'

(PIE z, zh > PIIr. z zh >) PIr. ž > OP : Av. ž

PIE	PIIr.	OP	GAv.	LAv.	
	abzdh-			avžd̥ata-	'lying in the water'
	dibzha-		divžaidyai		'to cheat'

(PIE z zh > PIIr. ž žh >) PIr. ž > OP : Av. ž

	i̯užam		yužəm	'you'
			dužda-	'thief'
			muždəm	'wage'

(PIE ž žh > PIIr. ž žh >) PIr. ž > OP : Av. ž

	augžh-	aoγža	'thou sayst'
	u̯aγžhat-	uzwažat̰	'abduct'

(PIE γ > PIIr. ž >) PIr. ž > OP : LAv. ž

	mr̥γd-		məržd̥ikəm	'favor'

Examples for 1(15,18) and 2(4,11):

(PIE k kh > PIIr. k kh >) PIr. x > OP x : Av. x

	xraθu-	xrataw-		'wisdom'
	θuxra- (PN)	suxra-		'red'
ksei-	xšay-	xša-		'rule'

Examples for 1(15,18) and 2(5a,11):

(PIE p ph > PIIr. p ph >) PIr. f > OP f : Av. f

pro-	fra-	fra-		'before'

PIE	PIIr.	OP	GAv.	LAv.	
kouphos		kaufa-	kaofa-		'mountain'
			drafšo		'flag'

Examples for 2(5b):

(PIE p ph > PIIr. p ph >) PIr. f > OP : LAv. v

	atpi̯as		aθvyo	proper noun

This is the only example available. In his Handbuch, Bartholomae (1893) defines the environment for this change to be after θ and before i.

Examples for 2(5c):

(PIE p > PIIr. p >) PIr. f > OP : Av. p

septm̥	hafta-		hapta-	'seven'
			suptim	'shoulder'

Bartholomae mentions the presence of a few words with an ft cluster which he assumes to be the more archaic forms--LAv. gərəftəm, matafto ... (cf. Morgenstierne, 1942a:70).

Examples for 1(15,18) and 2(6a,13a):

(PIE t th > PIIr. t th >) PIr. θ > OP θ : Av. θ

tu̯e-m	θuwam	θvą̇m		'thou'
pn̥thi-	paθi-	paθa-		'path'
i̯o-tha-	yaθa-	yoθa-		'who'

Examples for 2(6b):

(PIE t th > PIIr. t th >) PIr. θ > OP : LAv. ϑ

PIE	PIr.	OP	GAv.	LAv.	
	uxθa-			uxϑa-	'saying'
	puxθa-			puxϑa-	'fifth'
	fəθro			fəϑro-	'father'
	waxθva-			waxϑva-	'to be said'

Examples for 2(6a,13b):

(PIE t th > PIIr. t th >) PIr. θ > OP c : Av. θ

tritiio-	θrit-	citiya-	θritya-		'third'
putlo-	puθra-	puca-	puθra-		'son'
pətr-os-		pic-	piθro-		'father' (gen.)

Examples for 2(6a,13c):

(PIE t th > PIIr. t th >) PIr. θ > OP š : Av. θ

sn̥t-io-	hašiya-	haiθya-	'true'
u-mr̥tiu-	uwumaršiya-	mərəθyu-	'having self death'
	arašn-	arəθna-	'cubit' (duel)

Examples for 2(7a):

(PIE z > PIIr. z >) PIr. z > GAv. z : LAv. z

	uwarazmiš	warədusme	'soft ground'

PIE	PIIr.	OP	GAv.	LAv.	
			urwazəma-	urwasma-	'blessed-ness'
			izmah	aesməm	'firewood'

Examples for 1(10,24) and 2(14a):

(PIE $\underline{\text{ð}}$ > PIIr. $\underline{\text{ð}}$ >) PIr. $\underline{\text{z}}$ > OP $\underline{\text{z}}$: Av. $\underline{\text{z}}$

	aδda-	azda-	azda-	'known'
	maδda-	mazda-	mazda-	'wise'

Examples for 1(7,8,22,23c) and 2(14b):

(PIE $\underline{\text{ǰ}}$ $\underline{\text{ǰh}}$ > PIIr. $\underline{\text{z}}$ $\underline{\text{z}}$ >) PIr. $\underline{\text{z}}$ > OP $\underline{\text{z}}$~$\underline{\text{d}}$: Av. $\underline{\text{z}}$

ǰreiˆos	draya-	zrayo	'see'
eǰhom-	adam	azəm	'I'
ǰhosto-	dasta-	zasta-	'hand'

This $\underline{\text{d}}$ according to Bartholomae is phonetically $\underline{\text{ð}}$.

Examples for 1(7,8,24,28) and 2(8a,15a):

(PIE $\underline{\text{s}}$ > PIIr. $\underline{\text{s}}$ >) PIr. $\underline{\text{s}}$ > OP $\underline{\text{s}}$: Av. $\underline{\text{s}}$

esti		astiy	asti	'is'
ǰhosto-		dasta-	zasta-	'hand'

PIE $\underline{\theta}$ > PIIr. $\underline{\text{s}}$ >) PIr. $\underline{\text{s}}$ > OP : Av. $\underline{\text{s}}$

		woista-	'you know'
		čistiš	'inspection' (understanding)

(PIE x xh > PIIr. s sh >) PIr. s > OP s : Av. s

PIE	OP	GAv.	LAv.	
axmon	asmanam	asman-		'sky'
uex-i	wasiy-			'at will, greatly'
exui-	asa~aspa-	aspa-		'house'

Examples for 2(8b):

(PIE x > PIIr. š) PIr. s > OP θ : LAv. θ

xuro-	θura-	sura-	aivi-θuro	'victorious'
			θraotah	'flowing'
			θraxtay~ sraxtay-	'corner, side'

Bartholomae states that the above can be due to scribal mistakes. For a phonetic explanation of the change of s to θ, see page 50.

Examples for 2(15b):

(PIE s > PIIr. s >) PIr. s > OP š : Av. š

kas-	kaščiy	kaseit~

Examples for 1(8,22,23c) and 2(8a,15c):

(PIE x xh > PIr. s sh >) PIr. s > OP s~θ : Av. s

uix-	wiθ-	wis-	'house'
max-	maθišta-	masišta-	'longest'
ax-	asan~ aθanga-	asənga-	'stone'

PIE	PIIr.	OP	GAv.	LAv.	
xmto-		θata-	satəm		'hundred'
xhad-		θada-	suxᵛa-		'appear, seem'

Examples for 1(29) and 2(9a,16a):

(PIE s > PIIr. s >) PIr. h > OP h : Av. h

sed-əs		hadiš	hadiš		'sent'
as-		ah-	ah-		'throw'
	saina-	haina-	haena-		'army'

Examples for 1(29) and 2(9b,16a):

(PIE s > PIIr. s >) PIr. h > OP h : Av. ŋh

as-		ahatiy	aŋhaiti		'he shall be'
			aŋhan		'mouth'

Examples for 1(29) and 2(9c,16a):

(PIE s > PIIr. s >) PIr. h > OP h : Av. h'

		dahyu-	dah'yu-	dah'yu daiŋhu-	'land'
			ah'ya- ahya-	ahe-	'certainly'
			h'yaṯ	hyaṯ	'sit'

The alternation of PIr. h in Avestan is much more complicated than appears from rule (9abc). The changes involved are not of much importance here, and they might have to do with factors such as the orthography of Avestan. I

shall discuss this matter later (cf. Morgenstierne, 1942a: 62ff.).

Examples for 2(16b):

PIE	OP	GAv.	
esmi	ami	ahmi	'I am'

2.3.3 Liquids

The PIr. r̲ r̲̊ r̲̄ r̲̄̊ are the only reflexes of PIE liquids. The Old Persian writing system, however, has a syllabary character la, but it appears only in three non-Iranian examples (see Paper, 1958). Below are the consonantal reflexes of the PIr. liquids.

2.3.3.1 Avestan

(17) PIr. r̲ generally remains unchanged in Avestan.

(18) PIr. r̲̊ and r̲̄̊ become ə̲r̲ and ə̲r̨̲.

(19) After the application of rule (18),

a. Av. r̲ changes to hr̲ ([r̥], a voiceless sound) before p̲ and k̲, but

b. in combination with a following t̲ it forms the sound s̀ (cf. rule 2(2b)).

2.3.3.2 Old Persian

(20) a. PIr. r̲ remains unchanged in Old Persian, except

b. in combination with a preceding θ̲, it forms

a new sound ç (for examples see page 56).

(21) PIr. r̥ becomes OP ar.

PIr. r̥ in rule (20), which was derived from PIIr. r̥ (rule 1(40)), is not very clearly specified by Bartholomae. It is not mentioned how it changed in Old Persian and its Avestan evidence lacks strong support.

2.3.3.3 Examples

Examples for 1(12,32,38) and 2(17,20a):

(PIE r > PIIr. r >)PIr. r > OP r : Av. r

PIE	OP	GAv.	LAv.	
pro-	fra-	fra-		'before, forth'
enter	antar	antarə		'inside'

(PIE l > PIIr. r >) PIr. r > OP r : Av. r

leukos	rauča	raoča-		'white, light'
solu̯o-	haruwa-	haurwa-		'all'

(PIE l̥ > PIIr. r̥ >) PIr. ar > OP ar : Av. ar

dl̥gho	dargam	darəga-	darəδa-	'long'

(PIE r̥ > PIIr. r̥ >) PIr. ar > OP ar : Av. ar

pr̥uos-	paruwo- ~ paurwa-			'formerly'

Examples for 1(12) and 2(18,21a):

(PIE $\underset{\circ}{r}$ > PIIr. $\underset{\circ}{r}$ >) PIr. $\underset{\circ}{r}$ > OP ar : Av. ər

PIE	PIIr.	OP	GAv.	LAv.	
$m\underset{\circ}{r}tos$		marta-	mərəta-		'dead'
$t\underset{\circ}{r}s$-sxe-		tars-	tərəs-		'fear'

Examples for 2(18):

(PIE $\underset{\circ}{r}\,\underset{\circ}{l}$ > PIIr. $\underset{\circ}{r}$ >) PIr. $\underset{\circ}{r}$ > OP : Av. r

	$n\underset{\circ}{r}š$-	nərašˇ-	nərəušˇ-	'the men'

Examples for 2(19a):

(PIE $\underset{\circ}{l}$ > PIIr. $\underset{\circ}{r}$ >) PIr. $\underset{\circ}{r}$ > Av. ər Av. (ə)hr

$u\underset{\circ}{l}ko$-	warka-	wəhrko-		'wolf'
$k\underset{\circ}{r}p$-		kəh$\underset{\circ}{r}$p m		'body'

2.3.4 Nasals

The PIr. nasals remain almost intact in Avestan and Old Persian.

2.3.4.1 Avestan

(22) a. PIr. nasals remain unchanged, except

b. PIr. m becomes Av. n when occurring after a long vowel and before an r.

c. PIr. ŋ becomes Av. n before an Av. g which is derived from earlier Av. gw.

2.3.4.2 Old Persian

(23) a. PIr. nasals remain unchanged, except

b. they do not appear before OP consonants.

Although no Old Persian text shows an example of a nasal before a consonant, most Iranists transcribe preconsonantal nasals where etymologically correct. All Iranists consider the absence of such nasals or traces of them in other shapes to be due to orthographic conventions. It should also be noticed that there is no sign for Bartholomae's OP ŋ in the orthography.

2.3.4.3 Examples

Examples for 1(39) and 2(22a,23):

(PIE m n > PIIr. m n >) PIr. m n > OP m n : Av. m n

PIE	PIIr.	OP	GAv.	LAv.	
me-		ma-	ma-		'not'
somo-		hama-	hama-		'some'
eǰhom		adam	azəm		'I'
nomn-		nama-	nama-		'name'
xno-		xšna-	xšna-		'learn, know'

Examples for 2(22b):

(PIE m > PIIr. m >) PIr. m Av. n

dhuamr-		dwąnaraya-	'the gloom'

Examples for 2(22c):

(PIE $\underline{\eta}$ > PIIr. $\underline{\eta}$ >) PIr. $\underline{\eta}$ > Av. $\underline{n}$

PIIr.	PIr.	Skt.	LAv.	
	θaŋgwar		θanwarə	'bow'

(PIE $\underline{\eta}$ > PIIr. $\underline{\eta}$ >) PIr. $\underline{\eta}$ > Av. $\underline{\eta}$

paŋkt-		paŋtiš	paŋtaŋhum	'fifth'

2.3.5 Vowels

In keeping with Bartholomae's study, I will still describe the consonantal $\underline{y}$ and $\underline{w}$ (from IE $\underline{\hat{i}}$ and $\underline{\hat{u}}$) under the heading of vowels. However, at this stage of the language, the occurrence of the consonantal unit has been specified by the changes that occurred in Proto-Indo-Iranian times and seen through rule 1(46). This section is included for the sake of providing examples.

(24) PIr. $\underline{y}$ and $\underline{w}$ underwent no change in Avestan and Old Persian.

2.3.5.1 Examples

Examples for 2(24):

PIE	OP	Av.	
$\underline{\hat{i}}$a-	yad-	yaz-	'worship'
$\underline{\hat{i}}$ad-a	yada-	yada-	'where'
$\underline{\hat{y}}$re$\underline{\hat{i}}$os	drayah-	zrayah-	'sea'

PIE	OP	Av.	
uix-	wiθ-	wis-	'house'
deiuo-	daiwa-	daewa-	'demon, divinity'

2.4 Anaptyxis

Anaptyxis, the etymologically unwarranted development of a secondary vowel between two consonants, takes place in both dialects,[7] that is, Avestan and Old Persian.

2.4.1 Avestan

In Avestan, different vowels appear in different environments. Below the various consonant clusters that are affected by anaptyxis are described.

(25) A vowel appears between an r and any following consonant except y and w.[8]

The appearance of this vowel prevents the changes possible through rules 2(1b,19a). Compare the following examples with those for rules 2(1b,21), (pages 46, 62):

Rule 2(25):	Av. kərəpəm	warəkahe	marətaesu
Rule 2(19a):	Av. kəhrpəm	wəhrko	
Rule 2(1a):			mašyaesu

(26) A vowel appears after n (< PIIr. m) s z f and before r.

GAv. xrunəraṇm fsəratuš

LAv. -dwąnaraya səraošo

(27) a. A vowel appears before a nasal if it is preceded by any of the following: r z ɣ s š θ x and, in addition,

b. in Late Avestan after d g.

GAv. urwazəma usəmahi aešəmo yoiθəma

In general, anaptyctic vowels can be found between consonants of any kind. These vowels prevent some of the changes posited for Avestan from taking place. In many instances the anaptyctic vowels could be attributed to later orthographic conventions.

2.4.2 Old Persian

Anaptyxis could be attested with certainty only when the anaptyctic vowel is not a since the clusters of C+C and C+a+C cannot be distinguished from each other in the writing system. The only Old Persian evidence for anaptyxis is the following:

(28) A vowel appears after a d which is followed by ru.

OP duruva- drauga- 'firm' Skt. dhruvá-

OP aduruǰiya 'he lied' Av. druǰim 'devil'

2.5 Sandhi

2.5.1 Avestan

Bartholomae gives a detailed account of the changes that have taken place between word and morpheme boundaries. He has divided the sandhi rules into (a) changes that take place between 'independently accented words' and (b) those between non-accented morphemes and accented ones. He then discusses the changes that appear in initial, medial, and final position of each morpheme or word involved in groups (a) or (b) above. The changes that took place in type (a) forms are few:

(29) In final position, Ir. xt becomes Av. gəṯ.

PIIr. iaukt GAv. yaogəṯ

PIIr. parakt LAv. paragəṯ

The rest of the PIr. consonants (clusters) remain almost unchanged.

(30) Initially there are two cases of metathesis:

a. wr becomes rw (which later receives an epenthetic vowel to become urw).

Skt. vratám GAv. urwataiš 'according to the creed'

b. mn becomes nm.

OP amanaya 'he has waited'

LAv. mąm avi nmanaya- 'you should wait for me'

(31) PIr. d of initial dm is assimilated in Late Avestan to a corresponding dental nasal.

GAv. dəmanəm LAv. nmanəm 'house'

(32) PIr. db cluster initially becomes LAv. t̰b.

GAv. daibisənti LAv. t̰bišto

OP duwitiyam GAv. daibitim LAv. at̰bitim 'twice'

(33) At times an etymologically unwarranted t̰ and ϑ̰ appear before k and b respectively.

GAv. t̰kaeso LAv. t̰kaeso 'promise

LAv. fra-ϑ̰baoye, wiϑ̰baoye Skt. bhavati

Avestan has one other peculiarity with regards to the PIr. š̌ and š̌w. At the boundaries of compound or reduplicated words one finds numerous cases of š̌h and š̌x^{w} sounds in place of or along with the PIr. š̌ and š̌w. However, the š̌ is usually separated by a period (.) from h and x^{w}.

PIE	PIr.	GAv.	LAv.	
su-sakha-	hušaxa-	huš.haxa-		'good friends'
si-sakti-	hišaxti-		hiš.haxti-	'it follows'
su-sua-	hušwafa-		hušx^{w}afa-	'he slept'

2.5.2 Old Persian

(34) PIr. x^{w} becomes OP f initially.

OP windafarna (PN) : LAv. windix^{w}arən

(35) PIr. dm clusters lose their d and become OP m.

OP maniyam GAv. dəmanəm 'house'

(36) PIr. t becomes OP h.[9]

OP barah LAv. barat Skt. abharat 'lift up'

(37) PIr. št cluster loses its t finally and becomes OP š.

OP aiš- LAv. aiš-

The largest number of sandhi rules that Bartholomae enumerates deal with the changes in sounds that occur at boundaries of words or morphemes that are not independently accented. These sandhi rules deal with all sorts of words and enclitics standing in close relation to or combined with the neighboring word. The sound changes appear either in the last sound of the first form or in the first sound of the second form. Bartholomae considers these sounds to be in medial position.

Some of the sandhi rules account for variation in orthography. Depending upon how one views the relation between orthography and the sound system, it is possible to argue that orthographic variation represents phonetic variation and therefore can reflect phonetic change. Many of the sandhi changes are similar to changes that have occurred at an earlier time in the development of Avestan. However, the majority of the changes brought about by the sandhi rules

involve some of the most widespread and common Indo-European phonological changes, such as assimilation and reduction of geminates. It is thus possible to reduce the number of sandhi rules by incorporating them into such general rules. The sandhi rules will not be discussed any further since they are the least important part of Bartholomae's contribution.

2.6 Conclusion

In this chapter I present Bartholomae's contrastive description of Avestan and Old Persian phonology in relation to their common Proto-Iranian source. Many PIr. sounds fall together and a few new sounds, e.g. OP ç and h', are created. On the following pages I shall present Bartholomae's postulated sounds for Avestan and Old Persian in semiphonetic charts.

CHART 4

CHART OF AVESTAN CONSONANTS
RELEVANT SOUNDS ABSTRACTED FROM BARTHOLOMAE

	Labial	Inter-dental	Dental		Pala-tal		Velar	
Obstruents								
Stops	p		t				k	
	b		d				g	
Affricates						č		
						ǰ		
Fricatives	f						x	x^w
	v							
Sibilants		θ t̰	s	š	ṣ	ś		
		(d̰)	z	ž		(ź)		
Nonobstruents								
Liquids			r	ṛ	r̰			
Nasals	m		n		ñ		ŋ	
Glides	w				y	h'	h^{10}	

CHART 5

CHART OF OLD PERSIAN CONSONANTS
RELEVANT SOUNDS ABSTRACTED FROM BARTHOLOMAE [11]

	Labial	Inter-dental	Dental	Pala-tal	Velar
Obstruents					
Stops	p		t		k
	b		d		g
Affricates				č	
				ǰ	
Fricatives	f				x
	(v)				(ɣ)
Sibilants		θ c [12]	s	š	
		(ð)	z	(ž)	
Nonobstruents					
Liquids			r l		
Nasals	m		n		ŋ
Glides	w			y	h [13]

CHAPTER 2

FOOTNOTES

[1]In order to avoid the ambiguities of the word "Young" in Young Avestan, I will substitute the term "Late Avestan." Gatha Avestan (GAv.) will then stand for the language of older texts, Late Avestan (LAv.) for the less archaic language, and Avestan (Av.) a cover term for both.

[2]For a detailed and lucid description of the relationship of Avestan orthography to its sounds, see Windfuhr, 1971.

[3]See footnote 9, Chapter 1.

[4]Many of the following examples are reconstructed with a labiovelar by the scholars who posit PIE labiovelar stop series; but as was seen before, Bartholomae does not posit them.

[5]Contrary to Bartholomae's assumption, forms with this PIr. p in Old Persian texts are proven to be Median borrowings. The PIr. p (from u) was lost in Old Persian and thus we find OP asa for the above aspa. The same thing is true for zb from *zu (for details see Gershevitch, 1964).

[6]Bartholomae deals with OP f (PIE su) in several places (see 1(54) and 2(34) for more explanation).

[7]Bartholomae refers to Avestan and Old Persian as dialects as well as languages.

[8]Bartholomae considers Av. and OP y w r and the nasal as consonants.

[9]It should be noted that in Old Persian the final h is never written. Bartholomae postulated (36) mainly on the basis of the preceding vowel.

[10]Avestan h h' are normally classified as gutturals by most Iranists. In this chart I have grouped them with glides.

[11]The parenthesized signs in Chart 4 indicate Late Avestan sounds. In Chart 5 they are sounds for which there are no orthographic signs in Old Persian.

[12]This sign represents the sound which is represented differently by various Iranists: Bartholomae θr, Meillet and Benveniste ss, and Kent ç. The adoption of c is based on typing considerations.

[13]Old Persian h is normally classified as a guttural by most Iranists. In this chart I have grouped it with glides.

CHAPTER 3

POST-BARTHOLOMAEAN SCHOLARS

3.1 Introduction

European scholars were introduced to the Old Iranian languages in the eighteenth century. The fruit of numerous scholarly investigations and the application of nineteenth century linguistic techniques to these languages appeared in Christian Bartholomae's studies in Grundriss der Iranischen Philologie, edited by Wilhelm Geiger and Ernst Kuhn (1895-1901). Bartholomae's account of the history of the Old Iranian languages (1894) and a short description and comparison of Old Persian and Avestan (1895) have been, and to a large extent still are, regarded by Iranists to be the most comprehensive and conclusive treatment. No one has since made any serious attempt to challenge his historical survey or even rewrite it, even in the face of overwhelming new data provided by recent studies and the advancement of modern linguistic techniques.

Chapters one and two of this historical survey are detailed discussions of the major points of Bartholomae's above-mentioned studies. The motivation for such a lengthy presentation of one scholar's view is the place it holds in

relation to what has since appeared. The influence of Bartholomae's studies on the field of Iranian linguistics is so immense that in many respects it shaped the scholarship of not only Iranists but Indo-Europeanists such as Brugmann (1886 and 1897). Most of the studies that have appeared since Bartholomae can, in general, be classified into two groups: (a) descriptions of individual languages, Avestan and Old Persian, and (b), the relatively large number of articles supporting or refuting and correcting some of Bartholomae's reconstructions or explaining isolated etymological subjects. The major post-Bartholomaean studies of Old Persian grammar are: W. Brandenstein and M. Mayrhofer (1964), R. G. Kent (1950, 1953), and A. Meillet and E. Benveniste (1931). Of Avestan they are: H. Reichelt (1909) and S. N. Sokolov (1967). A. Jackson (1892), though pre-Bartholomaean, was considered for a long time as the major Avestan handbook in the English-speaking community.

In the present chapter I shall discuss the contributions of post-Bartholomaean scholars to various aspects of the development of the Old Persian and Avestan consonants. In addition to the works cited in the previous paragraph, this chapter will be concerned with the following studies: Henning (1942), Meillet (1937, 1966ed.), Morgenstierne (1942b, 1945), Hamp (1952), Lehmann (1952), Hoffmann (1958), Paper (1958), Gershevitch (1964), Burrow (1965), and Miller

(1968). It will be shown how each of the above scholars reanalyzes some parts of the Old Iranian data in the light of newly discovered data or new linguistic methods and arrives at different interpretations than those of Bartholomae.

3.2 Proto Indo-European sound inventory

Bartholomae's inventory of PIE sounds contains certain unfamiliar segments for a modern reader. It has sounds such as aspirated sibilants or velar fricatives that do not appear in more recent handbooks of Indo-European phonology; it lacks sounds such as labiovelars which are accepted by many Indo-Europeanists. Although the number or the nature of PIE sounds is not the subject of this study, nevertheless the difference in underlying postulated inventories directly affects the description of the subsequent stages of the language. The number as well as the nature of sound changes also will be affected differently.

None of the Iranists whose contributions are being studied are concerned with the reconstruction of a complete PIE sound system. Most of them, for reasons of their own, choose one of the competing reconstructed systems that are available at the time and use it in whatever way they want to. Bartholomae was one such Iranist and his PIE sound inventory is one of the many available inventories of his

time. Below I shall discuss the difference between the various PIE scunds postulated by the Iranists studied here.

3.2.1 Obstruents

3.2.1.1 Stops

3.2.1.1.1 Palatals

Earlier we discussed the disagreement among Indo-Europeanists over the PIE sounds from which the satam and centum dialects were originated (cf. pages 9-10). Reichelt (1909) follows Bartholomae in accepting PIE velar fricatives to be underlying sounds for Av. s z and OP θ d. But he also makes it clear, in accordance with Brugmann's earlier view (1887:286ff.), that in Proto-Indo-European times, the language had two main dialects: one with velar stop k-series and the other with velar fricative x-series. This notion is implicit in Bartholomae, too, but none of these scholars committed himself to reconstructing an earlier series of sounds for these two dialects. Later Brugmann (1930ed:542ff.) modifies his view by claiming the stop k̂-series to be the more primitive sounds. Except for Reichelt, most post-Bartholomaean Iranists have accepted some sort of palatal stops as the original PIE sounds which produce the two major isoglosses of the early Indo-European dialects. Meillet (1937) does not accept a PIE palatal stop series at all; rather he considers them as derived elements from the

PIE velars (cf. 3.2.1.1.4 below). Most other people, such as Kent (1953), Burrow (1965), and Brandestein and Mayrhofer (1964), postulate a $\hat{k}$-series for the Proto-Indo European stage. These people are then forced not to postulate any secondary PIE palatal series of sounds comparable to Bartholomae's k'-series (cf. page 17).

3.2.1.1.2 Velars

Almost all Indo-Europeanists reconstruct a series of PIE velars, which are transcribed with k or q signs.

3.2.1.1.3 Labiovelars

There is an unresolved dispute among Indo-Europeanists with regards to the correctness of postulating the labiovelar sounds k^w kh^w g^w gh^w as originally Proto-Indo-European. Bartholomae does not accept them as PIE sounds. On the other hand, many other scholars, such as Brugmann (1897), Kent (1953), and Burrow (1965), accept them as PIE sounds.

3.2.1.1.4 Discussion

The relationship of palatals, velars and labiovelars is a matter of disagreement among Indo-Europeanists. Different Indo-European languages provide phonetic evidence for the three classes of sounds, but no single language has all the three series of sounds. The centum languages provide evidence for velar and labiovelar k- and k^w-sounds and the satam languages for palatal and velar $\hat{k}$ and k sounds. Schol-

ars, such as Brugmann and Kent, who posit all three series as Proto-Indo-European, would propose that in satam languages k- and k^w-series were merged, while in the centum group $\hat{k}$- and k-sounds were merged. This very neat distribution of these three phonetically close classes of sounds has lent itself to two different kinds of interpretations.

On the one hand, Meillet (1937ed:90-95) postulates a velar k- and a labiovelar k^w-series on the basis of the distribution of PIE velars, which occur mainly in root final position especially after u, after s, and before a and r. The palatal stops which he transcribes k_1 are secondary derived forms. Later Lehmann (1952:101) supports Meillet by stating that before e stops are fronted, before o they are back, and before a they are neutral but nonpalatal. On the other hand, Kurylowicz (1935:1-26) reconstructs palatal $\hat{k}$- and velar k-series for Proto-Indo-European and describes labiovelar sounds as independent innovations in centum languages resulting from the velar or palatal combination with PIE $\hat{u}$. The disagreement between the scholars on this issue is still unresolved.

3.2.1.2 Fricatives

As discussed in relation to the PIE palatals (3.2.1.1), Reichelt (1909) is the only Iranist among those inventigated here who, following Bartholomae (1894), posits a PIE velar fricative series. The palatal fricative j of Bartholomae (1894) and Brugmann (1897) is considered by Reichelt (1909:50) to be of doubtful nature and not distinguished

from PIE i̯ in the Proto-Indo-Iranian period. All the remaining scholars studied here do not postulate the above two classes of sounds as Proto-Indo-European.

3.2.1.2.1 Sibilants

Bartholomae (1894) posits ten original PIE sibilants (1.2.2.2.2). Reichelt (1909), following Brugmann (1897), reduces the sibilants to eight and thus deviates from Bartholomae in several points. First he explicitly states that in the Proto-Indo-European period there was only one basic dental sibilant s; all other dental sibilants, such as sh z zh, are derived from s through combinatory sound changes. Second, in place of Bartholomae's s̯-series (1.2.2.2.2), Reichelt has þ-sounds whose environmental restrictions are identical with those of the former. This þ is later changed to PIIr. s̯ and thus becomes identical with Bartholomae's view. Thirdly, Reichelt does not posit any PIE sound corresponding to Bartholomae's PIE θ and ð; instead he derives the correspondences of θ and ð later through the assibilation process (cf. 3.4.1.1).

Most other Indo-Europeanists agree with Reichelt (1909) on positing only one voiceless dental sibilant for Proto-Indo-European, but they disagree with the number of variants that he assigns to them. Most scholars accept only one voiced variant z for s which appears before voiced obstruents (see Meillet, 1937, for a clear description of z).

With respect to Bartholomae's θ and ð, the major consensus is in line with Brugmann (1897) and Reichelt's (1909) view which does not accept these sounds as belonging to the original Proto-Indo-European sound system. The reflexes of these sounds in different Indo-European languages are derived later through different innovations.

3.2.2 Nonobstruents

There are two major views on the nature of nonobstruents. The most dominant one is that which considers all nonobstruents as sounds that can function as syllabic nuclei, but many of them can also function as consonants. This is the analysis of nonobstruents presented by Bartholomae (cf. 1.2.3), Brugmann (1897), and many others. Meillet (1937) makes a sharper division between the nonobstruents that can function only as syllabics--*les voyelles*--and those that can function both as syllabics and as consonants--*les sonants*. Lehmann (1952) calls Meillet's former groups "vowels," the latter group "resonants," and adds a third group called "laryngeals."[1]

The second view on the status of what is called nonobstruent here is that which classifies the consonantal-functioning segments apart from the syllabic ones and then classifies the former groups with the obstruents and the latter group with the vowels. A very clear example of this type of analysis which uses the phonemic principle

of classification can be seen in Kent (1953:24).

3.2.2.1 Liquids

All Indo-Europeanists postulate two liquids: r and l. Both function as consonants and as syllabics according to certain phonological and grammatical restrictions. Within the syllabic group one finds both a short and a long syllabic sound.

3.2.2.2 Nasals

Bartholomae postulates four PIE nasals (1.2.3.2). Reichelt (1909) and Kent (1953), following Bartholomae, also posit four sounds and agree with him that $\tilde{n}$ and η appear only before palatals and velars. Burrow (1965) posits only three nasals , m n η, and Lehmann (1952) only two, m n. Most Iranists agree on the double function of these nasals--syllabic and consonantal--just like liquids.

3.2.2.3 Semivowels

All Indo-Europeanists posit the two PIE $\underset{\sim}{i}$ (y) and $\underset{\sim}{u}$ (w) sounds as counterparts of the i and u vowels. These semivowels are classified by Meillet (1937) and Lehmann (1952), following Saussure (1879), with the nasals and liquids under the same class of sounds.

3.2.2.4 Discussion

The difference between the different available PIE sound systems is due to the methodology applied by various

scholars. On the one hand, the phonological units posited by Bartholomae (1894), Brugmann (1897), Kent (1953), and many others are clearly phonetic elements. They are to a great extent in agreement about the phonetic character and the distribution of PIE sounds, but they do not try to abstract the basic phonemic system based on phonetic similarity and complementary distribution. For example, for Bartholomae (cf. 1.2.3.2) PIE $\underline{\eta}$, although specified as appearing only before PIE velars, is still a Sprachlaut different from PIE $\underline{n}$ and $\underline{\tilde{n}}$. The same thing can be said about the analysis of what are called resonants. In spite of the fact that the complementary distribution of the syllabic and consonantal variants of each sound class has been known for a long time (cf. Bartholomae, 1883), each variant of these sounds is considered as a separate unit in tracing its development from the PIE time to Old Persian and Avestan. A modern example of this treatment is Kent (1953).

On the other hand, there are studies that have used the phonemic principles in postulating a smaller number of basic PIE phonemes. The most recent phonemically reconstructed PIE sound system is done by Lehmann (1952). On the basis of the function of a sound as syllabic, he classifies the PIE sounds into obstruents, vowels, and resonants (cf. Meillet, 1937:80ff.). Then there are statements as to the nature of the distribution of variants. In this manner Lehmann (1952:5) claims to provide the basic elements of the

Proto-Indo-European language rather than the Proto-Indo-European speech--a practice of nineteenth century scholarship.

3.2.3 Summary

The following phonetic inventory is taken from Kent (1953:24). It includes all the major PIE phonetic sounds. Although Kent is writing in the era when phonemic theory was the dominant view, and he uses the terms "phonemic" and "phonetic," his Proto-Indo-European inventory is surely nonphonemic. The reason for choosing Kent's inventory over Reichelt's (1909) or Brandenstein and Mayrhofer's (1964) is that, in essence, it roughly corresponds to Bartholomae (Chart 1) and has been accepted as the dominant Proto-Indo-European system for a long time. All the reduced vowels and diphthongs are excluded in this chart.

3.3 Changes in Proto-Indo-European

3.3.1 Assimilatory changes

Most Indo-Europeanists agree with Bartholomae (1.2.1) on the existence of assimilation in Proto-Indo-European times. However, Meillet and Benveniste (1931) and Kent (1953), who deal with Old Persian, do not postulate the so-called Bartholomae's law (see Chapter 1, rules 4-5) at all. This might have to do with the lack of evidence for its application in Old Persian.

CHART 6

PROTO-INDO-EUROPEAN SOUND CHART
RELEVANT SOUNDS ABSTRACTED FROM KENT

Vowels	Pure			Semiconsonantal					
short	e	o	a	i	u	$\underset{\circ}{r}$	$\underset{\circ}{l}$	$\underset{\circ}{m}$	$\underset{\circ}{n}$
long	$\bar{e}$	$\bar{o}$	$\bar{a}$	$\bar{i}$	$\bar{u}$	$\underset{\circ}{\bar{r}}$	$\underset{\circ}{\bar{l}}$	$\underset{\circ}{\bar{m}}$	$\underset{\circ}{\bar{n}}$

Consonants					
labial	p	ph	b	bh	m
dental	t	th	d	dh	n
palatal	$\hat{k}$	$\hat{k}h$	$\hat{g}$	$\hat{g}h$	$\tilde{n}$
pure velar	q	qh	g	gh	ŋ
labiovelar	q^u	q^uh	g^u	g^uh	ŋ

Clusters				
dental	tst	tsth	dzd	dzdh

Continuants (Voiced except s)			
sibilants	s	z	
liquids		l	r
semivowels		$\underset{\circ}{i}$	$\underset{\circ}{u}$

3.3.2 Obstruents

3.3.2.1 Stops

There seems to be a great deal of difference between Bartholomae's account of the changes that affect PIE stops (1.2.2.1) in their passage into Proto-Indo-Iranian and those of other Iranists, such as Kent (1953). Bartholomae claims that PIE stops appear unchanged in Proto-Indo-Iranian (page 7), but Kent (1953:29), however, postulates a few changes for this period. Some of these changes are due to the difference in the composition of the PIE sound inventory of each scholar. For example, Kent has a rule which delabializes the PIE labiovelars in Proto-Indo-Iranian. This sound change does not appear in Bartholomae (1894) due to the absence of a labiovelar series in the PIE sound inventory.

3.3.2.1.1 Palatals

The development of the PIE $\hat{k}$-series is one of the most widely discussed subjects in Indo-European phonology. Besides the disagreements about the phonetic nature of these PIE sounds (see 3.2.1.1.1), there are various views about the ways in which these sounds must have developed in satam languages. Most scholars, on the basis of Balto-Slavic and Indo-Iranian, have reconstructed *$\acute{s}$ *$\acute{s}h$ *$\acute{z}$ *$\acute{z}h$ sounds to which PIE palatals would directly change (cf. Kent, 1953). All the different reflexes of the PIE palatals in Indo-

Iranian languages, such as Skt. ś j h, Av. s z, and OP θ d, are then derived from these sibilants. As representative of the scholars postulating the above PIIr. ś śh ź źh, I will discuss Kent's analysis below.

According to Kent (1953:28):

(1) PIE k̂ k̂h ĝ ĝh become PIIr. ś śh ź źh.[2]

This rule is different from the three rules (6, 7 and 8) that Bartholomae postulates (Chapter One) in order to account for the changes involved in his corresponding series of sounds, namely, velar fricatives.

Morgenstierne (1942b) does not accept the *ś as the direct Proto-Indo-Iranian descendent of PIE palatals. In his short essay on "The Development of Indo-European Consonantism in Iranian," he postulates a palatalized dental t'-series for Proto-Indo-Iranian.

(1a) PIE palatal stops become PIIr. palatalized dental stops.

In a later article, Morgenstierne (1945) presents additional information from Kafiri dialects to disprove the reconstruction of PIIr. ś and in support of his own *t', while adding another possible alternative reconstruction, namely, a palatal affricate. He argues that the PIIr. ś-sounds of other scholars cannot be the underlying sound from which, on the one hand, the Skt. ś j h, Av. s z, and OP θ d,

and on the other hand, Kafiri ċ [t^s] and ǰ could be derived. Kafiri, an intermediate language between Sanskrit and Old Iranian languages, shows many archaic features of Indo-European phonology and morphology, and the appearance of ċ [t^s] as a reflex of IE palatals is claimed to shed doubt on the sibilancy of PIIr. ś́ as an older form for Kafiri ċ, Skt. ś́, and Ir. s š̌ θ. Rather he argues that the only way to account for them is to reconstruct a common Aryan (PIIr.) palatalized dental or palatal affricate (t' or č̌).

Burrow (1965:73) in his account of the Sanskrit reflexes of the PIE palatals agrees with Morgenstierne's (1945) view on the nature of Common IIr. sounds. At first he adopts the ś́-sound for Proto-Indo-Iranian as well as for other satam languages, but due to the evidence from Kafiri he is forced to admit that for ś́ "before complete assibilation there was an affricate stage."

(1b) PIE palatal stops become PIIr. palatal affricates.

Then, one can directly derive Kafiri ċ ǰ, Skt. ś́ j h, and OP θ d. Burrow deliberately gives an alternative t'-series of signs for these sounds in order to keep it distinct from the č̌-series which itself is developed from the PIE velars (k-series) by the so-called secondary palatalization (cf. 1.2.2).

3.3.2.1.2 Velars

Most post-Bartholomaean Iranists postulate one rule for the PIE velars which produces a series of palatals or palatalized velars.

(2) PIE velars become c' ǰh g' g'h when standing before e ē i ī y.

The input to (2) includes not only the PIE simple velars but those that are the output of rule (3) below (cf. Kent, 1953:29). Kent considers (2) to be a diachronic sound change producing the PIIr. palatal stops. Bartholomae (1894) postulates that (2) is a synchronic rule operative in Proto-Indo-European before its split into different languages. The difference in the time assumed for the operation of change (2) (Bartholomae's rule (1), Chapter One) results in an identical stop system but for different stages of language development, that is, Proto-Indo-European and Proto-Indo-Iranian.

	Bartholomae's PIE				Kents's PIIr.			
Labial	p	ph	b	bh	p	ph	b	bh
Dental	t	th	d	dh	t	th	d	dh
Palatal	k'	k'h	g'	g'h	c'	c'h	g'	g'h
Velar	k	kh	g	gh	k	kh	g	gh

3.3.2.1.3 Labiovelars

The postulation of PIE labiovelars is disputed by

Kurylowicz (1935), and many Iranists such as Morgenstierne (1942a,b) do not accept them. On the other hand, many others, such as Kent (1953), Meillet (1937), Brandenstein and Mayrhofer (1964), consider labiovelars as original PIE sounds. In any case, in Indo-Iranian languages they have completely merged with the simple velar series.

(3) PIE k^w kh^w g^w gh^w merge with k kh g gh in Proto-Indo-Iranian.

3.3.2.2 Sibilants

The PIE s sound is treated by post-Bartholomaean scholars in a different manner than it is by Bartholomae (1894) and Reichelt (1909). For example, Kent at the beginning of his description rejects the existence of PIE sh and zh. PIE z, although listed in his PIE inventory, is later described as a variant of PIE s or derived from PIE d in a PIE d+d cluster. PIE s is assumed to have undergone two changes in passing to the Proto-Indo-Iranian stage:

(4) PIE s becomes PIIr. š if preceded by PIIr. i u r k or by PIIr. palatal or velar stops.

(5) PIE s becomes an h when final after PIIr. a and immediately followed by a pause between phrases or at the end of a sentence.

In Chapter One Bartholomae has a rule like (4) above; (5) was mentioned as a PIIr. sandhi change with no such h listed

in the list of correspondences for any stage of the language. Kent (1953:40), however, posits PIIr. $\underline{h}$, keeps it in Proto-Iranian, and changes it in different Iranian languages.

3.3.3 Nonobstruents

The distribution of the PIE resonants and the phonetic nature of their allophones in the various environments is described by Edgerton (1943). There are three phonetic realizations for each of the resonants: a nonsyllabic element, a syllabic element, and a combination of related syllabic and nonsyllabic elements. Lehmann (1952:10) summarizes Edgerton's findings within the phonemic framework. I shall restate Lehmann's account of the resonants in the following formulas, using the first letters of vowel (V), consonant (C), and resonant (R) as mnemonic devices.

(6) a. $R \longrightarrow$ syllabic / $C-C$

b. $R \longrightarrow$ nonsyllabic / $V-V$

c. $R \longrightarrow$ nonsyllabic / $VC-V$

d. $R \longrightarrow$ syllabic + nonsyllabic / $\overline{V}C-V$

However, the above is the description of a single resonant in the environment of vowels and obstruents. The contiguous resonants have quite a different behavior with respect to their allophones. Lehmann (1952:10-11) gives the following tabulation of the different allophones of resonants in various environments with the observation that # pause acts as a consonant.

One resonant	tit	#it	ti#			
	aya	#ya	ay#			
	ayt					
	atya	but		ktiya, ātiya		#tiya
Two resonants	aywa	but		āyuwa		
	atyut	atyu#	but	ātiyut		ātiyu#
				ktiyut		ktiyu#
				#tiyut		#tiyu#
	#yut					
	ayut	ayu#				
	#tiwa	ātiwa	ktiwa			
	atyuwa					
either	yuwa or	possibly iwa; pattern uncertain				
Three resonants	aywit	aywi#	aywiya			

All Iranists that I have examined in this study describe the development of the phonetic elements that are the output of (6) and not the phonemic elements that are the input of (6). They consider the Proto-Indo-European forms to be from a stage which already contains the allophonic elements produced by the subrules in (6). That is why most of the PIE sound inventories, as well as the input to the rules postulated for nonobstruents, contains consonantal and vocalic allophones of the resonants.

3.3.3.1 Liquids

Reichelt's (1909:57ff.) description of the development of PIE liquids in Indo-Iranian languages is different from that of Bartholomae (cf. 1.2.3.1, rule (12)). Reichelt does not explicitly state that PIE r and l merged into PIIr. r. Rather he mentions that "Die liquidae r and l werden oft dissimilatorisch vertauscht" (page 57). Without further comment or example he adds that in Proto-Indo-Iranian

"...doch erhielt sich l nur mundartlich weiter..." (page 58). This intimates that PIE l is to be found in the main Indo-European dialects with which the Iranists deal. In fact, he states that PIE l was preserved in the Indic dialect group to which the classical language belonged and in the Iranian dialects from which New Iranian has descended. However, he acknowledges the merger of PIE r and l in Vedic Sanskrit and Avestan.

Kent (1953) separates the consonantal allophones of resonants from their vocalic counterparts and groups the former allophones with the PIE obstruents and the latter with the PIE vowels. Then in a different section he traces the development of each allophone in latter stages of the language. He does not seem to subscribe to the dialectal preservation of PIE l. Brandenstein and Mayrhofer (1964) practically follow Kent in all points except that they account for the effect of the laryngeals on PIE resonants. In terms of the change of PIE r l, most all Iranists follow Bartholomae's rule (12) (cf. 1.2.3.1).

3.3.3.2 Nasals

Reichelt (1909:58) deviates from Bartholomae in very minor ways. He does not posit the sweeping change of syllabic nasals as is postulated by Bartholomae (1.2.3.2, rule (14)); instead he posits the following:

(7) Short and long syllabic nasals become respectively

PIIr:

a. a and ā before consonants and

b. an am and ān ām before vowels and y and w.

Kent (1953) agrees with Reichelt's description, except that in (7b) he introduces a reduced vowel for prevocalic short nasals instead of an.

3.3.3.3 Semivowels

All Iranists agree with Bartholomae (1.2.3.3) that PIE y and w remain unchanged in Proto-Indo-Iranian.

3.4 Proto-Indo-Iranian

The sound changes that are enumerated in the previous section do not produce a great deal of change. The PIIr. consonantal system differs from its earlier PIE consonantal system in minor ways: labiovelars and l have disappeared, PIE palatal stops have changed their manner of articulation, and the velar series have given rise to new palatal stops. The major difference between the PIIr. consonants reconstructed by Bartholomae (cf. 1.2.4) and the ones postulated by other Iranists has to do mainly with the original PIE inventory postulated by each scholar. Other differences, such as Bartholomae's rule (6) and (7) (cf. 1.2.2.2.1), represent the degree of detail and accuracy of one's description. For example, instead of the latter rules, many scholars treat the development of PIE palatals before

consonants, i.e. kt ps, as exceptions or particular developments (cf. Kent, 1953).

Other problems result from the choice that one makes between the alternative descriptions of the innovations available for the PIE sounds. For example, if one accepts (1) as the correct description of the innovation of the PIE palatals, then he must be sure that the output of (1) does not merge with that of (4), as both are nondental, nonvelar, and nonretroflex sibilants. Most Iranists are aware of this problem and that is why they symbolize the output of (1), the ś-series, different from š, the output of (4), although the significance of these symbols is nowhere explicitly specified. This problem will not arise if one accepts Morgenstierne's view (1942b) which assigns the change of PIE s to š to a latter stage of language development, perhaps Proto-Iranian, or if one chooses (1a) or (1b) over (1). Similar problems will arise if (1b) is chosen to be a correct innovation of the PIE palatals; the output of (2) which is characterized as a palatal ć-series (Kent, 1953: 29) may intersect with them. This is anticipated by Burrow (1965:73) and thus the alternative symbol, t'-series, is suggested. This last symbol, t', which Burrow provides as an alternative symbolization, is in fact the other phonological alternative, (1a), suggested by Morgenstierne (1942), which stands for palatalized dentals and which is used by many other Iranists (cf. Sokolov (1967), Windfuhr (1971)).

One way of avoiding this problem is to accept the change characterized by (1a) which produces a PIIr. palatalized dental t' from PIE palatal stops. I will reject this notion at this time, leaving my justification for this decision until page 102ff.

Another way of preventing the merger of the outputs of (1c) and (2) is to delay (2) until further innovation affects all instances of the palatal fricatives of rule (1) and changes them one step further. That is, one can consider (2) as a latter innovation, perhaps of Proto-Iranian times (see 4.3.3. for further justification). One can also consider the output of (2) as palatalized velars rather than as palatal stops. In fact, this is what one can infer from Morgenstierne's table of correspondences (1942b:80).

For the purpose of clarity in this historical survey, it is desirable to select one of the two alternatives mentioned in the preceding section, that is, (1) or (1b), so that further innovations of these original PIE palatals can be described more easily. In Chapter Four I will attempt to prove that (1b) above is the correct alternative; and I shall try to present, for the first time, a new description of the later Iranian innovations. But it should be noted that none of the Iranists investigated here carry through Morgenstierne's (1945) view, i.e., (1b), in developing the PIIr. palatal affricate ǰ into Av. s and z and OP θ and d. Most Iranists accept as Proto-Indo-Iranian either the more traditional view

of ś-sounds or Morgenstierne's earlier view of a t'-series (1942b). Since this chapter is an historical study of dominant post-Bartholomaean views and because the development represented by (1b) is not explicated in any detail, I shall accept (1) as representing the mainstream of linguistic thinking on this subject. Nevertheless, under palatals (3.4.1.1.1) the issue will be investigated further.

3.4.1 Stops

A major difference between Iranian and Indic languages is the various innovations that have affected the PIIr. stops in the Iranian languages. Most Iranists agree with Bartholomae's description (1.3.1.1). Below, Kent's (1953:29) description will be restated.

(8) PIIr. voiceless stops p t c' k, if standing before a consonant become voiceless spirants f θ š̆ x, unless preceded by a sibilant.

(9) PIIr. aspirated voiceless stops ph th ć̆h kh, if standing after a sibilant, lose their aspiration and become p t c' k respectively; otherwise they become voiceless spirants f θ š̆ x.

(10) PIIr. aspirated voiced stops bh dh ǵ̆h gh lose their aspiration and merge with b d g' g.

A comparison of the above with Bartholomae (1.3.1.1,

rules (15) to (18)) easily reveals that Kent's description (1953:29) is not as complete as Bartholomae's; namely, it does not mention that a nasal dental has the same affect on the process of sound change as sibilants have in rules (8) and (9).

3.4.1.1 Dental stops

Bartholomae's rule (10) (1.2.2.2.2) is a synchronic sound change in Proto-Indo-European times. It changes the first dental stop of a geminated dental cluster into an interdental fricative θ or ð. These sounds are absent in the PIE sound inventory of all other Iranists because either they do not consider Bartholomae's analysis to be correct, or they assign the change of geminated dentals to a later stage of the language development.

Reichelt (1909), following Brugmann (1897), handles this change through what is normally called assibilation. Bartholomae's account of it in rule (10), by which an IE t and d before t(h) and d(h) change to IE interdental sibilants θ and ð is partly in line with the major Iranian innovations which make voiceless stops fricatives (cf. rules (8-9)). These IE sibilants remain unchanged in Proto-Indo-Iranian, but later they change to PIr. dental sibilants s and z. This s and z are thus kept distinct from other PIr. s and z by not undergoing the general change to š and ž when preceded by i, etc. Reichelt, on the other hand, considers

the result of the clustering of dental t or d with the t(h) and d(h) to be the affricatization of the first dental (Reichelt, 1909 § 391I) in common Indo-European times as

$$(11)\quad \text{PIE} \begin{bmatrix} t \\ d \end{bmatrix} \longrightarrow \text{IE} \begin{bmatrix} t^s \\ d^z \end{bmatrix} \Big/ \text{———} \begin{bmatrix} t(h) \\ d(h) \end{bmatrix}$$

The IE affricated sounds t^s and d^z which seem to be allophonic variants of dental stops, according to Reichelt, change into simple dental sibilants s and z but in different times.

First he posits the change of IE affricated d^z to PIIr. z along with the simplification of the dz cluster to z in an identical environment.

$$(12)\quad \text{IE} \begin{bmatrix} d^zd(h) \\ dzd(h) \end{bmatrix} \longrightarrow \text{PIIr.} \begin{bmatrix} zd(h) \\ zd(h) \end{bmatrix}$$

PIE de-d-dhi > IE de-d^zdhi > PIIr. dazdhi>

PIr. dazdi : LAv. dazdi 'give!'

PIIr. uaidz-dhuam > GAv. fra-voīzdūm

Second he describes the change of IE affricated t^s, which had remained unchanged in Proto-Indo-Iranian, to PIr. s along with the simplification of PIIr. ts cluster in an identical environment.

$$(13)\quad \text{(IE) PIIr.} \begin{bmatrix} t^st(h) \\ tst(h) \end{bmatrix} \longrightarrow \text{PIr.} \begin{bmatrix} st \\ st \end{bmatrix}^3$$

PIE ped-tay > pat-tay > IE pat^{s}tay >

PIIr. pat^{s}tay > PIr. pasti : LAv. pasti

PIIr. naitst > PIr. naist : LAv. nāist

Reichelt does not explain his reasons for assigning the changes represented by (12) and (13) to different historical periods. In fact, the output of (13) could be subjected to PIIr. rule (4) and become $\underline{\underline{z}}$. But as the examples demonstrate, such a change did not take place. This can be explained by assuming that the above-mentioned rules should operate in the following order:

(14) 1. Rule (11)

2. Rule (4)

3. Rule (12)

4. Rule (13)

An examination of rule (12) and (13), regardless of the time of their application, will show the manner in which most post-Bartholomaean Iranists handle these sound changes. Each of these rules is a combination of two types of sound change. The top part of each demonstrates the replacement of a dental affricate by a dental sibilant before a dental stop. This replacement rule is combined with a completely different sound change, the bottom part, which deletes a dental stop before a dental sibilant followed by another dental stop. It is not obvious why

Reichelt, along with other Iranists, combines these types of sound changes in one statement. The only conceivable similarity between the two types of changes can be found in their phonetic transcription: i.e., $t^{s}t$ $d^{z}d$ and tst dzd and perhaps phonetic similarity. (For further discussion of this subject see 4.3.5.)

3.4.1.2 Velars

All Iranists agree that PIIr. velars remain unchanged in Proto-Iranian, except for those stated in rules (8-10).

3.4.1.3 Palatals

There are two series of palatal consonants in Proto-Indo-Iranian: first the reflexes of PIE velar series by rule (2), c' c'h g' g'h; second the reflexes of PIE palatals, either by rule (1) or (1b).

PIIr. palatal stops from PIE velar stops remain unchanged in Proto-Iranian, except for the changes that are common to all stop rules (8-10).

In section 3.4, I briefly pointed out the diversity of views among Iranists with respect to changes of PIE palatals. In this section I shall discuss in more detail the main issues involved. First, it is known that in Iranian the reflexes of the PIE palatal $\hat{k}$-series are quite distinct from those of the PIE velar k-series. The same is

true in Kafiri. In Sanskrit such a distinction exists only between ś and c; the remaining sounds have merged. Therefore, it is important not to allow the two series of sounds to be confused with one another in such an early stage of language development. Secondly, there is the issue of the later development of PIE palatals in Avestan and Old Persian. Burrow (1965) does not commit himself on the details of the subsequent Iranian changes. But from the following quotation it is obvious that he does not postulate a common Pre-Iranian stage (1965:73):

> ...that Old Persian θ, d which appear in place of s, z in the rest of Iranian...have developed directly out of such affricates, and that there is therefore no common Iranian treatment.

At this point let us examine Morgenstierne's view on this subject. In his "Development of Indo-European Consonantism in Iranian" (1942b), he characterizes almost all of the major changes involved in the development of Iranian consonants by means of twenty-one glosses. We shall abstract his views on the changes of PIE k̂- in the following manner:[4]

a. IE /k̂/ = [k̂] ⟶ IIr. /t'/ = [t']

b. IIr. /t'/ = [t'] ⟶ Pre-Ir. [θ']

c. Pre-Ir. [θ'] ⟶ Com.Ir. /θ'/

d. CIr. /θ'/ ⟶ Av. { /s/ ; /š/ before { t ; s } }

To account for Kafiri and Old Persian the following can be added:

e. IIr. /t'/= [t'] ⟶ Kafiri /ċ/ = [t^s]

f. CIr. /θ'/ ⟶ OP /θ/

The first innovation characterized by (a) is the change of PIE palatal $\hat{\underline{k}}$-series in their place of articulation with a simultaneous palatalization of the resultant dental. This is different from the traditional view presented by Nyberg (1931) who claims a change in the manner of articulation. This resultant sibilant is a palatal series, as is posited in rule (1). Morgenstierne believes that the Kafiri languages split off after the application of (a). Statement (e) indicates that palatalized dental /t'/ changes in its palatalization to become an affricate, while retaining its dental articulation and thus becoming $\underline{ċ}$ [t^s]. From the same /t'/, Morgenstierne believes Skt. $\underline{ś}$ (1945), as well as CIr. $\underline{θ'}$ are derived. In fact, (b) produces a palatalized interdental fricative series, which is different from [t'] only in the manner of articulation, i.e. stop becoming fricative. It is from this /θ'/ that OP $\underline{θ}$ and Av. $\underline{s}$ are perhaps derived through (d) and (f). There are a number of objections that can be raised to Morgenstierne's analysis. Ilya Gershevitch has forwarded a few which I shall explain before my own are stated.

In an article entitled "Dialect Variation in Early

Persian," Gershevitch (1964), in the course of his examination of different Old Persian words for proving in Old Persian itself certain minor dialect differentiations--not those of Median--compares the two views of the development of PIE palatals.

The main reason for the different treatments of PIE palatals, at least in Iranian, has to do with the way that one views their development in Old Persian and Avestan. In Old Persian there are a great number of θ sounds which have developed from PIE $\hat{k}$- and correspond to Av. s, e.g. OP viθ-, Av. vis- 'royal house' from PIE $u\hat{i}\hat{k}$-. On the other hand, there are a number of instances where Old Persian demonstrates an s as the reflex of PIE palatals (besides OP θ), in addition to the OP š which appears in words such as višta 'ready' from *$u\hat{i}\hat{k}$+to-.

In the past, Iranists attributed the above diversity in the reflex of PIE palatals in Old Persian to the mixture of Old Iranian languages (Tedesco, 1921). Meillet and Benveniste (1931) have incorporated this in their description of Old Persian phonology. Gershevitch, in this study, questioned the designation of all the Old Persian words with s to Median--a non-Persic language--which led him to re-examine the whole idea of the change of the PIE palatal in Iranian.

According to Gershevitch (1964), in the older theory of PIE palatal change, the OP θ, which is a simple interdental fricative, is derived through an intermediate PIr. s

from PIE ḱ. But since New Persian (NP) is believed to be a descendent of Old Persian, if an s instead of a θ is found in NP sang, from OP aθa(n)ga, this irregularity is usually described by designating it to a Median *asanga. There are two instances in which Old Persian allows an original OP s to be derived from PIE ḱ; first, when PIE ḱ occurs before PIE s, e.g. OP θrsa- 'to fear' from PIE tr̥(s)-sḱo; and second, when PIE ḱ occurs before PIE u̯, e.g. OP asa from PIE eḱwo-. The reason for considering the s in these examples (and not the one in *asanga-) to be real Old Persian is the belief that these s's were clusters of ss at the time when PIr. s was becoming OP θ. But this does not hold true for OP θadaya 'to appear' from PIE sḱedoyo-. The latter is explained through an early simplification of *ss from PIE sḱ.

The other theory about the development of PIE palatals is advanced by Morgenstierne (1942b). In it he postulates a palatalized dental voiceless stop *t' for Proto-Indo-Iranian. I summarized this view on pages 103-4,(a) through (f). Morgenstierne would explain the two-way development of PIE ŝk- in the following manner: The *ŝk- in PIE ŝkedoyo-, which had become PIr. sθ, in PIE tr̥(s)-sḱo- in intervocalic position, remained until later when it became double s.

Gershevitch (1964) rightly objects to Morgenstierne's view on general grounds. The change of PIE ḱ to PIr. θ in sθ cluster seems to be contrary to other indisputable Iranian sound changes.[5] By the sound change that turns

PIIr. voiceless stops into their corresponding fricatives, PIIr. ph th kh become Ir. f θ x. This sound change is inhibited only in one environment, namely after PIE s in which case their corresponding simple stops replace them. Therefore, where we would expect a θ we usually have a t. Consider the following examples given by Gershevitch:

Av.	vid-	voista	:	Skt. vettha	'know'
Av.	da	dadaθa	:	Skt. dadatha	'give'
Av.		da-θra	:	Skt. da-tra	'gift'
Av.		vas-tra	:	Skt. vas-tra	'dress'

Gershevitch also objects to Morgenstierne's view that sθ is simplified to θ in medial position by the loss of s. This change is also considered by Gershevitch to be unparalleled in Iranian and contradicts the change of PIr. sθ to OP s in OP tṛsa, which is assumed to be a later development.

To the above objections to Morgenstierne's view of the development of PIE palatals advanced by Gershevitch, I would like to add my own which can be very general. Leumann (1941), Morgenstierne (1942a), and Gershevitch (1964) have all discussed the assets and liabilities of postulating a PIIr. palatalized dental /t'/. But no one, to my knowledge, has yet questioned the possible consequence of a cluster of this PIIr. t' with another t, i.e. t't. According to Morgenstierne, PIE kt becomes PIIr. /t't/, then Pre-Ir. /θ't/, and finally /št/ in both Avestan and Old Persian. The question that I should

like to raise concerns the phonetic distinguishability of the two segments in the /t't/= [t't] clustering, as in Morgenstierne (1942b). In this cluster we have two consonants with identical features except for one being palatalized. In view of the fact that palatalization of consonants is such a natural and widely operative assimilatory sound change in Indo-Iranian, can /t't/ = [t't] stand not extending the palatalization to both dental consonants? The answer seems to be negative. In fact, Morgenstierne himself, for a PIE ks cluster, postulates the palatalization of the s in PIIr. [t's] in the phonetic representation, even though he does not do so for PIE kt: PIIr. /t't/ = [t't]. At this point I am not questioning the pronouncibility of [t't] in Proto-Indo-Iranian, but the fact is that for the former group of sounds palatalization extends itself and for the latter it does not. It is interesting to observe the phonetic characterization that he gives for the Pre-Iranian stage of the above cluster, namely [θ't].[6] If the palatalization of /t'/ in /t't/ cluster does affect the second t, turning it into /t't'/, then it is very difficult to envision how the Avestan and Old Persian št cluster could be produced.

In summary, there are two main views on how the PIIr. reflexes of PIE palatals develop into the Proto-Iranian stage. Following Morgenstierne (1942b) some scholars accept PIIr. t', which gives rise to PIr. θ'. Others who follow Bartholomae accept PIIr. ś which produces a PIr. s.

3.4.2 Sibilants

A second major difference between Iranian and Indic languages appears in the development of an Ir. h from the PIE s. Bartholomae (1894) describes it by five rules (cf. 1.3.1.2.2). However, other Iranists assign many of his posited sound changes to later stages, such as Avestan or Old Persian periods. For example, Kent (1953:40) describes the entire sound change by:

> (15) PIIr. s remains unchanged before voiceless stops (p t k ph th kh), but in all other positions it becomes PIr. h.

Other changes of PIE s, such as PIE $\hat{k}s$ to Ir. $\check{s}$ or PIE ps to Ir. $f\check{s}$, are treated as individual cases. (For a critical analysis of the different descriptions available for Proto-Iranian see 4.3.1).

3.4.3 Resonants

None of the Iranists investigated in this study treat the development of PIIr. resonants in any detail. Bartholomae's description still remains as the most detailed analysis available.

3.4.4 Summary

The above rules create a number of changes in the PIE sounds that are presented in Chart 6. The consonants of Chart 6 evolve into later stages of language and produce

the PIIr. (cf. 3.4), and later the PIr., sound systems. The relationship between the newly produced sounds and those of Chart 6 are characterized by the rules exemplified above. In this section the following chart, Chart 7, is intended to represent the Proto-Iranian sounds in relation to those of the preceding stage--i.e., PIE and PIIr. sounds.

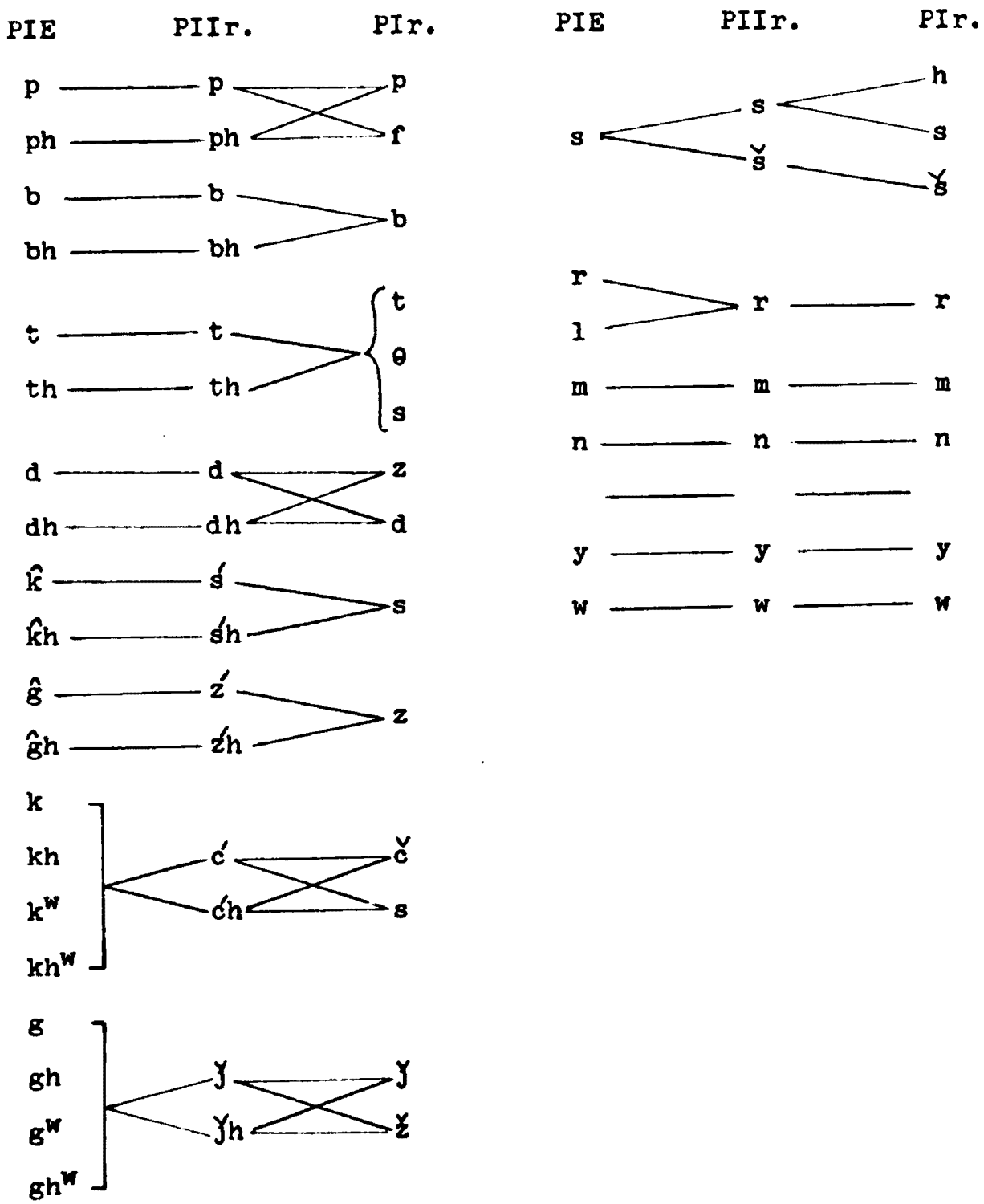
3.5 Proto-Iranian

The Proto-Iranian sound inventory (Chart 7), arrived at by post-Bartholomaean Iranists, is smaller than that of Bartholomae (Chart 3). The absence of some of the PIr. sounds in Chart 7--which are posited by Bartholomae's Chart 3--correspond to the absence of sound change in this chapter. The scholars studied in this chapter--except for Reichelt (1909)--do not consider such additional sounds in Chart 3 as Proto-Iranian. For example, most Iranists consider Bartholomae's rules (17), (50), and (52) (Chapter One), which produce $\underline{v}$ $\underline{x^w}$ $\underline{t}$ respectively, to be innovations peculiar to Avestan. Some Iranists consider PIr. $\underline{\check{s}}$ (of Chart 3) to be a PIr. sound. For instance, Morgenstierne (1942b) and Sokolov (1967) represent it in their inventory of Proto-Iranian sounds, but none of the rules presented in this chapter predict its derivation. Bartholomae's series of nasalized vowels ($\underline{u}$ $\underline{r}$ $\underline{i}$) are completely absent in all other descriptions.

However, there are a number of other differences

CHART 7

PROTO-IRANIAN PHONETIC CHART
(FROM PROTO-INDO-EUROPEAN TO PROTO-IRANIAN)



which exist between Bartholomae's account of Proto-Iranian evolution and that of post-Bartholomaean accounts. One example of such a difference is the change of PIE u̯ to p or b after PIE s or z.

A few instances of Bartholomae's PIr. p and b are the result of a change in the PIIr. semivowel w. The process was explained by rule (36), Chapter One. This p and b, along with the rest of PIE labial stops, appear unchanged in Old Persian and Avestan (cf. 2.3.1), (rules (1) and (3)). Reichelt (1909), insofar as he deals with the Avestan sounds, agrees with Bartholomae in ascribing the change--rule (36), Chapter One--to the Proto-Iranian period. Meillet and Benveniste (1931), however, are not very clear in their account of the development of this PIIr. w, since their grammar is mainly descriptive and not historical. They recognize a difference in the development of this PIE u̯ sound in Old Persian and Avestan. In Old Persian they attribute the simultaneous occurrence of two alternants for the same words--with and without p or b--e.g. asa and aspa, to the realm of dialect mixture--a subject which is not fully considered by Bartholomae (1895).

Kent does not add any new thing to the above. He describes the development by the following correspondences: PIE k̂u̯ ĝu̯ > PIIr. śu̯ źu̯ > Av. sp zb and OP s z.

None of the Iranists studied in this chapter present a systematic description of the development of Proto-

Iranian sounds into Old Persian and Avestan. Except for Morgenstierne (1942b) and Sokolov (1967), who present PIE, PIIr. and PIr. sounds through charts, no one even postulates a complete inventory for PIr. sounds. Therefore, Bartholomae's (1894 and 1895) are still the most complete and systematic diachronic descriptions available of Old Persian and Avestan. Morgenstierne (1942b) and Sokolov (1967), who posit a series of PIr. sounds, develop the Avestan sounds and do not deal with the Old Persian development. On the other hand, Meillet and Benveniste (1931), who deal exclusively with Old Persian, posit a Common Iranian (CIr.) stage comparable to the Proto-Iranian stage seen in Chart 7.

In the rest of this chapter I shall describe the efforts of different Iranists who deal with subjects related to either Old Persian or Avestan.

3.5.1 Avestan

Anquetil Duperron introduced the Avesta to the western world in 1771. Sixty years later Eugene Burnouf (1883) began the first major philological study of the language of Avesta. According to Henning (1942), the studies of Geldner (1877) and Andreas (1902) had a discouraging effect on the later scholarship of Avestan. Iranists, instead of searching into the tremendous amount of newly discovered Middle Iranian data for the interpretation of Avestan, wasted their efforts in tracing the

development of different Avestan letters.

In the historical setting described by Henning (1942), there is another scholar who felt the need for a different interpretation of the Avestan orthography and sound system. In 1942 Georg Morgenstierne published his famous "Orthography and Sound-System of the Avesta," which for all practical purposes is still the most accurate description of the Avestan phonological system. He follows the tradition of Bartholomae (1895, 1904), Jackson (1892), and others who consider the Avestan writing system as a self-contained and self-explanatory device for the representation of the Avestan sound system, as was understood by the Sassanians. He assumes with Henning (1942) that the Avestan alphabet is an invention by learned people for the purpose of recording the pronunciation of the language of their holy scriptures. Following Nyberg (1938) and others, he agrees that the present texts of Avesta all go back to an archetype; and therefore errors due to the difference in the times of reduction, scribal practices, etc., allowed for certain inconsistencies. But Morgenstierne (1942a) believes that there existed a system behind the orthography of Avestan, and he tries to describe that system by stating the obvious regularities and by finding explanations for what he calls "orthographical variations" by resorting to the principles of phonetics and phonemics. The result of his study is the reconstruction of the pronunciation of Avestan as employed by those

who first invented the alphabet.

Morgenstierne takes for granted an underlying phonemic system which had been reconstructed for Early Iranian (EIr.) and accepted by many of his contemporaries, e.g. Benveniste (1934). He tries to show how different Avestan letters, which had already been assigned some phonetic value, are related to the reconstructed Early Iranian language. The method he uses for determining the Avestan sounds is that which is used in a phonemic analysis. He shows that many different letters in Avestan correspond to the same EIr. sound, and then he determines the distribution of each of these letters with respect to the other letters in the alphabet. He determines which letters stand as independent sounds and which in complementary distribution to them. He concludes by distinguishing between sounds which are phonemes and others which are phonetic variants of the phonemes.

Morgenstierne proposes the following inventory of consonantal phonemes for Avestan. The phonemes which belong exclusively to Late Avestan are parenthesized.

1.	k	x	g	(ɣ)			
2.	č	x́	ǰ		(ŋ́)	š	ž
3.	t	θ	d	(ð)	n	s	z
4.	p	f	b	(v)	m		
5.	h						

6. r (ɣ) ř

7. y w

This inventory is quite different, as we shall see below, from that which was presented by Bartholomae (1895) (Chart 4) some fifty years before. It has been abstracted from the same number of Avestan letters standing for nonvocalic sounds. Each of these sounds is represented by at least one letter, which in turn may or may not have other letters as its conditional variants. Furthermore, some of these sounds have phonetic variants for which one cannot find any letter although there are orthographical conventions which indicate their presence.

In view of the fact that Morgenstierne's (1942a) analysis is still the most detailed description available, I shall discuss here certain points of his description in detail.

The Avestan ŋ is in most instances a variant of dental n before h, but the two occurrences of ŋ in LAv. paŋtaŋhum 'fifth port' and before r in hazaŋra 'one thousand' forced Morgenstierne to consider it a phoneme. In Gatha Avestan ɣ is a conditioned variant of g, but in Late Avestan they have become contrastive. The same is true for all the voiced fricatives, i.e., v ð ɣ. A GAv. ŋ́ is very rare but seems to be a phoneme in Late Avestan.

In the orthography there are three distinct letters

for $\underline{\check{s}}$ which are normally transcribed as $\underline{\check{s}}$ 𐬱, $\underline{\check{\check{s}}}$ 𐬲, and $\underline{\grave{s}}$ 𐬳. Morgenstierne assumes that $\underline{\check{\check{s}}}$ (<*cy) may be a fricative counterpart of $\underline{\check{c}}$, and $\underline{\grave{s}}$, a voiceless fricative counterpart of $\underline{\check{r}}$ (<*rt); but in Gatha Avestan they probably merge into $\underline{\check{s}}$.

Morgenstierne claims that certain Av. consonants have palatalized or labialized variants which are identifiable by different orthographical conventions. For example, a $\underline{t}$ preceded by an $\underline{i}$ is pronounced as a palatalized [t'], whereas after $\underline{a}$ it is [t]. Also he defines the traditional $\underline{h'}$ sign as a palatalized variant of $\underline{x}$ rather than of $\underline{h}$. The $\underline{h}$ has a labialized allophone [h^w] after $\underline{u}$- in $\underline{baraŋuha}$, which is different from the labialized [x^w]. Morgenstierne considers the [h^w] and [x^w] to be phonemically /hw/ and /xw/.

An $\underline{hr}$ cluster is believed to be voiceless [$\underset{\circ}{r}$] before $\underline{p}$ and $\underline{k}$ and is considered to be a variant of /r/. Morgenstierne believes that the later [$\underset{\circ}{r}$] becomes an independent phoneme.

In Morgenstierne's Avestan inventory one does not see $\underline{\underset{\sim}{t}}$ $\underline{\underset{\sim}{d}}$ $\underline{h'}$ $\underline{x^w}$ $\underline{\grave{s}}$ $\underline{\check{\check{z}}}$ $\underline{\underset{\circ}{r}}$ which occur in Bartholomae's chart (Chart 4). The $\underline{\underset{\sim}{t}}$ and $\underline{\underset{\sim}{d}}$ are assigned as allophones of /d/, $\underline{h'}$ and $\underline{x^w}$ of /x/, $\underline{\grave{s}}$ of /$\check{r}$/; $\underline{\check{\check{z}}}$ and $\underline{\underset{\circ}{r}}$ are not considered by Morgenstierne at all.

As a supplement to his "Orthography and Sound System in Avesta," Morgenstierne (1942b:79ff.) gives a tabular account of the development of the major Av. consonants

from Proto-Indo-European. I have discussed certain inadequacies of his description of the PIE palatal stops in section 3.4.1.3, but the point which is of interest here is his listing of his reconstructed CIr. consonants, which could have been his main guideline for the phonemicization of the Avesta sounds.

1.	k	x	g		6.	š [~ž]		
2.	č	ǰ	ǰ		7.	θ'	χ'	
3.	t	θ	d	n	8.	r	[l?][8]	
4.	p	f	b	m	9.	y	w	
5.	s [~z ~ h][7]							

This Common Iranian sound inventory can tentatively be equated with what Morgenstierne called Early Iranian, since there is no serious evidence against it at this time. It is also similar to the phonemic inventory that Morgenstierne postulated for Gatha Avestan. The major difference between the two phonemic systems of Common Iranian and Gatha Avestan can be summarized below.

1. GAv. /ŋ/ is developed perhaps from CIr. n.
2. GAv. /š/ replaces CIr. x.
3. In GAv., /z/ and /h/ become phonemic, while in Common Iranian they are only variants of /s/.
4. In Gatha Avestan, /ž/ becomes phonemic, while in Common Iranian, is is an allophone of /š/.

5. GAv. /r̆/ is a new phoneme; it developes from the CIr. /rt/ cluster.
6. CIr. /θ'/ and /x̌'/ do not appear in Gatha Avestan; they change to /s/ and /z/.

Ten years after the publication of Morgenstierne's article, Eric P. Hamp (1952) presented a short phonemic analysis of "Non-Syllabic Phonemes of Avestan," which deals mainly with Late Avestan. It is based on the orthography without reference to any historical or palaeographic evidence. In most cases Hamp's results match those of Morgenstierne, but in a few instances, which we will present below, they contrast with each other.

Hamp's roster of nonsyllabic phonemes consists of:[9]

Obstruents					
1. Stops	k	t	p	č
	g	d	b	ǰ
2. Spirants	x	θ	f	
3. Sibilants		s		
		z		
4. Shibilants		š		
		ž		
5. Nasals		n	m	
6. Semiconsonants		r		
7. Aspirates		h		
8. Semivowels[10]		y	w	

This chart is very similar to Morgenstierne's (1942a) inventory of Gatha Avestan, even though Hamp postulated it for Late Avestan. The differences between the two scholars' inventories have to do with the rigor used in the phonemic analysis of the data. Hamp's analysis exemplifies the linguistic climate of the post-Bloomfieldian era when phonemic theory was becoming a rigorous "scientific" method of investigation of the phonology of a language. Morgenstierne represents the pioneering European work in phonemics in the early 1940's.

The difference between Hamp's and Morgenstierne's Gatha Avestan phonemic inventories can be seen in the presence of /ś̬/ and /ŕ̬/ in Morgenstierne. He posits these two sounds for Gatha Avestan (as well as for Late Avestan) on the basis of orthographic and etymological differences, although they are purported to have become /s̬/ eventually. Hamp (1952:81) working only on the orthographic evidence without concerning himself with etymology, specifies the complementary distribution of each of the signs and assigns the three signs to one phoneme, /s̬/:

1. [s̬] ∿ allophone of /s̬/ before /k t p č#/
2. [ś̬] ∿ allophone of /ś̬/ before /y/
3. [r̬] ∿ allophone of /ś̬/ elsewhere

Another difference between the two is the status of Av. voiced fricatives. Morgenstierne assigns phonemic

status to them for Late Avestan but allophonic status in Gatha Avestan. His reason for this analysis is not phonemically motivated; in fact, he does not show enough contrasts between the voiced stops and voiced fricatives to warrant such an analysis. It seems that Morgenstierne confuses the idea of the existence of a set of new, regular correspondences--specified by new signs--with new phonemes. Hamp, working with the more rigorous phonemic theory, considers these voiced fricatives to be allophones of the voiced stop, even in Late Avestan. On the other hand, Hamp, not overly concerned about the phonetic value of the signs, goes along with the traditional interpretation of the h' sign (as a palatal h) and considers it to be an allophone of /h/, whereas Morgenstierne, on the basis of what he calls [h'] --a "phonetically unlikely sound"--, does not accept the traditional view, but rather considers [h'] to be an allophone of /x/.

3.5.2 Old Persian

In Bartholomae's (1895) contrastive description of Old Persian and Avestan, the former seems to be less accurately described. Many of the sounds that he postulates for Proto-Iranian are simply of Avestan character, and as such, not appropriate as underlying sounds for the Old Persian phonetic system.

Almost all Iranists who work with Old Persian disagree

with Bartholomae on a number of issues, some of which were touched on before in 3.5. Meillet and Benveniste's (1931) Grammaire du vieux-perse is the best synchronic description of Old Persian available to date. Their phonetic analysis of Old Persian data is very lucid. They claim a close relation between OP sounds and those of Common Iranian:

> Le systeme consonantique du perse represente celui de l'iranien commun, a quelques particularites dialectales pres:
>
> | | | |
> |---|---|---|
> | p | t | k |
> | f | θ | x |
> | b | d | g |
>
> on y joindra les semi-occlusives chuintantes c, et j..., les nasales m et n, les sifftantes s, z et š, ž, plus la sifflante particuliere rendue ici par ss, les sonantes y, w, r. La language ne comparait pas de l.

Each of these sounds is described with regards to the environment in which it occurs, its probable pronunciation, and, at times, in relation to some older stage of language. Because of the descriptive nature of Meillet and Benveniste's Grammar, one finds a more detailed treatment of Old Persian than was observed in the contrastive study of Bartholomae (1895). The most important achievement of this book in the area of phonology is its introduction of dialectal considerations in determining the sounds of Old Persian. In their examination of the Old Persian lexicon, Meillet and Benveniste, following Bartholomae, observe the fact that certain words differ from the expected forms by deviating from

the well-known historical sound changes. For example, in certain words where historical considerations require the presence of OP θ or d, an s or z appears, while in other lexical items one finds the normal correspondences θ and d. Bartholomae (1895) describes this to be the result of "alternation" between different OP sounds. For example, his rule (14a-b) accounts for the alternation of d with z, both etymologically corresponding to PIr. z. This PIr. z, on the one hand, is itself derived from several other sounds, i.e. PIE s d ĝ ĝh, (corresponding to Bartholomae's PIE z δ ɣ ɣh). The restriction on the distribution of these PIE sounds already excludes the occurrence of PIE z in initial position; it occurs only before voiced consonants. It is also known that the PIr. z, which comes from PIE d (Bartholomae's PIE δ) occurs only before a PIE d, so that the only other z which is found in Proto-Iranian must necessarily be a reflex of the PIE ĝ and ĝh (cf. rules (8), (22), and (23d)). On the other hand, OP d, besides its normal correspondences (PIE d and dh), "alternates" with PIr. z, which is itself a reflex of PIE ĝ ĝh. This d inherits all the distributional conditions of PIE ĝ and ĝh and completely merges with the PIr. d. Meillet and Benveniste consider this two-way development of PIE ĝ ĝh into z and d, not a matter of alternation of two OP sounds, but a mixture of Old Persian and Median or Avestan dialects, perhaps through borrowing. The same explanation holds true

for the s and θ alternation specified by rules (15a and c), Chapter Two. However, in the case of s and θ we have an Old Persian text where the same lexical item appears in two different forms, e.g. aθanga- and asan- 'stone.'

Meillet and Benveniste consider the d and θ to be the Old Persian correspondence to PIE k̂-, (Bartholomae's x-series), while z and s, which appear in words that are borrowed as Median reflexes. How the OP θ and d have been evolved is not discussed by them, but it is conceivable that PIr. s reflexes of PIE palatals undergo further changes to produce OP θ and d, while no such change is necessary for Avestan or Median.

The best available account in English of the diachronic sound changes that give rise to the Old Persian sounds, appears in Kent (1950, 1953). It summarizes most of the important sound changes involved. In a way it is a fitting supplement to Meillet and Benveniste's (1931) descriptive grammar.

A great deal of Kent's (1953) account of sound changes has appeared throughout this chapter. He follows the tradition of Brugmann (1897) in developing the PIIr. sound system; however, in more important cases, he stops short of reconstructing the Proto-Iranian stage. For example, he does not explicitly state the PIr. reflex of PIIr. ś-sounds. He derives the OP θ and d and Av. s and z directly from PIIr. ś- and sometimes from PIE k̂-sounds,

ignoring the commonly expressed view that Proto-Iranian reflex of PIIr. ś- is dental sibilant s (cf. 3.4.1.3). If he accepts this, in view of the fact that Avestan reflexes of PIE k̂-sounds are also s and z, these Avestan sounds appear to be identical with Proto-Iranian sounds. Then OP θ and d would naturally appear as later innovations. Not being willing to become involved in such a dispute, he avoids the question and derives the Old Persian and Avestan reflexes of PIE k̂-sounds from PIIr. ś-series. Perhaps another reason for his not having a Proto-Iranian reflex of PIIr. ś-sounds is the fact that in Old Persian it appears as three different sounds: θ s š in aθanga, asa, and wišta, and in Avestan as two sounds: s and š in aspa and wišta. It should be remembered that most of Kent's statements of sound change are very general and operate across the board (cf. rules (1), (2), and (3)). Such general statements--to be used as a teaching guide--could not be worked out for OP θ s š. Therefore he treats all the examples of OP š (from PIE k̂) in a different section and those of s as cases of dialect mixture.

Most of Kent's (1953) individual treatment of sounds, e.g. PIIr. ćy to šy, can be accounted for by the general rules, but there are several sound changes that are exclusively Old Persian. For example, PIE k̂r and k̂l and PIE tr and thr all become OP c, a sharp, lengthened sibilant (cf. Brandenstein and Mayrhofer (1964:13) for a detailed

description of this sound). This was expressed in Chapter Two, rule (14b). Kent (1953) describes the derivation of OP c by a different, apparently unrelated process, although the reflexes of both PIE t and $\hat{k}$ in these positions ought to be OP θ, and the change involved is the same. Another example involves the change of (PIE ty) PIIr. θy to OP šy, but not OP θ from PIE $\hat{k}$, (PIIr. ś).

Hoffmann (1958) discusses the above two issues and points out the ordering factors involved. In the case of OP c, the sound change which produces it must be a late rule--operating subsequent to the change of PIIr. ś to OP θ. But with regard to the fact that only θ from PIIr. t becomes OP š and not OP θ from PIIr. ś, he postulates that the change of PIIr. t to š is prior to the change of PIIr. ś to θ. This allows the latter to appear unchanged in Old Persian.

Gershevitch (1964) uses the change of OP θy to šy, and the exceptions to it, as arguments for identifying minor dialects in Old Persian--separate from Median and Avestan. But Risch (1954) discusses the OP c from the earlier θr as the result of a process of consonant cluster simplification which he believes to be a major characteristic of Old Persian phonology. Another example of this simplification process is the appearance of anaptytic vowels between consonants, as in druɣ/duruɣ. He argues that this indicates that Old Persian is farther removed from common Old Iranian.

3.5.3 Conclusion

Descriptions of Avestan and Old Persian consonants are available in the various references mentioned above. In sections 3.5.1 and 3.5.2 I have discussed certain characteristics of the various descriptions in relation to Bartholomae (1894 and 1895), Chapters One and Two. Depending on the analysis of the PIE palatals in Old Persian and Avestan, one can come to different conclusions about the antiquity of each language. Iranists, except Risch (1954), do not take a clear position on this issue. Meillet and Benveniste (1931) discuss the degree of antiquity of Old Persian vis-à-vis the Avestan language. One finds statements such as the following dispersed in the course of description:

> A beaucoup d'egards, le vieux-perse est une langue dont l'evolution est avancée et commoncements d'un état moderne y apparaissent. (page 19)
>
> Les innovations perses sont en partie les mêmes que celles de l'avesta recent. (page 23)

They present few solid examples in phonology to establish the point of the last quotation. The main sound change that has affected the consonants of Late Avestan to differentiate them from Gatha Avestan, and which Meillet and Benveniste ascribe to Old Persian, is the sound change which causes the voiced stops to become fricatives in intervocalic positions. The pronunciation law, although correct, is not, of course, supported by the orthography of Old Persian and is not held

by many other Iranists.

It should be mentioned that some of the PIE sound changes, such as "Bartholomae's law," (cf. rules (4) and (5), Chapter One), still operate without exception in Gatha Avestan, but in Late Avestan and Old Persian they cease to operate.

In comparing Sanskrit with Avestan, Jackson (1892) mentions certain irregularities in Late Avestan with regard to Bartholomae's law. He noticed that while in Gatha Avestan this law is carried out without exceptions, it shows a number of exceptions in Late Avestan. According to this law, forms such as PIE augh- when suffixed by -*ta should change to *augdha; this later becomes *augda by rule (16) of Chapter One. In Gatha Avestan an anaptytic vowel gets inserted and the result is *aogəda 'you spoke.' But in Late Avestan instead one finds *aoxta, a form deviating from Bartholomae's law. Jackson thinks somehow the suffix -*ta regained its voiceless nature, and according to rules (2) and (3), devoiced the preceding obstruent (which had already lost its aspiration) and later turned it into a fricative by rule (18), all of Chapter One.

These kinds of exceptions and deviations from the general rules in different languages have attracted the attention of linguists for a long time. In the last decade we have seen a number of discussions on these subjects attempting to deal with them in terms of the notions of

"rule-ordering." I shall have more to say about this in the next chapters. The same situation exists in Old Persian, and that is why no mention of Bartholomae's law appears in the Old Persian grammars, such as Kent's (1953).

CHAPTER 3

FOOTNOTES

[1]The laryngeals, as non-obstruent sounds, will not be discussed at all in this study.

[2]Kent (1953:34) has one exception to rule (1) where PIE *k̂-* does not become *ś-*; rather, it becomes *ć*. This occurs only before PIE *s*. The reason for his assumption comes from the reflex of PIE *k̂* in Skt. *kṣ* cluster. He claims that it is difficult to conceive how Skt. *k* could be derived from a PIIr. sibilant *ś*.

[3]The aspiration of all PIIr. consonants disappears in Proto-Iranian; therefore, I have dropped the aspiration from the right hand of the rule.

[4]In accordance with the usual practice, I shall enclose his phonemic symbols in slanted lines and phonetic symbols in brackets.

[5]I had arrived at this conclusion, objecting to Morgenstierne, quite independently, but now that I have come across Gershevitch's article I shall present his arguments as they have been proposed in 1964. See my additional objection on page 214.

[6]More objections to Morgenstierne's view, which is the basis of the work done by Windfuhr, will be given in other places, especially with his idea of the antiquity of Old Persian over Avestan.

[7]The sounds in brackets are variants of the sounds outside of them.

[8]It is not obvious why Morgenstierne even mentions a CIr. *l*. I have represented it here as it appears in his article.

[9]The phonemes of juncture are not listed here.

[10]Here I have to change Hamp's signs, namely, *i* and *u* to *y* and *w*.

CHAPTER 4

FROM PROTO-INDO-EUROPEAN TO PROTO-IRANIAN

4.1 Introduction

Traditionally the main task of an historical linguist has been the reconstruction of a proto-language and a list of sound changes that convert it into its daughter languages. The problems related to the chronology of the sound changes are, if at all treated, but of secondary import.

Part One of this dissertation is an excellent example of this scholarly tradition. It shows that in practice it is impossible to do any serious historical linguistics without knowing the chronology of the sound changes since derivations of a correct descendent language are, to a great extent, dependent upon it.

The present part is an attempt to describe the sound changes involved in the development of OP and Av. consonants within the framework of generative phonology from Proto-Indo-European. The units that have been chosen as PIE sounds are those that have been reconstructed by means of comparative method and internal reconstruction and have been accepted by almost all Indo-Europeanists. No attempt is made here to justify the reconstruction or to present a synchronic phonological analysis of Proto-Indo-European.

The synchronic processes are referred to only insofar as they effect the diachronic changes involved.

In the present chapter the exact nature of the sound changes described in Part One will be re-examined. I shall particularly concentrate on the presentation of each sound change within the distinctive feature framework with the goal of demonstrating the linguistically significant generalization, often lost in the mass of data accumulated in the traditional approach summarized in Part One. While the exact characterization of each sound change is the main subject of this chapter, the relative chronology of these changes is referred to in passing. A more detailed discussion of the latter topic will be presented in Chapter Five.

4.1.1 The model

The description of the diachronic phonological changes involved in the actual development of OP and Av. consonants will be presented here within the framework of generative phonology as proposed by Halle (1959, 1962), Chomsky (1965, 1966), Chomsky and Halle (1968), Stanley (1967), McCawley (1968), and Kiparsky (1965). The basic tenets of generative phonology are taken for granted, and the discussion of the theoretical nature will be limited to those areas that are raised by the data in the course of the description.

The Proto-Indo-European language, like all other

languages, must exhibit a certain degree of phonological redundancy. It is not possible to discuss these redundancies in detail, but occasionally certain of these redundancies are referred to and characterized by a set of morpheme structure conditions. Basically the redundancies impose three types of constraints which are presented by: a) segment structure conditions, b) sequence structure conditions, and c) constraints on the combination of (a) and (b). Following Stanley (1967), I accept the view that "for every significant generalization that can be made about the morphemes of a language there is a corresponding morpheme structure condition," but in this study no attempt shall be made to discuss the PIE morpheme structure conditions, since the aim in this study is not a description of PIE phonology. Rather I shall discuss only those conditions which contribute to the study of diachronic sound changes involved in the development of OP and Av. consonants.

I shall assume that the PIE sound units are presented in the form in which they appear in the lexicon of a generative grammar; that is, each morpheme is represented by a phonological matrix consisting of columns of segments and rows of distinctive features. The phonological component of the grammar, then, operates on these abstract forms and produces their phonetic forms.

The dictionary matrices will present nonredundant specifications of the segments specified by binary features.

These are the input to the phonological rules. The phonological rules may change feature values ('-' to '+' or vice versa), may add or delete whole segments, may permute segments, may introduce new features, or may delete the old ones by adding or deleting rows, etc. The phonological rules will be linearly ordered.

The phonological rules will have the following form: A ⟶ B/X — Y. The arrow (⟶) means "rewrite as" or "replace by." The slash (/) means "in the environment of." Thus the above rule says: "Replace A by B when A is preceded by X and followed by Y." Furthermore, this rule is to be interpreted in such a way that all of the nonredundant features of A which are not specifically mentioned in the rule remain unchanged. For example, the following phonological rule

$$\begin{bmatrix} -\text{low} \\ V \end{bmatrix} \longrightarrow \begin{bmatrix} \alpha\text{back} \end{bmatrix} \Big/ \begin{bmatrix} \quad \end{bmatrix} \quad (c) \quad \begin{bmatrix} \alpha\text{back} \\ V \end{bmatrix}$$

is to be interpreted as: Rewrite all [-low](high or mid) vowels as [-back] (front) vowels before an optional consonant followed by a [-back] vowel, and rewrite all [-low] vowels as [+back] before an optional consonant followed by a [+back] vowel. Nonredundant features of the vowels remain unchanged, e.g. high vowels remain high, mid vowels remain mid, nasalized vowels remain nasalized, and so forth.

The morpheme structure conditions

are applied to all matrices in the surface structure representation of (utterance) sentences prior to the application of the phonological rules. It will show, however, that some of the morpheme structure conditions apply to strings which are the output of phonological rules as well as to those which are the input to this component of the grammar (cf. 4.3.2). Furthermore, following Schachter and Fromkin (1968:18) I will include the convention that when a feature is specified as redundant in the morpheme structure rules, it remains redundant with the application of the phonological rule if the nonredundant feature is changed and the redundant features are not mentioned. For example, all PIE palatal stops [+high] are redundantly [-anterior] which must be specified by a segment structure condition. If a rule changes the value of the feature [+high] to [-high] and does not mention the feature anterior , this means that the segment that was redundantly [-anterior] changes to [+anterior] simultaneous with the change in feature [high].

4.2 Proto-Indo-European

Traditionally most of the reconstructed sound systems for Proto-Indo-European are very symmetrical and systematic. For example, PIE stops consist of four (or five) series of sounds based on the different points of articulation, each of which consists of aspirated and unaspirated voiced and voiceless sounds. The set of sound changes that are postu-

lated for turning these sounds into other sounds in different descendent languages, although posited with a goal of showing a one-to-one correspondence, on the contrary seems responsible for producing a mass of irregularities. In some sense the innovations disturb the regularities easily identified in the inventories of PIE sounds (cf. Charts 1 and 6), which include the universal characteristics of the Indo-European languages.

However, none of the PIE sound inventories that are available to date are as linguistically "systematic" and "natural"[1] as they seem to be. For example, some of the PIE sounds do not appear in any of the descendent languages, e.g. sh zh. They are posited by Bartholomae (1894) because of his view of symmetry and as a consequence of his rules (4) and (5) in Chapter One. Also, PIE $\hat{k}$ $\hat{k}h$ $\hat{g}$ $\hat{g}h$, namely, nonstrident, nonaffricated palatal stops, do not appear as contrastive sounds in any Indo-European language. Most palatal stop sounds in Indo-European languages are also strident affricates. In addition, if any of the available inventories of PIE sounds is subjected to the conditions of "naturalness" and "symmetry" proposed by Chomsky and Halle (1968:400ff.), it will become obvious that any unmarked palatal stops, universally and most naturally are also strident and affricated ([+delayed release]). Therefore, postulation of nonaffricated PIE $\hat{k}$ $\hat{k}h$ $\hat{g}$ $\hat{g}h$, although they are sounds that are in-between the centum velar and the

satam nonvelar descendent sounds, makes the PIE sound inventory not altogether "symmetrical" and "natural."

In this study the following inventory of PIE sounds (Chart 8) is accepted without further discussion, and it will presently be shown that some of the first sound changes (innovations) have the consequence of "simplifying" the language.

4.2.1 Palatals

One of the earliest and most important sound changes that has affected the PIE sound system, and which has given rise to the major Indo-European dialect differentiation, is the change of PIE palatals. The reflexes of PIE k kh g gh are s and z in Avestan and θ and d in Old Persian. The first change that affects the PIE palatals can be characterized by the following:

$$(1)\quad \begin{bmatrix} +\text{obst} \\ +\text{high} \\ -\text{back} \end{bmatrix} \longrightarrow \quad [+\text{strident}]$$

The only nonback, high obstruents in the classificatory chart of PIE sounds are the palatal stops. This rule produces strident affricates in a Jakobsonian way of affricating stops. Chomsky and Halle (1968:321) discover that not all affricates are strident and thus propose a new feature to account for affricatization. Thus the following rule could be substituted for (1):

CHART 8

PROTO-INDO-EUROPEAN SYSTEMATIC PHONEMES

	p	b	bh	t	d	dh	$\hat{k}$	$\hat{g}$	$\hat{g}$h	k	g	gh	s	m	n	r	l	w	y	e	a	o
Syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
Obstruent	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-
Consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-
High	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	+	+	+	+	-	-	-
Anterior	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	-	-	-	-
Coronal	-	-	-	+	+	+	+	+	+	-	-	-	+	-	+	+	+	-	+	+	-	-
Interrupted	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	-	-	-	-	-	-	-
Nasal	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-
Back	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	-	-	-	+
Voiced	-	+	+	-	+	+	-	+	+	-	+	+	-	+	+	+	+	+	+	+	+	+
Aspirated	-	-	+	-	-	+	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
Strident	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
Lateral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-

$$(1a)\quad \begin{bmatrix} +\text{obst} \\ +\text{high} \\ -\text{back} \end{bmatrix} \longrightarrow \quad [+\text{delayed release}]$$

However, I will not accept rule (1a) rather than (1) for the following reasons: The adoption of (1a) necessitates the postulation of another sound change, (1b), in order to change the affricated stops--the output of (1a)--, and most of their subsequent developments, into strident sounds.

$$(1b)\quad \begin{bmatrix} +\text{interrupted} \\ +\text{delayed release} \end{bmatrix} \longrightarrow [+\text{strident}]$$

Since as far as I know all affricated stops in Indo-Iranian are strident and because feature stridency plays a large role in the major diachronic sound changes involved in Indo-Iranian phonology, it seems more natural to express the processes involved by rule (1). Then among the redundancy rules there will be a (rule) segment structure condition, such as:

$$(1c)\quad \text{If} \quad \begin{bmatrix} +\text{interrupted} \\ +\text{strident} \end{bmatrix}$$

$$\Downarrow$$

$$\text{Then} \quad [+\text{delayed release}]$$

which completes the processes involved.

The output of rule (1) is in agreement with Brugmann's (1888:187) earlier view about the pronunciation of these sounds by the speakers of the satam group of

languages. He speculates that in common-Indo-European times, an affricated stop-series is as dialectically plausible as a velar fricative series (posited by Bartholomae, 1883) as is the velar stop series that is pronounced by the speakers of centum dialects (see 1.2.2.2.1).

The output of (1) is comparable to the sounds which many scholars reconstruct to represent the PIIr. reflexes of PIE palatals. Morgenstierne (1945), on the basis of Kafiri dialects, proposes that such affricated palatals are to be preferred over the traditional sibilants as the sounds most immediately derived from the PIE palatals. However, not being very sure of his own proposal, he gives an alternative reconstruction for them. These are the palatalized dental series which he had postulated before (1942b) and used throughout his earlier descriptions of the development of the IE consonantal system in Old Iranian and Avestan. Burrow (1965:73) also postulates for PIIr. a series of palatal affricates of some sort without committing himself to much elaboration on this recommendation.

The change characterized by (1) is a very natural and desirable sound change. It moves the "asymmetrical" PIE sound system toward a more simplified structure by affricating the PIE palatal in line with the sound system of the majority of Indo-European languages. The simplifying effects of rule (1) are well documented by Chomsky and Halle (1968:400ff.) as a natural and universal property of the

unmarked palatals in most languages.[2] Insofar as the development of descendent languages is concerned, it is possible to view (1) not so much as a phonological change as such but as a process of simplification of the system itself. The first major innovation in PIE palatals would then be (15) which changes the palatal affricates into dentals. This line of argument could have more far reaching implications--at least, more far-reaching than I want to get into--with regard to the validity of positing a contrastive series of palatal stop k-sounds for Proto-Indo-European. Perhaps Meillet's (1964 [1927]:91ff.) objection to to the positing of such a series as PIE phonemes can be justified. Although he mentions (1964 [1927]:83) the fact that

> ...les prépalatales ne comportent que difficilement une occlusion parfaite, elles se «mouillent», ce qu'on indique par un accent après la lettre (ainsi k' pour k prépalatal mouillé), et tendent enfin à devenir des miocclusives...,

he posits such unattested segments k_1 as intermediate sounds from which the satam sibilants are derived. These kinds of marked palatal stops are the consequence of his phonological theory which views the sound change as phonetic drift (Kiparsky, 1965:Chapter 2), in this case the change in the place of articulation.

4.2.2 Sibilants

The characterization of the change of these PIE

palatals should not be considered as taking place in isolation; in fact, it is an event in the interwoven network of changes that go on continuously in the Proto-Indo-European language. For example, in the same period that (1) is actively involved in changing certain sounds, another innovation affects the PIE s.

PIE sibilants constitute one of the most complicated issues of Indo-European phonology. Various scholars postulate different numbers of PIE sibilants. Bartholomae (1894: 15) postulates ten, and others, one or two. Following the view of most Indo-Europeanists today, I accept only one contrastive voiceless dental sibilant, s, with a voiced conditioned variant, z, derived through rule (6).

The changes involved in the development of the PIE sibilant in the Indo-Iranian group of languages are as involved as those of palatals. In Sanskrit this dental sibilant is represented, not only by dental s, but also by a retroflex ṣ. In Kafiri there are s ṣ š. In Iranian the PIE sibilant corresponds to s š h. The first change of PIE s in Proto-Indo-Iranian that most scholars agree upon is one or another version of Bartholomae's rule (11), which states that s-sounds become š-sounds when they occur after liquids, velars, and i- and u-vowels (see 1.2.2.2.2), all of which can be represented respectively by: l̥ l̥̄ l̥̄̊ r̥ r̥̄ r̥̄̊; k' k'h g'g'h k kh g gh; x xh ɣ ɣh; and i̯ i ī u̯ u ū. For many years scholars have examined these environments

from a comparative point of view. They have found that this large number of environments is actually reconstructed on the basis of a small amount of attested sounds. For example, there is no evidence for the change in the environment after l l̥ l̥̄, perhaps due to a very early merger of PIE l with r. In Indo-Iranian languages, many members of the class of sounds which Bartholomae calls "gutturals," have changed to other sounds. For example, Bartholomae's velar fricatives--Brugmann's palatal stops--undergo certain changes (see 3.4.1.3). The only "guttural" sounds that remain in most Indo-Iranian languages are thus the simple velar series which are normally characterized by a k. Today most scholars represent the above restrictions by a listing of i u r k where a following PIE s appears as š.

There are several major deficiencies in the phonological framework in which the diachronic description of various Indo-European languages has traditionally been studied. For many years scholars have been aware of the change of PIE s to PIIr. š in the environment following i u r k. They have discussed it in great length and have proved its accuracies by providing a great number of examples. But until now no one as far as I know has explained why such a change which appears in so many different Indo-European language families, i.e. Indic, Slavonic, Iranian, should have taken place after such a diverse and seemingly unnatural group of sounds. In other words, the unanswered

question is, what common phonetic feature is shared by i u r k kh g gh, etc., which would allow an identical change in a following PIE s?

The articulatory phonetic theory upon which most of the work accomplished by Indo-Europeanists is based is not capable of identifying any common feature among i u r k. Within articulatory parameters i and u can be classified as high vowels, k kh g gh as velar stops (consonants), and r as a liquid (resonant). The phonemic theory which is also based on such an articulatory phonetic framework, such as the one used by Lehmann (1952), is also incapable of explaining anything more. In fact, within traditional phonemic theory, the three classes of sounds represented by i u r k are as diverse as they could possibly be; they represent the three major classes of sounds, namely, consonants, vowels, and resonants (cf. 3.2.2). This, I think, is due to the serious inherent limitation of this theory. Indo-Europeanists, linguists, and philologists who have operated or still operate within such a theoretical phonetic framework, as they almost all have done, are forced to characterize the above-mentioned environment by listing the four sounds--i u r k (see Kent (1953), Burrow (1965), and Windfuhr (1971:115) .

The phonetic theory that has been a major part of Generative Phonological theory, namely, Distinctive Feature Analysis, provides for the first time a very plausible

answer to the question concerning the common feature conditioning the change in PIE s. The change of s to š involves a change in the place of articulation; that is, it is a change from the dental area to the alveo-palatal region, obviously due to the phonetic nature of the preceding sound. A glance at the classificatory chart (Chart 8) of the distinctive features of our contrastive sounds reveals that in fact not only the above sounds--i u r k--but all the sounds listed by Bartholomae's rule (11) share a common value in the phonetic feature [+high]. In this theory, the feature high characterizes the placement of the body of the tongue and is one of the primary phonetic features which classifies the primary classes of speech sounds (see Chomsky and Halle, 1968:304ff.). The change involved in the PIE s becoming PIIr. š can be simply described by the following rule:

$$(2)\ [+\text{strident}] \longrightarrow [+\text{high}] \;/\; [+\text{high}][\text{——}]$$

This rule involves a change in the feature high, i.e. [-high] to [+high]. The environment in which it takes place is following a sound which itself has the feature [+high]. It thus appears that this change, which has been the most troubling sound change for Indo-Iranists, is merely a case of progressive assimilation which extends the feature [+high] to a following non-high sibilant. This rule, however, does not account for Kafiri developments.

Accompanied by the change of the value of feature high in (2) is another change, (2a), which alters the feature anterior in the following way:[3]

$$(2a)\quad \begin{bmatrix} +\text{obst} \\ +\text{high} \end{bmatrix} \longrightarrow [-\text{ant}]$$

This change does not need to be mentioned as it is accounted for as a direct result of our convention on the application of rules (cf. 4.1.1, page 135).

4.2.3 Liquids

One major objection that could be raised to the above analysis is the specification of PIE *r* and *l* as [+high]. It has been a customary practice to consider liquids as dentals and, as such, [-high]. This has been an arbitrary practice, and there is no way to prove the validity of such phonetic characterization. In this study I specify the liquids as alveopalatal and, as such, [+high]. The reason for such feature specification is its behavior as a conditioning element, along with other [+high] sounds in rule (3).

It should be noted that *i u r k* do not include *l*. One way of accounting for the exclusion of *l* in the list is to postulate that rule (2) takes place after the following rule:

$$(3)\quad [+\text{lateral}] \longrightarrow [-\text{lateral}]$$

Rule (3) is another isogloss distinguishing the Indo-Iranian languages from the other Indo-European languages. It merges PIE l with PIE r. This order of rule application, (3) then (2), is not accepted by many since rule (2) distinguishes not only Proto-Indo-Iranian but also Slavic languages from other Indo-European languages; whereas, rule (3) identifies the Indo-Iranian languages alone. I do not accept this view of a common pre-Indo-Iranian-Slavonic application of (2). I believe that in each of these languages this sound change has come about quite independently with minor differences in the specification of the environment. For example, in Slavonic s remains after l and in Kafiri it remains after u.

4.2.4 Voiceless stops

Bartholomae (1894), Brugmann (1897), and Kent (1953) --among others--posit a series of aspirated voiceless stops for Proto-Indo-European: ph th $\hat{k}$h kh (kh^w), besides the unaspirated ones (cf. Chart 6). This is the older view of Proto-Indo-European phonology. In the late 1800s, Saussure (1891) proposed that the aspirated voiceless stops were not PIE sounds, but that rather they were derived in Indo-Iranian from the combination of PIE voiceless stops and a laryngeal. Saussure's proposal is now accepted by most Indo-Europeanists. Kurylowicz (1935:46ff.) later provides evidence for the correctness of considering the aspirated

voiceless stops as an Indo-Iranian innovation. Much is now available on this issue with summaries of the main arguments in different handbooks, such as, Burrow (1965), Collinge (1970), Keiler (1970), Lehmann (1952), Winter (1965), etc.

Not much is known about the phonetic features of the laryngeals, and I will not try to describe them in this study. I will accept the view proposed by Kurylowicz (1935) and represent this innovation by:

(4) $\begin{bmatrix} +\text{int} \\ -\text{voice} \end{bmatrix} \longrightarrow [+\text{asp}] \,/\, [\,\underline{\quad}\,] [+\text{laryngeal}]$

(5) $[+\text{laryngeal}] \longrightarrow \emptyset$

Through the application of rule (4), there is an alternation between PIE voiceless stops and aspirated voiceless stops. But as soon as rule (5) eliminates the following laryngeal, there occurs a restructuring in the grammar, and the aspirated voiceless stops become contrastive units.

4.2.5 Assimilatory changes

Most scholars recognize a number of assimilatory sound changes in Indic as well as in the Iranian languages which they assign to the late Proto-Indo-European period. The most widespread of these changes are the regressive voicing assimilations which are described by Bartholomae's rules (2) and (3), (Bartholomae, 1894 §23), (cf. 1.2.1). The distinctive feature framework allows for the two rules

to be characterized by:

$$(6)\quad \begin{bmatrix}+\text{obst}\\-\text{asp}\end{bmatrix} \longrightarrow [\alpha\text{voiced}] \,/\, [\,\_\_\,] \begin{bmatrix}+\text{obst}\\ \alpha\text{voiced}\end{bmatrix}$$

This rule extends the value for the voicing feature of the last member of a cluster of obstruents over all segments in such clusters. It also produces the alternation between the voiceless and voiced IE sibilants, s and z (see 4.2.2).

There is also a progressive assimilatory process which is usually referred to as "Bartholomae's law." It was described earlier under Bartholomae's rules (4) and (5), (cf. 1.2.1). I shall characterize this process by rules (7) and (8).

$$(7)\quad [+\text{obst}\,] \longrightarrow \begin{bmatrix}+\text{asp}\\ \alpha\text{voiced}\end{bmatrix} \,/\, \begin{bmatrix}+\text{asp}\\ \alpha\text{voiced}\end{bmatrix} [\,\_\_\,]$$

$$(8)\quad [+\text{asp}\,] \longrightarrow [-\text{asp}\,] \,/\, [\,\_\_\,]\,[+\text{obst}]$$

By a progressive assimilation (7) extends the features of aspiration and voicing over an obstruent cluster. Rule (8) immediately operates on the output of (7) as a dissimilatory change and de-aspirates the original aspirated obstruent. These two rules account for the facts exemplified by Bartholomae's rules (4) and (5), i.e. ph + t ⟶ pth and bh + t ⟶ bdh, but they also change ph + d ⟶ pth for which he provides no example.

In the generative framework there are alternative

ways of accounting for Bartholomae's law, (7-8). One is the use of transformational rules.

$$(9)\ \begin{bmatrix} +\text{obst} \\ +\text{asp} \\ \alpha\text{voiced} \end{bmatrix}_1 \quad [+\text{obst}]_2 \Longrightarrow [-\text{asp}]_1 \quad \begin{bmatrix} +\text{asp} \\ \alpha\text{voiced} \end{bmatrix}_2$$

This rule is a clearer representation of Bartholomae's law than (7-8): the first segment loses the aspiration while the second segment gains not only the aspiration but the value of the voicing feature of the first segment.

Rule (9) is a much more powerful device than the usual rewrite rules of (7) and (8). There is no theoretical basis by which one can choose between the two alternatives. However, I shall choose the first alternative, (7-8), and will attempt to justify my choice by later language specific developments (see 5.7).

4.2.6 Nonobstruents

In classificatory chart 9 , the so-called resonants are specified as [-syll, -obst]. According to the environment in which they appear they acquire different phonetic specifications (cf. 3.3.3). For this reason, Lehmann (1952) does not postulate $\underline{n}$ $\underline{r}$ $\underline{l}$ $\underline{u}$, etc. in his phonemic inventory. The appearance of these sounds in the phonetic level is described by a number of allophonic statements which are part of the PIE sound system.

In Chapter 3 (page 92ff.) the allophonic statements of

the PIE resonants were presented, but not in an altogether precise manner, especially when resonants appear next to one another. In this section I will attempt to describe, in a different manner, the underlying generalizations that govern the behavior of PIE resonants.

(10) [-obst] → [+syll] / [-syll] [———] [+obst]

(11) [-obst] → [+syll] / [-syll] [-syll] [——]

(12) ø ——→ [-syll] / [+syll] [———] [+syll]

The above rules account for the major morphophonemic variations of the resonants in Proto-Indo-European as first completely explicated by Edgerton (1943). Lehmann (1952) demonstrated the regularities discovered by Edgerton through the tabulation of certain hypothetical forms which appear in Chapter Three of this study. Rule (10) applies to all resonants when they appear before an obstruent or word boundary[4] and after a nonsyllabic element.

tyt > tit

#ti > ti

atywt > atyut

ayw > ayu#

aywyt > aywit

ktywt > *ktyut

#tywt > *#tyut

Rule (11) operates on the resonants which appear after a

cluster of two nonsyllabic elements, namely, two consonants or a boundary and a consonant, some of which are the forms already changed by (10).

ktywa > ktiwa

*ktyut > *ktiut

aywya > *aywia

#tya > *#tia

*#tyut > *#tiut

Except for the first item, all the above forms which are the output of rule (11) are wrong. Rule (12) must operate on them to give the correct result.

*ktiut > ktiyut

*aywia > aywiya

*#tia > tiya

*#tiut > tiyut

One problem seems to remain unsolved: the resonants which appear after a consonant preceded by a long syllable. None of the above rules seems to change them; therefore, they will all remain nonsyllabic as resonants are marked [-syllabic] in the systematic phonemic representation. One way to account for them is to accept PIE long vowels as items that are derived secondarily through certain phonological rules not described in this study. This concept is the basis for excluding long syllabic items from classifica-

tory chart 8 . The long vowels then could be considered as combinations of a vowel and a laryngeal:

$$\begin{bmatrix}+\text{syll}\end{bmatrix}\ \begin{bmatrix}+\text{H}\end{bmatrix} \Longrightarrow \begin{bmatrix}+\text{syll}\\+\text{long}\end{bmatrix}$$

This would allow for writing the long vowels in forms such as ātiya, ātiyut, and āyuwa as aHtya, aHtywt, and aHywa. Now the above rules apply and give the correct results.

aHtywt by (10) > aHtyut by (11) > aHtiut by (12) > aHtiyut

aHtya by (11) > aHtia by (12) > aHtiya

aHywa by (11) > aHyua by (12) > aHyuwa

It should be noted that the above three rules are morphophonemic statements about the synchronic state of resonants in the Proto-Indo-European language. The scholars who work in the tradition of Bartholomae (1894) and Brugmann (1897) consider these rules as very early sound changes already operating in Proto-Indo-European and thus derive the later Proto-Indo-European daughter languages from the output of these sound changes--the allophones of the original resonants (cf. 1.2.3, 1.3.2 and 2.3.3 to 2.3.5).

4.3 Proto-Indo-Iranian

The twelve rules given above are all that is needed to arrive at the stage comparable to what is usually called Proto-Indo-Iranian. The only changes that have produced

restructuring are those of (3), (7), and (8). All other sounds remain unchanged in the underlying representation. All forms with PIE l are now identical with those of PIE r. Instead of voiceless stops before laryngeals, there is now a series of aspirated voiceless stops, which contrast with other voiceless stops. If a new classificatory chart of systematic phonemics for Proto-Indo-Iranian is to be set up it will differ from that of PIE Chart 8 by the absence of a column for l and the addition of a column for voiceless aspirated stops. The rest of the changes described through (1-12) produce changes in feature specification of the different segments.

4.3.1 Sibilants

Due to the innovation characterized by (2), an alternation between PIE s and š appears early in the language. Most scholars assign this sound to the Proto-Indo-Iranian period. However, the PIE s continues to change with time. Scholars disagree on the number and the order of changes that affect the PIE s in producing its different reflexes in Old Persian and Avestan. The major innovation that affects PIE s in distinguishing the Iranian from other Indo-Iranian languages is the appearance of alternation between s and h.

The sound change that produces h is interestingly complicated in two respects. First, the change involves

segments with completely opposite feature compositions. The specification of PIE s is [-syll, +obst, +cons, +coro, +ant, +strid] and that of h is [-syll, -obst, -cons, -coro, -ant, -strid]. The change is in at least five different features. Although this wholesale change of feature specification is a very costly one in the distinctive feature theory, nevertheless, it is relatively common in many languages, e.g. Spanish, Greek, Sanskrit, and so forth.

The second point of interest involves the diversity of the different environments in which this change is believed to have taken place. Bartholomae (1894) specifies these environments by stating where IE s does not change to h, i.e. before voiceless stops, before n, and after t and d (see 1.3.1.2.2). Kent (1953:40) reduces this to the position before p t k, perhaps because of the Old Persian data. Almost all Iranists assign the change to the Proto-Iranian period. None of the scholars that I have investigated go beyond listing such an unnatural class of sounds next to which the change has taken place. No one even asks why such a change has taken place under such diverse conditioning factors.

The inability of the Iranists working within the tradition of Bartholomae and Brugmann to address themselves to the question raised here is due to the limitation of the linguistic theory with which they work. Their understanding of the process of sound change and their view that one

language descends directly from an earlier stage of the language have been very limited. One finds ample evidence in the works of these scholars to show that they believe that once a change has occurred in a sound, it is impossible for it to reverse itself. In other words, sound change is unidirectional. Also, when a sound change happens in any stage of the language, the next stage inherits only sounds that are available in that stage. And if the next stage of the language were to change, the domain of its innovations would (have to) be limited to the sounds that it has inherited from the earlier stage.

In order to support the above assessment of the work of these scholars, one need only examine their handling of the development of PIE s to Old Iranian h. The following (a) through (c) represent the essence of Bartholomae's (1894) and Reichelt's (1909:51) accounts of PIIr. s.

(13) a.
b. s → { h ~ / ___ p, t, k ; h ~ / ___ n ; h ~ / t, d ___ }
c.

While (13a) states the reflexes of PIIr. s in Old Persian, (13a-c) seem to represent the situation in Avestan; but this is in fact meant to represent the changes that affect PIE s in Proto-Iranian times. If one agrees with Kent (1953:40) that the only change that affected PIIr. h was (13a), which is the most general rule and which gives us an environment that

consists of a natural class of sounds, then an *h will appear before n. This would produce the wrong result as PIE s and not h appears before n (and r) in Avestan. One way of remedying this is to have (13b) apply first and then (13a). No one would agree to that since the notion of the ordering of rules in historical development, which is vaguely implicit in the work of these scholars, would be violated; no one would claim that (13b) is historically older than (13a). In addition, there is no evidence for (13b) and (13c) in Old Persian altogether. On the other hand, (13c) is really not a rule at all; it states that one cannot find s after t and d in Avestan. This, however, is not an accurate statement. The facts are that there is no IE s after t or d in Avestan; the PIE s which used to occur after an earlier t and d remains unchanged even after t and d, for whatever reason, have disappeared. In order to keep this PIE s from becoming h in Avestan (13c) is posited. There is no evidence in Old Persian to reject or to substantiate this rule. One thing that seems to be certain is that (13b) and (13c) belong exclusively to Avestan and not to the Proto-Iranian stage.

Considering the lack of Old Persian support for (13b-c), one could attempt to account for the latter innovations as purely Avestic. But this would not be accepted by any Iranist because if the change indicated by rule (13a), or some rule of that general character, had already altered

all instances of PIIr. s, then one would have to change PIr. h (from PIE s) back to Av. s before n (and r) or after t and d. This type of sound change which reverses a sound to its earlier form is against the unidirectional tendency and the irreversibility of sound change.

There is a corollary concept involved in the above practice. Within this theory and practice, when one studies a language he sees phones, phonemes, morphemes, allomorphs, etc., that is, different inventories of different types of units. The interrelation between these units is of much less interest. As a result the reconstruction of different stages of languages in the past reflects these underlying assumptions in all points. This kind of linguistic theory, which views the languages as sets of sounds rather than as a set of rules which governs the network of relationships in the language, has handicapped the studies of most Iranists. For example, they cannot conceive of the notion that Avestan and Old Persian grammars can have rules and that each can have different sets of rules or that both can share the same rules in different orders. Consequently, Iranists have lumped together, as a Proto-Iranian process, all they knew about PIIr. s in the manner discussed above and have hoped that by deleting the unnecessary resulting elements from Old Persian that they have solved the problem.

In the following pages I shall present the changes of PIIr. s to h in a way different from the above.

$$(14)\quad \begin{bmatrix} +\text{obst} \\ +\text{ant} \\ -\text{int} \end{bmatrix} \longrightarrow [-\text{cons}] \sim / \; [\; \underline{\quad} \;] \; [+\text{cons}]$$

At this stage of development of the Indo-European language, the only non-interrupted anterior obstruent is s, which changes through (14) to h before vowels and glides. It does not change before nasals (13b) and liquid r, both of which are [+consonantal]. However, it takes care of (13c). I shall describe this later. In order to account for more of the restrictions indicated by (13), one can rewrite the rule with curly brackets.

$$(14a)\quad \begin{bmatrix} +\text{obst} \\ +\text{ant} \\ -\text{int} \end{bmatrix} \longrightarrow [-\text{cons}] \sim / \; [\; \underline{\quad} \;] \left\{ \begin{bmatrix} +\text{nasal} \\ +\text{coro} \end{bmatrix} \right\} \left\{ [+\text{cons}\;] \right\}$$

The top part of this rule accounts for the retention of PIIr. s before n, and the bottom part takes care of everything else. Disregarding the occurrence of s in the environment of (13c), (14a) takes care of all the changes characterized by (13).

I shall reject the adoption of rule (14a) as part of the grammar of Proto-Iranian for the following reasons: It was mentioned earlier (page 24) that the environment in which the changes in (13) take place cannot be considered as a natural class of sounds. In fact, that is why the curly brackets are used above. Rule (14a) is not a single sound change; it is a combination of two separate rules.

The first question that one must ask is whether these two rules have affected the language at the same time. A simultaneous application of the two in such diverse environments is doubtful. There is no evidence to support it. In accordance with the tendency of the spread of sound change through rule addition or rule simplification, it seems more probable that one of the two rules operated first. If it is accepted that the two rules were not simultaneous, two other questions must be answered. First, which of the two takes place first? And second, do the two rules apply immediately one after the other? Historically there is no way to answer these questions. Most Iranists assume that some kind of a change in PIE s takes place after the split of Iranian from Indic languages.

It is these kinds of questions which have led me to postulate (14), which is equivalent only to the bottom part of (14a). Although the curly brackets of (14a) would demonstrate the two different environments in which h never corresponded to IIr. s, they are void of any explanatory power with respect to the issues raised above.[5] By postulating (14) I separate the two parts of (14a) and provide a negative answer to the question of whether the two sound changes are simultaneous. Also by positing them in such an early stage of the language, I claim that the bottom part of the rule was an earlier sound change. However, the answer to whether the rules applied immediately one after another needs

some elaboration.

The remaining reflexes of the PIE s, that is, excluding those changed by (2) and (14), appear differently in Avestan than in Old Persian. In the former the s changes to h before m alone, (13b), whereas in the latter we are told (Kent, 1953:41) that h occurs before m and r, but no example of OP h or PIIr. s before an n is attested. In other words, PIE s still occurs before n and r in Avestan but not in Old Persian.

4.3.2 Palatals

The series of palatal affricates, the output of (1), undergo additional changes in the course of the development of different Indo-Iranian (or perhaps satam) languages. According to the nature of their change, they produce the various attested correspondences--Sanskrit, Kafiri, Old Iranian--of the PIE palatal stops. The type of change that these affricates can undergo is dependent upon the other sound changes that affect the grammar and the inherent properties of the phonological units of each language.

In Iranian languages the above affricates undergo further changes:

$$(15)\ [+\text{strid}] \longrightarrow [-\text{high}] \sim / [\text{---}]\,[-\text{syll}]$$

Except for the environmental factors, (15) seems to be just the reverse of (2) which changes nonhigh stridents to high

sounds. The change represented by (15) involves one more feature besides high, namely that of anterior. This is a natural consequence, a side effect of the change in the feature high--and quite the reverse of (2a)--since all non-high obstruents are also redundantly [+anterior].

(15a) If $\begin{bmatrix} +obst \\ -high \end{bmatrix}$

$\Downarrow$

Then $[+ant]$

It should be noted that (15) can be replaced by

(15') $[+strid] \longrightarrow [+ant] \sim / \; [\text{——}][-syll]$

and (15a) then by

(15'a) If $\begin{bmatrix} +obst \\ +ant \end{bmatrix}$

$\Downarrow$

Then $[-high]$

and still represent the desired innovation. It is obvious that there is nothing in the form of the rules that would make one alternative more desirable than the other. In fact, the theory of generative phonology offers no mechanism for selecting one over the other without the aid of the notion of linking rules. This notion allows for the correct application of phonological rules in accordance with the marking conventions which specify the intrinsic content of phonological features. A similar situation exists in

the palatalization process of the Slavic languages. Chomsky and Halle (1968:420ff.) handle the problem through the marking conventions which set up a hierarchy among the features. Their conclusion supports the choice I make here by adopting (15) and (15a) as the more natural way of describing the sound changes involved.[6]

Obviously, rules (2a) and (15a) could be combined together by the use of variables in the following way:

(16) If $\begin{bmatrix} +\text{obst} \\ \alpha\text{high} \end{bmatrix}$

$\Downarrow$

Then $[\ -\alpha\text{ant}]$

This would state the significant generalization that is inherent in the structure of the phonological system of Proto-Indo-European and will account correctly for the involved innovations. An alternative to (16) is available through the utilization of marking conventions (see Chomsky and Halle, 1968:405-7). However, within the model used in this study (4.1.1), the changes indicated through redundancy rules (2a), (15a), and (16) are automatically taken care of due to the convention that was imposed on the application of phonological rules (cf. page 135).

It should be noted at this point that the output of (15), which is an affricated dental, is very similar to the reflex of PIE palatals which Morgenstierne (1945) found in Kafiri dialects. In these dialects only the voiceless

c̲ [t^s] has remained an affricated dental while the rest have become y̲ or z̲. These could very well be later developments which parallel those of Sanskrit.

Before going further in the description of the PIE consonants, I shall recapitulate the main changes that I have already described. All of the PIE palatal stops have become affricated palatals (1) or dentals (15); the PIE l̲ and r̲ were merged into r̲ (3), and the PIE s̲ was changed into a palatal sibilant (2) and h̲ (14).

After the change characterized by (14) has taken place, the alternation that was represented by (1) and (15) merges with those of (2) and (14) by:

(17) [+strid] ⟶ [-int]

On the one hand, this rule changes the palatal affricates which were the result of the application of rules (1) and (15) into palatal fricatives, which automatically merge with the output of rule (2). On the other hand, it changes the dental affricates into dental fricatives, identical with the PIE s̲ which still exists in the language following the operation of rules (2) and (14). Rule (17) is one of the last major rules in the development of PIE palatals, which derives their Old Iranian reflexes which are sibilants.

4.3.3 Velars

After rule (17) eliminates all the instances of PIE

palatal stops by changing them into PIr. sibilants, a new series of palatal stops is developed.

$$(18)\ \begin{bmatrix}+\text{obst}\\+\text{high}\end{bmatrix} \longrightarrow [-\text{back}] \,/\, [\text{——}]\ \begin{bmatrix}-\text{cons}\\-\text{back}\\-\text{low}\end{bmatrix}$$

This series of palatal stops establishes a new alternation with the velars until the time when parts of the conditioning factors of this alternation are eliminated. After the application of rule (18), the PIE e and o vowels merge with PIE a. This creates a restructuring of the language and causes the new series of palatals to become contrastive units. This process is traditionally called "second palatalization."

The merger of PIE e and o into a is shared by both Indic and Iranian languages, and as a result, almost all scholars posit this change for the Proto-Indo-Iranian stage. In the same vein, the preceding rule, (18), is assigned not only to Proto-Indo-Iranian, but some people consider it to be a distinguishing feature of Slavic languages as well.

I consider this rule as a very late development in the grammar; it follows the rule which creates the PIr. h (rule 14). This means that I consider the second palatalization as a late independent development in the various satam languages. This is not, of course, in agreement with the traditionally accepted view.

Within the present theory, the palatal stops, the

output of rule (18), are nonaffricated. It is necessary to have another rule to turn the output of (18) into strident affricates--a rule identical with rule (1).

(19) $\begin{bmatrix} +\text{obst} \\ +\text{high} \\ -\text{back} \end{bmatrix} \longrightarrow [+\text{strid}]$

If it is accepted that rules such as (1) and (19) are segment redundancy conditions of the language, their appearance as phonological rules is not desired. However, this was not accepted for the Proto-Indo-European system and was considered as a simplifying move towards a more natural system. The question that should be asked now is if, at this stage of language development, when individual languages have split from other Proto-Indo-European languages, it is correct to assign (19) as a segment structure condition. All evidence points towards a positive answer and thus (19) becomes a segment structure rule.

(19a) If $\begin{bmatrix} +\text{obst} \\ +\text{high} \\ -\text{back} \end{bmatrix}$

$\Downarrow$

Then $[+\text{strid}]$

4.3.4 Stops

The result of the changes characterized by (4-5) is an increase in the number of PIIr. stops. The application of (1), (15), and (17) eliminates the original PIE palatals.

Most of these sounds remain unchanged in Sanskrit, but in Iranian they undergo new changes.

(20) $\begin{bmatrix}+\text{asp}\\-\text{voice}\end{bmatrix} \longrightarrow [-\text{int}] \sim / [+\text{cons}]\ [\text{——}]$

(21) $\begin{bmatrix}+\text{asp}\\-\text{voice}\end{bmatrix} \longrightarrow [-\text{int}] / ([-\text{cons}])[\text{——}]\ [-\text{syll}]$

(22) $[+\text{asp}\ ] \longrightarrow [-\text{asp}]$

The three rules above characterize the changes that PIE voiceless and voiced stops and those produced by rules (4) and (5) must undergo sometime before reaching the Old Persian and Avestan stages. Although all of the aspirated sounds undergo the general process of de-aspiration, voiceless stops in particular are subject to further changes.

The simple PIE voiceless stops change to their corresponding voiceless fricatives only in certain environments. But aspirated voiceless stops, the output of (4-5), according to environments, change in two ways; they either lose their aspiration and fall together with the simple voiceless stops, or they become the corresponding unaspirated voiceless fricatives. Most of the available descriptions of these changes specify that voiceless stops change to fricatives before a consonant, if not preceded by a sibilant or n. Aspirated voiceless stops change to simple stops when they follow a sibilant or n and to fricatives elsewhere (cf. 1.3.1.1).

Rule (20) characterizes the change that aspirated voiceless stops undergo. Its environmental conditioning factors differ from those found in other descriptions. It specifies that the change does not take place if the preceding sound is a consonant. I believe that this is correct; one cannot find any evidence, at this stage of language development, that aspirated voiceless stops have become fricatives after any consonant, excluding the development of PIE palatals. The reason that one finds only sibilants and n as the conditioning factors in other descriptions is that most of the Iranists are preoccupied with cataloging the sounds of their data. They do not attempt to draw significant linguistic generalizations by going beyond the observable data even though the whole method of comparative diachronic linguistics is based on such generalizations. Rule (20) derives a series of aspirated fricatives. And (21) also produces voiceless fricatives but unaspirated. But the PIE voiceless stops to which (21) does not apply are those which appear after consonants. Rule (22) de-aspirates all the aspirated sounds. It changes the PIE voiced sounds--the aspirated sounds which have gone through rules (1), (15), and (17) and the output of (4), (5), (18), and (20).

In order to arrive at the correct result, (22) must be ordered with respect to (20) and (21); for if we were to place it before (20), it would merge the aspirated stops with unaspirated ones and there would be no more need for

(20). However, if it is placed after (20), it would affect not only the output of (20) but those voiceless aspirated stops that were not affected by (20), i.e. clusters such as *sth and *sph. Then rule (21) would apply not only to the PIE voiceless stops, etc., but also to voiceless stops from the aspirated voiceless stops (22) and would change them into fricatives when they occur before [-syll] segments. Thus PIIr. *sthr becomes, through (22), *str, and by rule (21) it changes to *sθr, a result which is incorrect. But if (20) and (21) apply before (22), no such undesirable result would be produced.

The above-mentioned changes (20-22) of PIE or PIIr. stops are considered to be among the main innovations which distinguish the Iranian languages from the Indic ones. In this section I have attempted to describe the traditional view within the distinctive feature method of analysis. The application of rules (20-22) is ordered in such a way as to maximize the domain of their application while minimizing the number of features that are to be changed by these rules. The above characterization of these changes by three ordered rules is obviously a great improvement over the generally vague and often confused descriptions found in the literature. Nevertheless, they are not as elegant as they might be. There is a partial similarity of the environments in (20) and (21), and the fact that it is not possible to combine them into one rule clearly shows that the

analysis above does not represent a significant linguistic generalization.

For many years Indo-Europeanists have observed the partial similarity of the conditioning factors in the changes characterized by (20) and (21). They have known that, in general, corresponding aspirated and unaspirated voiceless stops, where the latter are followed by a consonant, merge into a voiceless fricative; but if any of these stops are preceded by a sibilant, the aspirated stops become unaspirated while the original PIE unaspirated voiceless stops remain unchanged. (cf. Bartholomae, 1894; Kent, 1953, etc.). There have been no straightforward ways for them to specify the partial identity of the environments without redundantly stating them twice, especially since the aspirated voiceless stops undergo two separate changes--i.e. loss of aspiration and fricativization--while the unaspirated stops undergo one change which produces a conditioned fricative series. In the environment where the aspirated stops are found losing their aspiration, the original unaspirated stops do not change, which results in a merger of the former into the latter stops. In the environment where both classes of stops change into voiceless fricatives, the conditioning factors are quite diverse. One thing has been obvious to all--that after a sibilant a stop always appears; that is, the change to fricative is not carried on in this environment.

In an attempt to specify the partial identity of the environmental factors discussed above, I was faced with the same difficulties. I was unable to eliminate the redundant parts of rules (20) and (21) and capture the generalization that must underly these changes. All attempts within the traditional taxonomic framework of phonemic theory are doomed to be no more revealing than the statements of correspondances of the nineteenth century.

One of the major contributions of this dissertation to the field of Iranian phonology is the explanation that it provides for the first time in Indo-European linguistics for the troublesome and yet unexplained factors involved in the changes of PIIr. stops into Iranian. The reason for partial identity of the environments, in which stops appear after sibilants or in which stops never change to fricatives (after sibilants), is a very simple one. It has to do with the redundancy condition of PIE morpheme structure. But this cannot be stated except through the theoretical provisions of generative phonology. The entire conditioning factors for (20) and its identical counterpart in (21) could be eliminated since in these environments the change specified by (20) and (21) does not take place. These are not changes and thus cannot be stated by phonological rules. In our theory, phonological rules add, eliminate, and change features and segments, none of which occur when the stops are followed by [+cons, -voc] in the underlying form of this

stage of language development. Instead, the process can be stated by a sequence structure condition which belongs to the Proto-Indo-European language and still is operating within the language.

$$(23)\ \begin{bmatrix}-\text{syll}\\+\text{cons}\end{bmatrix}\ \begin{bmatrix}+\text{obst}\\-\text{strid}\end{bmatrix} \Rightarrow \begin{bmatrix}+\text{int}\end{bmatrix}$$

Rule (23) states that in a morpheme all voiceless obstruents following another obstruent must redundantly be [+interrupted].

The postulation of (23) forces us to modify the anaylsis of the changes that affect the Proto-Indo-Iranian stops. They can now be characterized by rules (24) to (26).

$$(24)\ \begin{bmatrix}+\text{asp}\\-\text{voice}\end{bmatrix} \longrightarrow [-\text{int}]$$

$$(25)\ [-\text{voice}] \longrightarrow [-\text{int}] \,/\, [\underline{\quad}]\ [-\text{syll}]$$

$$(26)\ [+\text{asp}] \longrightarrow [-\text{asp}]$$

Redundancy rule (23) will prevent these from producing any undesirable sounds. Rules (24) and (25) will produce voiceless fricatives--in environments allowed by (23)--and (26) will de-aspirate not only voiced stops but also voiceless stops kept because of rule (23), as well as the fricatives--the output of (24)--and all the others.

4.3.5 Dentals

Dental stops constitute an exception to the changes characterized by (25). It has been noticed that in clusters of two voiceless dental stops, the first stop does not become the expected PIr. θ, rather, it becomes s. In a parallel manner, the first stop of two voiced dental stops becomes a corresponding PIr. z. There are two major views on this process which are presented by Bartholomae's rules (1C) and (24), (cf. 1.2.2.2.2 and 1.3.1.2.2), and by Reichelt (1909:35-38). The only disagreement among Indo-Europeanists about this sound change concerns the time in which it is supposed to have taken place (cf. 3.4.2).

There is one apparent exception to the above two views which can be observed in Morgenstierne's (1924b:80) tabular presentation of the major IE consonantal changes.

IE [it^{s}to] /itta/ IIr. [it^{s}ta] /itta/
Pre-Ir. [iθta] CIr. /ista/ Av. /ista/

This manner of representing sound change has a schizophrenic quality to it. On the one hand, in the phonetic level of Indo-European and Indo-Iranian, Morgenstierne agrees with Reichelt (1909) and Brugmann (1897) in identifying the change as affricatization; and on the CIr. phonetic level he follows Bartholomae (1894) (cf. 1.2.2.2.2). On the other hand, on the phonemic level he does not agree with any of the two major views and postulates a direct

change from dental stop to dental sibilant.[7] In some sense, Morgenstierne confuses his description by introducing the phonemic/phonetic distinction without postulating a clear theory of sound change. It is not at all obvious whether the process of sound change is represented by the phonetic transcription or by the phonemic one.

The special status given to the change of the so-called geminated dental stops is due to the fact that they undergo changes that are different but symmetric in the various Indo-European languages. Dental stops--both voiced and voiceless, aspirated and unaspirated--have undergone similar changes. None of the Indo-Europeanists studied here agree in all points about the process of this sound change even though they adhere to one of the two dominant views in the literature and correctly show the Iranian correspondances of the IE dentals in predental position. In this study, Bartholomae's view (cf. 1.2.2.2.2) will be rejected in favor of the assibilation theory of Brugmann (1897) and Reichelt (1909), although the description of neither of these latter men will be accepted completely.

(27) $\begin{bmatrix} +\text{obst} \\ +\text{coro} \end{bmatrix} \longrightarrow [+\text{strid}] / [\text{——}] \begin{bmatrix} +\text{obst} \\ +\text{coro} \\ +\text{ant} \end{bmatrix}$

Among other things, (27) allows dental stops to become affricated according to Reichelt's rule (see rule (1) for another affricatization process). To derive the Iranian

reflexes, another sound change is necessary:

$$(28)\ \begin{bmatrix} +\text{strid} \\ +\text{ant} \end{bmatrix} \longrightarrow [-\text{int}]$$

Rule (28) changes the output of (27), i.e. affricated dental stops t^s and d^z into Iranian s and z. (It also applies vacuously to s.)

Although rule (28) will be eliminated later, for the present I shall assume that (27-28) correctly represent the changes involved in the development of the so-called geminated dental stops into Ir. st and zd. There are several interesting advantages in this manner of analysis, all of which reflect the validity of certain concepts inherent in the theory of generative phonology. For example, the domain of the application of (27) is quite a bit larger than that of geminated dental stops. Depending upon when this innovation takes place, it could apply to different series of sounds. In order to avoid the undesirable derivation of *θt from *tht, *tth, or *tt by rules (25) and (26), rule (27) must be placed before (25) and (26). The input of (27), then, will be all the coronal obstruents--t d th dh s z š ž č ǰ. Except for dental stops, all the other sounds are already [+strident] to which (27) applies vacuously. However, it applies to the remaining dental stop sounds; and by making them strident, they join the natural class of strident sounds. It should also be pointed out that,

earlier, rule (1) changed [+coro] sounds to [+strident], which included environments before consonants. Later I shall discuss the fact that in Old Iranian the move toward strident sounds is widespread and natural.

While the input to (27) is not potentially limited to dental stops--although it happened that way--the environment in which the change takes place is not limited to the dental stops either. Segments that are [+obst, +coro, +ant] in (27) include th d dh and also s. It seems that (21) does not correspond to the traditional geminated stops at all. This, in fact, is a desirable consequence of the analytical device. It represents a more general process which exists in the language, which changes the dental stop to a sibilant when it occurs before a dental stop or a dental sibilant, e.g. Skt. matsya, Av. masya 'fish.' Bartholomae expressed this by rule (19), and additional comments on this appear in Henning (1942), Morgenstierne (1942b), and Gershevitch (1964).

The linguistic period in which this innovation appeared is a matter of dispute among various scholars and of great importance to this study. Reichelt (1909) and Brugmann (1888:345) consider the affricatization part of the change to belong to late Proto-Indo-European times. Kent (1953:24) deviates from the above by changing *t-t to *tst and *d-d to *dzd; however, he believes that this change originated in the Pre-Indo-Hittite period.[8] In none of the

above descriptions is there any support for assigning this change to a particular linguistic stage. Within the Indo-Iranian languages, the geminated dental consonants remain unchanged in Sanskrit but undergo the changes characterized by (27-28) in Iranian. In the present description, as was referred to above, the place of this sound change within sets of ordered phonological rules has important consequences. It must tentatively be placed after rule (2), which changes an s to ṣ after i, since among the examples cited from Morgenstierne (1924b) the *st from *tt does not change in such positions. Also, if (27) is placed before rule (17), the need for (28) diminishes as (17) is only a more general version of (28) which has the same output.

4.4 Summary

In concluding this chapter, I would like to recapitulate the main changes that result from the operation of the phonological rules above.

In section 4.3 it was noted that PIE l merges with r, and a new series of PIIr. aspirated voiceless stops are produced. The addition of subsequent phonological rules to the phonological component produces further innovations.

The original PIE palatals, which appear as palatal affricates in Proto-Indo-Iranian, merge with other sounds. Their s-variants merge with the reflex of PIE s and with those which result from the change of geminated stops.

Their $\underline{\overset{\vee}{s}}$-variants merge with the $\underline{\overset{\vee}{s}}$-variants of PIE $\underline{s}$ and with the $\underline{\overset{\vee}{s}}$ produced by the second palatalization and rules (24) and (25). Through secondary palatalization a new series of palatal affricates arises. A new glide $\underline{h}$ is developed from PIE $\underline{s}$. While all aspirated sounds disappear, a new series of voiceless fricatives appears.

The sum total of all these changes gives rise to a phonological system comparable to--though not identical with--the reconstructed Proto-Iranian stage.

CHAPTER 4

FOOTNOTES

[1]In this study terms such as "natural" and "symmetrical" are used in the sense conventionally understood by generative phonologists. For detailed discussions of these notions see Chomsky and Halle (1968:Chapter 9), King (1969), Kiparsky (1965,1968), and Stanley (1967).

[2]Although this study does not integrate the marking convention into its analysis of the data, I shall at times refer to it for explanatory purposes, justifying or refuting or amending certain rules and notions. However, I shall not reproduce Chomsky and Halle's arguments for the postulation of a marking convention and their tentative views on the hierarchy and the intrinsic content of phonological features.

[3]For a redundancy rule which produces the opposite result see section 4.3.2.

[4]In this study boundaries are considered as obstruents. For convincing arguments on the subject of boundaries as obstruents in Old English see Roger Lass (1971).

[5]For a discussion on the use of curly brackets as valid notational devices see Chomsky and Halle (1968:330ff.). For the refutation of Chomsky and Halle's view see McCawley (1969).

[6]See footnote 2.

[7]Windfuhr (1971) essentially follows Morgenstierne (1942a) in claiming that in the original Avestan text/speech, an original <u>t</u> before <u>t</u> became <u>s</u>.

[8]Reichelt (1909) has these kinds of clusters parallel to the affricated stops, i.e., <u>t^{s}t</u> and <u>tst</u>, while Kent (1961) has only <u>tst</u> clusters.

CHAPTER 5

FROM PROTO-IRANIAN TO AVESTAN AND OLD PERSIAN

5.1 Introduction

In Chapter Four I presented the sound changes that operated on the PIE contrastive phonological segments. Only twenty of the twenty-eight numbered phonological rules affect the phonological system of Proto-Indo-European. The effects of these rules include the following: (a) changes in feature specification of a segment, rule (1); (b) deletion of phonetic features, rule (26); (c) deletion of segments, rule (5); (d) merger of segments, rule (3); and (e) creation of new sounds, rule (14), etc. The cumulative effect of these changes, besides the elimination of older allophonic variations and creation of new ones, is the appearance of new phonological segments that are quite different in their feature specification. All of these new sounds are reflexes of PIE contrastive segments, most of which can still be clearly distinguished from the identical phonetic sounds which are reflexes of other PIE sounds. For example, the dental sibilant reflexes of PIE palatals (cf. rules (1, 15, 17) of Chapter Four) are clearly distinguished from dental sibilants descended from the original PIE *s* by the fact that the former always appear presyllabic while the latter never appear

in such position; in all instances, prevocalic PIE /s/ changes to /h/ by rule (14).

In the present chapter I shall present the segments that are the output of the rules in a classificatory chart (Chart 9). It should be understood that although these sounds are the output of the rules and in many places contrastive, there are many instances where their occurrence can be easily specified on the basis of their environments (e.g. /h/ occurs only in presyllabic positions, rule (14) of Chapter Four). The segments of Chart 9 resemble the traditional sound system reconstructed for Proto-Iranian.

In this chapter for expository purposes the subtitles will refer to sounds of Chart 9 rather than the original PIE Chart 6 or 8. Each of the sounds in Chart 9 will be further developed into the attested sound segments of Old Persian and Avestan, and in very limited cases into Median.

5.2 Obstruents

At this stage of language development the obstruents have a feature specification quite different from that of earlier stages. All aspirated stops have disappeared, which corresponds to the absence of the feature aspirated in Chart 9. The feature lateral is also missing, due to rule (3) in Chapter Four. Instead, there are a series of palatal affricates and a series of fricatives, all of

CHART 9

PROTO-IRANIAN SYSTEMATIC PHONEMES

	p	f	b	t	θ	d	k	x	g	č	ǰ	š	ž	s	z	m	n	r	w	y	h
Syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Obstruents	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-
Consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-
High	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	-	+	+	+	-
Anterior	+	+	+	+	+	+	-	-	-	-	-	-	-	+	+	+	+	+	-	-	-
Coronal	-	-	-	+	+	+	-	-	-	+	+	+	+	+	+	-	+	+	-	+	-
Interrupted	+	-	+	+	-	+	+	-	+	+	+	-	-	-	-	+	+	-	-	-	-
Nasals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-
Back	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	-	+
Voiced	-	-	+	-	-	+	-	-	+	-	+	-	+	-	+	+	+	+	+	+	-
Strident	-	+	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-

which, except for /s/, do not appear in Proto-Indo-European Chart 8.

5.2.1 Stops

The stops which still appear in the language (cf. Chart 9) remain unchanged in both Avestan and Old Persian. Two exceptions to this general rule have been mentioned, both of which involve the voiced dental stop /d/. As already noted, at morpheme boundaries clustering of d+č become OP č but Median (Med.) šč; and d+n becomes both OP and Av. nn (cf. Reichelt, 1909:38 and Kent 1953:32 and 37). The latter could be characterized by (1):

$$(1)\quad \begin{bmatrix} +\text{int} \\ +\text{coro} \\ +\text{voice} \\ +\text{ant} \end{bmatrix} \longrightarrow [+\text{nasal}] \Big/ [\text{———}] \begin{bmatrix} +\text{nasal} \\ +\text{coro} \end{bmatrix}$$

As is well known, neither Old Persian nor Avestan allow geminated consonants, which results in the deletion of one of the nasals.

The change of an original d+č cluster to OP č, Med. šč, and Av. tč, however, needs further comment. I shall disregard the discussion of Av. tč cluster for the moment due to the as yet unclear phonetic specification of the Av. t sign. In respect to the Old Persian development of d in d+č cluster, it should be noted that it is commonly understood that somehow the d+č becomes č+č which undergoes the general Iranian rule that deletes one of the geminated

consonants (d+č̯ > č+č̯ > č̯). No one accounts for the Old Persian reflex of d+č̯ by deleting the d right at the beginning.

If one accepts the OP č̯ and Med. šč̯ as correct reflexes of an earlier d+č̯, then processes involved in their development could be explained by the following statements: (a) d must become devoiced; (b) it must change its point of articulation to the palatal area; (c) it must become strident to become OP affricate č̯; and (d) it must change its manner of articulation to become Med. fricative š̯.

There are several ways of accounting for the above (a-d). The first alternative that comes to mind is to allow the d+č̯ cluster to undergo the already described changes of Chapter Four. Rule (6), which will be restated here as (2), devoices the d of d+č̯:

$$(2)\ [+\text{obst}] \longrightarrow [\alpha\text{voiced}] \,/\, [\text{——}] \quad [\alpha\text{voiced}]$$

The output of (2), namely, the [t+č̯] cluster, will then be subjected to the fricativization rule, (25), of Chapter Four, which distinguishes Iranian from the Indic languages, restated here as (3):

$$(3)\ \begin{bmatrix}+\text{int}\\ -\text{voiced}\end{bmatrix} \longrightarrow [-\text{int}] \,/\, [\text{——}] \quad [-\text{syll}]$$

The result is a voiceless dental spirant θ in θč̯ cluster.

None of the other rules of Chapter Four can apply any longer. If one accepts Bartholomae's (1895) interpretation of the phonetic value of the Avestan sign t̲, namely as a fricative, then the output of (3) would represent the Avestan reflex of the earlier d+č̯ cluster. But if, following Morgenstierne (1942a), one considers Av. t̲ to be an implosive stop, then either additional changes are necessary or the analysis here is not the best.

However, in order to derive the Median reflex of a d+č̯ cluster, the output of (3) must undergo another assimilatory change, (4):

$$(4)\quad \begin{bmatrix} +\text{int} \\ +\text{coro} \\ +\text{ant} \end{bmatrix} \longrightarrow [+\text{high}] \,/\, [\text{——}] \begin{bmatrix} +\text{high} \\ +\text{coro} \end{bmatrix}$$

This rule changes a dental fricative to a palatal one, which automatically becomes redundantly [+strident] through the segment structure condition (19a) of Chapter Four. The resultant sound is a palatal fricative [š̯], identical with the Median šč̯ reflex of d+č̯. To arrive at the Old Persian reflex of early d+č̯ one has to reverse the change (3) by turning [š̯] into a palatal stop:

$$(5)\quad \begin{bmatrix} +\text{high} \\ +\text{coro} \\ -\text{int} \end{bmatrix} \longrightarrow [+\text{int}] \,/\, [\text{——}] \begin{bmatrix} +\text{high} \\ +\text{coro} \\ +\text{int} \end{bmatrix}$$

A second alternative analysis of the change of an earlier d+č̯ to OP č̯, Med. šč̯, is not to allow (3) to apply.

It should be recalled that in Chapter Four rule (27) applies to dental obstruents. It operates only before other dental obstruents. It is conceivable that the conditioning environment for (27) is unnecessarily limited and can be expanded to include other sounds as well. One can simplify the structural analysis of rule (27) represented here by (6a) by dropping certain features from its environment. That is, one can change (6a) to (6):

(6a) $\begin{bmatrix}+\text{int}\\+\text{coro}\end{bmatrix} \longrightarrow [+\text{strid}] / [\text{——}] \begin{bmatrix}+\text{obst}\\+\text{coro}\\+\text{ant}\end{bmatrix}$

(6) $\begin{bmatrix}+\text{int}\\+\text{coro}\end{bmatrix} \longrightarrow [+\text{strid}] / [\text{——}] \begin{bmatrix}+\text{obst}\\+\text{coro}\end{bmatrix}$

Rule (6) will change ts and tt of (6a) to $t^{s}s$ and $t^{s}t$ as well as $t\overset{\vee}{c}$ and $t\overset{\vee}{s}$ to $t^{s}\overset{\vee}{c}$ and $t^{s}\overset{\vee}{s}$. The output of (6), as such, does not appear in any of the three languages. However, it comes closest to Morgenstierne's (1942a:69) interpretation of the Avestan sign $\underset{\sim}{t}$ as a nonfricative, implosive stop and Windfuhr's (1971:114) view that it is a tense stop. However, to produce Old Persian and Median reflexes it is possible to assimilate the output of (6) to become homorganic with the following palatal affricate. This change can be characterized by:

(7) $[+\text{strid}] \longrightarrow [+\text{high}] / [\text{——}] \begin{bmatrix}+\text{high}\\+\text{coro}\end{bmatrix}$

The resultant sound is identical to the OP palatal affricate $\underline{\check{c}}$. To arrive at the Median reflex, the output of (7) must undergo one more change.

$$(8)\quad \begin{bmatrix}+\text{strid}\end{bmatrix} \longrightarrow \begin{bmatrix}-\text{int}\end{bmatrix} \Big/ \begin{bmatrix}\text{---}\end{bmatrix} \begin{bmatrix}+\text{high}\\+\text{int}\\+\text{coro}\end{bmatrix}$$

It should be noted that in order to derive Median $\underline{\check{s}\check{c}}$ cluster, it is not at all necessary to posit (7) and (8) in that way. One can postulate a different kind of ordering, namely, that the output of (6) first undergoes change (8) and then (7) without going through a $\underline{\check{c}}$ stage. In this way the difference between Old Persian and Median with respect to the change of an earlier $\underline{d+\check{c}}$ cluster is not a matter of deriving Median from Old Persian as the order of (7) and (8) indicate; rather, it involves the application of the same rules in a different order.

5.2.2 Fricatives

5.2.2.1 Sibilants

At the stage of language development which I called Proto-Iranian (cf. 5.1), there are two pairs of sibilants--dentals and palatals. Each of these sibilants corresponds to more than one PIE sound. Their relationship with their PIE sounds can be recapitulated in the following A and B statements using the rule numbers of Chapter Four.

A. PIr. /s/ in presyllabic position corresponds to PIE palatals (cf. rules (1, 15, 17)); before dental stops it corresponds to either PIE /s/ or dental stops (cf. rules (2, 14, 27, 28)); before other consonants it corresponds to PIE /s/ (cf. rule (14)).

B. PIr. /s̆/ before consonants corresponds to PIE palatals (cf. rules (1, 15, 17)); after high sounds it corresponds to PIE /s/ (cf. rules (2, 14)); after high sounds and before stops it corresponds either to PIE /s/ or palatals (cf. rules (1, 2, 15, 17)).

A close examination of the sound pattern of Avestan and Old Persian reveals that PIr. sibilants appear, with minor exceptions, unchanged in Avestan but undergo changes in Old Persian. Below I shall discuss the major sound changes that PIr. sounds must have undergone in order to appear variously in Avestan and Old Persian.

According to rule (14), PIE /s/ changes to /h/ before glides and vowels, and in all other positions the /s/ remains unchanged. This is the situation in which one expects to find the PIE /s/ in Proto-Iranian. In both Avestan and Old Persian the change of PIE /s/ to /h/ has become more widespread. In Avestan one finds an [h] before /m/ instead of /s/ (cf. rule (13b), Chapter Four).

(9) $\begin{bmatrix} +\text{ant} \\ +\text{strid} \end{bmatrix} \longrightarrow [-\text{cons}] \,/\, [\text{——}] \begin{bmatrix} +\text{nasal} \\ +\text{ant} \\ -\text{coro} \end{bmatrix}$

The only dental sibilant sound that appears at this stage before an /m/ is the reflex of PIE /s/.

In Old Persian the change of PIE /s/ to /h/ (rule (14) of Chapter Four) has become more general.

(10) $\begin{bmatrix} +\text{strid} \\ +\text{ant} \\ +\text{coro} \end{bmatrix} \longrightarrow [-\text{cons}] \,/\, [\text{——}] \left([-\text{obst}]\right)$

The output of rule (14) of Chapter Four is identical to that of (9) and (10) above. All produce the voiceless glide /h/ from PIE /s/. In 4.3.1 the traditional description of the above changes was discussed. I consider the main innovation, and the earliest one, to be that of rule (14), Chapter Four. It must be considered as a rule shared by both Avestan and Old Persian. This rule was simplified in such a way to extend its domain of application; in Avestan the extension is very minor and somewhat unnatural, but in Old Persian it extends to all PIE /s/'s which occur before nonobstruents. Therefore, in a diachronic grammar of Avestan one needs to state two rules, while in a diachronic grammar of Old Persian one needs to state only one rule, i.e. (10). It should be mentioned that Old Persian orthography does not represent the /h/ in front of m, r, or n.

Bartholomae (1894) and Reichelt (1909) postulate another innovation for the Proto-Iranian period, which can be characterized by:

$$(11)\quad \begin{bmatrix} +\text{obst} \\ -\text{high} \\ -\text{int} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{high} \end{bmatrix} \Big/ \begin{bmatrix} -\text{coro} \\ +\text{ant} \end{bmatrix} \begin{bmatrix} \text{---} \end{bmatrix}$$

From all that I can gather, (11) is posited to account for Avestan words, such as, <u>fšanayenti</u>. Kent (1953) and Meillet and Benveniste (1931) do not posit (11) since it is not relevant for Old Persian. Contrary to what appears in Bartholomae and Reichelt, this sound change does not seem to be a part of the grammar of Proto-Iranian. It does not appear in Old Persian, and the evidence for its postulation consists of only a few Late Avestan words. Therefore, in generating the Late Avestan sounds one must postulate (11) to appear before rule (9), but it would not appear in the phonology of Gatha Avestan or Old Persian.

According to rules (15) and (17) of Chapter Four, PIE palatals must appear as /š/ before consonants. However, there are some exceptions to these sound changes. In Avestan, instead of the expected /š/, one finds /s/ before /m/ and /r/. In Old Persian the same thing is true except that all reflexes of PIE /k̂r/ or /k̂l/ change to a new OP sound, <u>c</u>. The appearance of /s/ instead of /š/ before /m/ can be characterized by:

(12) $$\begin{bmatrix}+\text{strid}\end{bmatrix} \longrightarrow \begin{bmatrix}-\text{high}\end{bmatrix} / \begin{bmatrix}\text{---}\end{bmatrix} \begin{bmatrix}+\text{nasal}\\-\text{coro}\\+\text{ant}\end{bmatrix}$$

The only palatal stridents that appear in the language before nasals are the reflexes of PIE palatals. All other palatal stridents undergo various changes. It is also interesting to note that (12) produces /s/ in the same environment in which (9) changes the PIE /s/ (to /h/). Rule (12), which is common to both Avestan and Old Persian, must come after either rule (9) or (10) has run its course; otherwise, the output of (12) could become the input to (9) or (10) and change to an undesirable /h/.

The palatal strident fricatives produced by rules (1), (15), and (17) of Chapter Four appear as /s/ before /r/ in Avestan; in Old Persian they appear as <u>c</u> with simultaneous loss of the following /r/. The Avestan development is straightforward (cf. rule (13)), but the development of OP <u>c</u> involves further innovations.

(13) $$\begin{bmatrix}+\text{high}\\+\text{strid}\end{bmatrix} \longrightarrow \begin{bmatrix}-\text{high}\end{bmatrix} / \begin{bmatrix}\text{---}\end{bmatrix} \begin{bmatrix}-\text{obs}\\+\text{cons}\\-\text{nasal}\end{bmatrix}$$

Rule (13) is an innovation which I claim to be common to both Old Persian and Avestan. It also produces the proper Avestan reflex of PIE /$\hat{\text{k}}$/ in PIE <u>$\hat{\text{k}}$r</u> or <u>$\hat{\text{k}}$l</u> clusters. To arrive at the OP <u>c</u> reflex of these sounds, the output of (13), /sr/, must undergo further changes. Since OP <u>c</u>

corresponds to other PIE sounds besides palatals, namely, PIE voiceless dentals, which at this stage of language development appear as PIr. /θ/ before an /r/, I shall postpone discussing OP c until section 5.2.2.2. It should be noticed that the output of (13) is identical with that of (12), but their environments are quite different.

The major phonological difference between Avestan and Old Persian appears in their various reflexes of PIE palatals. In 3.4.1, 3.4.1.3, and 4.2.1, I discussed the various analyses available for these sounds. In the present analysis their innovation could be seen by rules (1), (15), and (17). I have maintained that in the stage which is called Proto-Iranian they appear as dental and palatal affricate /s/ and /š̌/ depending upon the environment in which they occur. In some places they have merged with the reflexes of PIE dental stops or sibilants; in many cases they can still be identified on the basis of their environments.

In Avestan the reflexes of the PIE palatals can be characterized as the output of rules (1), (15), and (17) of Chapter Four and (12) and (13) of the present chapter. They are strident palatals or dental fricatives /š̌/, /ž̌/ and /s/, /z/. The situation is not the same in Old Persian. Besides the latter strident fricatives, one finds that certain instances of PIE palatals correspond to OP θ and d.

I claim that OP /θ/ and /d/ are derived from the dental reflex of PIE $\underline{\hat{k}}$, which appears as /s/ in Proto-Iranian as well as in Avestan, by the following sound change:

$$(14)\quad \begin{bmatrix}+\text{coro}\\+\text{ant}\end{bmatrix} \longrightarrow [-\text{strid}] \sim / [\text{——}][-\text{obst}]$$

At this stage, the only sounds that could be the input to (14) are dental sibilants, which correspond to the three different sounds described in 5.2.2.1, A. The only sounds affected by (14) are the reflexes of PIE palatals which appear before [+syllabic] sounds as well as before /m/ and /r/ by rules (12) and (13). The palatal /$\check{s}$/ reflex of PIE $\underline{\hat{k}}$-series remains unchanged.

Another sound change affects part of the output of (14) to change the voiced nonstrident interdental fricative [ð] to a voiced dental.

$$(15)\quad \begin{bmatrix}+\text{coro}\\-\text{strid}\end{bmatrix} \longrightarrow [+\text{int}]$$

It should be noted that in spite of the fact that our rules regularly develop a voiced palatal fricative /$\check{z}$/ from the PIE palatals (cf. Chart 9), this sound is not attested in Old Persian text, and in Avestan one finds only a few examples with uncertain etymology. Bartholomae (1894) accounts for part of the absent $\underline{\check{z}}$ (from PIE /$\hat{g}$/ and /$\hat{g}$h/) in Proto-Iranian (cf. 1.3.1.2.2,

rule (23b). He postulates that the above ẋ becomes voiceless before n (see also Kent,1953:35). This can be characterized as follows:

$$(16)\quad \begin{bmatrix} +\text{palatal} \\ -\text{int} \end{bmatrix} \longrightarrow [-\text{voiced}] \,/\, [\text{———}] \begin{bmatrix} +\text{nasal} \\ +\text{coro} \end{bmatrix}$$

5.2.2.2 Nonsibilants

The innovations involved in the development of PIE voiceless stops were discussed earlier through rules (20-26). The preconsonantal voiceless dental stops produce a series of voiceless interdental fricatives which remain unchanged in Avestan. However, in Old Persian one finds a c in place of the expected θr cluster.

It was mentioned (page 191) that this OP c is also a reflex of PIE /k̂r/ or /k̂l/ cluster. In the Proto-Iranian stage, the latter sounds appear as /s̆r/, which in turn are subjected to rule (13) and become /sr/. Rule (15) then changes the latter to /θr/. Both the output of rule (15) and that of rule (25) of Chapter Four, which is restated in this chapter as (3), undergo an identical sound change which I characterize as:

$$(17)\quad \underset{1}{\begin{bmatrix} +\text{coro} \\ -\text{strid} \end{bmatrix}} \underset{2}{\begin{bmatrix} -\text{syll} \\ +\text{cons} \\ -\text{nasal} \end{bmatrix}} \Longrightarrow \underset{1}{\begin{bmatrix} +\text{coro} \\ +\text{strid} \\ +\text{int} \end{bmatrix}} \quad \underset{2}{\emptyset}$$

This rule turns all instances of θr into strident dental

affricates. Kent (1953:25) describes this $\underline{c}^1$ as a "voiceless sibilant between dental $\underline{s}$ and alveolar $\underline{\overset{\vee}{s}}$." Meillet and Benveniste (1931) call it "sifflante forte." Brandenstein and Mayrhofer (1964:13) call it "das einen scharfen (gelängten?) $\underline{s}$-Laute...." Paper (1955:27) shows its various correspondences in Royal Achaemenid Elamite as $\underline{\overset{\vee}{s}}$ and in Babylonian as $\underline{\overset{\vee}{s}}$ and $\underline{tr}$. All agree to its sibilant character, and the output of (17) is a strident sound. In the absence of a more definite view on the exact phonetic nature of this OP sound, I consider $\underline{c}$, as a strident dental affricate $[t^s]$, to be an acceptable, though tentative, phonetic specification. This decision is supported by the phonetic framework used in this study. Any other change in feature specification of OP $\underline{\theta}$ would create a merger with other OP sounds of the palato-alveo-dental region, i.e. $\underline{t}$ $\underline{\theta}$ $\underline{s}$ $\underline{\overset{\vee}{s}}$ $\underline{\overset{\vee}{c}}$. If it is necessary to keep OP $\underline{c}$ separate from the latter sounds, there is only one natural choice, in line with other previous changes, namely, a dental affricate $\underline{t^s}$. However, this specification should be considered as an additional tentative description along with others mentioned above. One thing is certain that this sound does not contrast with other Old Persian sounds and, contrary to the accepted view, is not phonemic.

5.2.3 Consonant cluster simplification

In part two I have not yet discussed the matter of

consonant cluster simplification. Many of the rules in Chapters Four and Five change certain consonants and make them identical with their neighboring sound. At various points (e.g. 5.2.1), I have mentioned the need for some general rule which deletes one of the sounds of geminated consonants. In Chapter One this rule was presented as a tentative alternative to the elaborate system of Bartholomae (1894).

Most post-Bartholomaean Iranists describe the simplification of consonant clusters with one or two rules. Kent (1953:32,45), for example, has two types of changes for clusters: (a) one deals with the changes of dental clusters (see Chart 6), and (b), the other which he calls "shortening of long consonants" deals with the derived geminated consonants due to other sound changes.

In the analysis presented in part two, the changes involved in the development of dental clusters are taken care of by rule (6) of this chapter. But the simplification of geminated consonants has not been dealt with. In rule (36) of Chapter One, I proposed to delete the second segment. because of Bartholomae's $\underline{\check{s}s}$ change to $\underline{\check{s}}$ rather than $\underline{s}$ (cf. 1.3.1.3). However, this is an arbitrary decision. In fact, an $\underline{\check{s}s}$ cluster, which could be considered as an intermediate cluster derived from $\underline{\check{s}+s}$ or $\underline{\hat{k}s}$ clusters, would in our format undergo certain changes. For example, $\underline{\check{s}+s}$ by rule (2), Chapter Four, becomes $\underline{\check{s}\check{s}}$, and $\underline{\hat{k}s}$ by rule (1)

becomes <u>čs</u>, by rule (2) <u>čš</u>, and by rules (15 and 17) <u>šš</u> (all rules from Chapter Four). Therefore, the reason for deleting a specific sound of a geminate is not valid. Any of the two consonants seem to be deletable by a rule such as,

(18) [+cons] [+cons] ⟹ [+cons]

Condition: both consonants are identical.

This rule can operate cyclically until all clusters with two or more identical consonants can be reduced to one. For example, in PIE <u>trs-sḱe-ti</u> there are two /s/'s and a /ḱ/. First rules(1), (15), and (17) of Chapter Four change /ḱ/ to /s/, producing a *<u>trs-sse-ti</u>; then rule (18), Chapter Five, applies twice to give the correct Old Persian form <u>tarsa</u>. Notice that at this point rule (2), Chapter Four, does not change -<u>rs</u>- cluster to -<u>rš</u>- as it is not operative anymore in the language. A more restricted version of (2) still applies in Old Persian in a very limited way, changing <u>ni+stā</u> to <u>nista</u> as in OP <u>niyaštāyam</u>.

5.3 Nonobstruents

The nonobstruents in Chart 9 differ from the PIE contrastive sounds of classificatory Chart 8 by the absence of PIE /l/ and the presence of a new glide /h/. In 4.2.6 there are three rules which are meant to specify the environments in which the syllabic and nonsyllabic variants of these nonobstruents appear. These rules seem to be

synchronic in Proto-Indo-European. However, PIE lexical matrices to which the phonological rules of Chapters Four and Five apply have not been subjected to rules (10-12) of Chapter Four, and, as a result, no syllabic resonant will appear. This assumption about the nonexistence of syllabic resonants in PIE forms is contrary to the practice of all Iranists, who trace the development of both syllabic and nonsyllabic reflexes of PIE resonants down to Old Persian and Avestan.

At some point in the language, rules (10-12) will have to apply in order to produce the syllabic elements of the phonological system. If one assumes that the result of innovations characterized by some of the rules in Chapter Four and rules (1, 6, 7, 8, 12, 13, 16) of the present chapter would be the creation of a phonological system comparable to the reconstructed Proto-Iranian language, then it would be necessary to allow rules (10-12) of Chapter Four to produce the following syllabic/nonsyllabic alternations: [i~y, u~w, $\underset{\circ}{m}$~m, $\underset{\circ}{n}$~n, $\underset{\circ}{r}$~r].[2] The phonological system of Proto-Iranian with $\underset{\circ}{n}$ $\underset{\circ}{m}$ as syllabics is surely not identical with either Avestan or Old Persian. In the latter languages there are no orthographic signs for $\underset{\circ}{n}$ $\underset{\circ}{m}$ $\underset{\circ}{r}$. Some scholars posit an $\underset{\circ}{r}$ for both Avestan and Old Persian based mostly on etymological reasons. However, this issue has no consequence for the analysis of consonants presented here.

The process of syllabification of nonobstruents in Avestan and Old Persian can be characterized as identical to (10-12) of Chapter Four. Because of the presence of [i] and [u] in both languages, it is necessary to derive all the syllabic counterparts of consonantal obstruents. Then through another rule the n̲ m̲ and perhaps r̲ change to their respective reflex /a/ in Avestan and Old Persian.

(19) $\begin{bmatrix} +\text{syll} \\ -\text{obs} \\ +\text{cons} \end{bmatrix} \longrightarrow [+\text{low}]$

5.3.1 Liquids

Early in the development of Proto-Indo-European phonology, /l/ and /r/ merged into /r/. The various views on how this took place are stated in 3.3.3.1. In Chart 9 only one liquid /r/ appears. In Avestan there is no sign for /l/, but in Old Persian one finds a special sign for an /l/ which appears only in a very few words. Paper (1956) attributes the source of this sign and sound to the speech of the scribes and their literacy in "one or both of the cuneiform languages then in use in Achaemenid chancery" (25) --Late Babylonian and/or Royal Achaemenid Elamite.

PIr. /r/ remains unchanged except for the one instance where it is deleted simultaneously with the change of the preceding OP θ̲.

In Avestan, also, the PIr. /r/ remains unchanged except in /rt/ clusters. In Gatha Avestan texts, one finds

an $\underline{\check{s}}$ sign for it (cf. 2.3.1.1, rule (1.b), 2.3.2.1, rule (4), and 3.5.1).

Except for Benveniste (1948:27) who considers this $\underline{\check{s}}$ as an orthographic change with a phonetic value of [rt], most Iranists assign some kind of new phonetic interpretation to this letter. Bartholomae (1906) considers this $\underline{\check{s}}$ to be a voiceless [R]; Morgenstierne (1942) calls it a fricative /$\check{r}$/. Miller (1968:274-283) confirms Morgenstierne's analysis and presents the following (a-c) as representations of the changes involved:

a. /r/ ⟶ /R/ before /p t k/

b. /Rt/ ⟶ [RR]

c. [RR] ⟶ ([$\check{R}\check{R}$] >) /$\check{R}$/

The processes explained above can be characterized in feature framework as:

$$(20)\quad \begin{bmatrix} -\text{syll} \\ +\text{cons} \\ -\text{nasal} \\ +\text{coro} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{strid} \end{bmatrix} \Big/ \begin{bmatrix} \text{———} \end{bmatrix} \begin{bmatrix} +\text{obst} \\ +\text{coro} \\ +\text{ant} \end{bmatrix}$$

It should be recalled that PIE /r/ is specified in this study as a [+high] sound. Rule (20), which is an Avestan sound change, is very similar to rule (6) of the present chapter which changes the dental stops into dental affricates. The feature specification of the segments which are the input to (6) can be further revised to include /r/ in

the following manner:

(21) $\begin{bmatrix} -\text{syll} \\ +\text{cons} \\ +\text{coro} \\ -\text{nasal} \end{bmatrix} \longrightarrow [+\text{strid}] \,/\, [\text{——}] \begin{bmatrix} +\text{obst} \\ +\text{coro} \end{bmatrix}$

The /r/ in the Av. /rt/ cluster becomes strident $[\overset{\vee}{\text{r}}]$. This change, according to Chomsky and Halle (1968:302 and 329), creates such a radical constriction that it turns into an obstruent. Now if the following t is deleted, the result is the sound that is postulated by Morgenstierne (1942a) and Miller (1968).

(22) $\begin{bmatrix} +\text{coro} \\ +\text{ant} \\ +\text{int} \end{bmatrix} \longrightarrow \emptyset \,/\, \begin{bmatrix} +\text{coro} \\ +\text{voc} \\ +\text{strid} \end{bmatrix} [\text{——}]$

Rule (6) is needed as part of the diachronic description of both Old Persian and Avestan in order to produce the various reflexes of dental stops in Proto-Iranian. Old Persian reflects the output of (6) unchanged. In Gatha Avestan, however, rule (6) seems to have become more generalized to include the PIr. /r/. The output of (20) is a natural sound compatible with the inherent feature specification of PIr. sounds. That is, PIr. /r/, which is specified as [+high, +coro, +ant], if allowed to undergo devoicing through (2) of this chapter, becomes a [+high, +coro, +ant, +strid, -voice] sound by (20) or (21), a sound very similar to Av. /$\overset{\vee}{\text{s}}$/.

There is a large number of words, especially in Late Avestan texts to which rule (20) does not apply; that is, /rt/ clusters appear unchanged. Also for a few words there are alternate spellings with š and rt letters. Miller's (1968) study attempts to prove that as a general rule in Avestan, the Old Iranian /rt/ cluster is regularly represented by a (š sign) /ř/ and that the existing forms with /rt/ are examples of restoration of the Old Iranian cluster. This means, for forms with alternative spellings, rt becomes [š] and then goes back to the original rt. In Miller's format, based on his analysis of /rt/ change to [ř], one can explain the phenomenon of phonetic restoration of clusters by the following:

(22) OIr. [rt] > [Rt] > [RR] > [ŘŘ] > GAv. [Ř] > [ŘŘ] > [RR] > [Rt] > LAv. [rt]

Miller's criticism of Bartholomae's (1906) phonetic analysis of this phenomenon on the basis of accent is a valid one, but his own solution, that is, restoration of the older form due to some analogical process is hardly a better solution. (For a detailed analysis of the subject of analogy, especially concerning Kurylowicz's views, see Kiparsky, 1965.) The question to be asked is whether the Av. /r/ was restored through phonetic drift, as is illustrated in (22) or through some sort of phonetic replacement. To say that rt forms are restorations of older forms

indicates hardly anything beyond the observational statement of the actual correspondences.

Within the framework of generative phonology the change of /rt/ to [ɣ̊] can be explained in two ways. One can view it as an innovation which appears in Avestan and which precedes the rule for anaptyxis; thus, it changes all rt clusters phonetically to an [ɣ] sound. However, later in time there appears a reordering of rules which places the rule for anaptyxis before (20) and (22); this turns rt clusters into rət, which do not match the structural analysis of (20) anymore. The isogloss with š sign (/ɣ̊/) confirms the earlier operation of (20). The other way of describing the occurrence of rt in Late Avestan is to consider rule (20), which started as an optional rule in Gatha Avestan, to have been lost in Late Avestan.

5.3.2 Nasals

PIr. nasals, /m/ and /n/, remain unchanged in Old Persian except before obstruents where they seem to have been lost. Most scholars consider the systematic absence of the nasal in these positions to be a matter of orthography of Old Persian; and thus on the basis of etymological studies, they insert a nasal before consonants where warranted.

Morgenstierne (1942a) postulates three nasal consonantal phonemes for Gatha Avestan and four for Late Avestan

(cf. 3.5.1). Hamp (1952) posits only three. I claim that in the systematic phonemic representation of Avestan there are only two nasal consonants. All other Avestan nasals are automatically derived by a phonological rule which assimilates the nasal to the features related to the points of articulation of the following consonants. Problems related to ŋt and ŋr clusters in paŋtaŋhum and hazaŋra-, however, are of othographical nature rather than of phonology.

(23) $$[+\text{nasal}] \longrightarrow \begin{bmatrix} \alpha\text{high} \\ \beta\text{coro} \end{bmatrix} / \left[\text{———}\right] \begin{bmatrix} \alpha\text{high} \\ \beta\text{coro} \end{bmatrix}$$

5.3.3 Glides

PIE glides /w/ and /y/ appear unchanged in Proto-Iranian, and except for one change in /w/ they appear unchanged in Avestan and Old Persian.

It should be recalled that at this stage of language development the reflexes of PIE palatals before y and w are still ẋ and ż. While they remain unchanged before y in both Old Persian and Avestan, they change to s and z before w, and at the same time the latter glide changes to p and b in Avestan but is lost in Old Persian. There is no widely accepted view on how these changes have taken place. Most available descriptions, which are based on the theory that sound change is "phonetic drift" (see Kiparsky, 1965), have little to recommend over those that give the correct list

of correspondences. The following treatment is an attempt to explain the processes--in a very tentative manner--within the distinctive feature analytic framework.

(24) $\begin{bmatrix} -\text{cons} \\ +\text{high} \\ +\text{back} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{obst} \\ \alpha\text{voiced} \\ +\text{ant} \end{bmatrix} / \begin{bmatrix} +\text{high} \\ -\text{int} \\ \alpha\text{voiced} \end{bmatrix} \begin{bmatrix} \text{———} \end{bmatrix}$

This rule changes the PIr. /w/ to its [+obstruent] counterparts /f/ and /v/, depending on the value of the feature of voicing of the preceding segment. The output of (24), as clusters of [šf] and [žv] are impossible clusters in both Old Persian and Avestan. They must first undergo the following rule in order to change [šf] and [žv] to [sf] and [zv].

(25) $\begin{bmatrix} +\text{high} \\ +\text{strid} \end{bmatrix} \longrightarrow [-\text{high}] / \begin{bmatrix} \text{———} \end{bmatrix} \begin{bmatrix} +\text{ant} \\ -\text{coro} \\ -\text{int} \end{bmatrix}$

At this point, the output of (25) can undergo a change and (a) delete the [f] or [v] reflex of PIr. glides or (b) change them into a sound congruent with the sound patterns of Old Persian and Avestan. In Old Persian the former (a) happens, and PIr. /šw/, /žw/ appear as /s/ or /z/.

(26) $\begin{bmatrix} +\text{obst} \\ +\text{ant} \\ -\text{coro} \\ -\text{int} \end{bmatrix} \longrightarrow \emptyset / \begin{bmatrix} +\text{strid} \end{bmatrix} \begin{bmatrix} \text{———} \end{bmatrix}$

In Avestan the latter (b) takes place and PIr. [šw] and

[ǰw] become [sp] and [zb]. It must be recalled that for Proto-Indo-European I posited a sequence structure rule, i.e. (23) of Chapter Four, which prevents the occurrence of a noninterrupted obstruent after a consonant. That was when the only noninterrupted sound was PIE /s/. But now in both Old Persian and Avestan, there are both strident and nonstrident fricatives. But as PIE sounds change into new sounds with different phonetic specifications, the restrictions on morpheme structure change. In this stage of the language development, the corresponding sequence structure condition can be characterized as:

(27) [+strid] [+obst]
⇓
[+int]

The output of (25) will automatically be matched with (27) and [sf] and [sv] become /sp/ and /sb/, which are the correct Avestan reflexes of PIr. /ǰw/ and /ǰw/.

5.4 Summary

In the preceding sections of this chapter, I presented the major differences between Old Persian and Avestan consonants in their development from the Proto-Iranian sound system. In this section I shall recapitulate the major points of difference between the two languages in the following columns of correspondences:

PIE	PIr.	Av.	OP
k̂r/k̂l	šr	sr	c
k̂w/ĝw	šw/žb	sp/zb	s/z
k̂-series	s/z	s/z	θ/d
tr/thr	θr	θr	c
rt/rth	rt	rət/š	rt
dk	dč	t̰č	č

Two additional changes can be enumerated here. I shall discuss them in detail in the next section.

ty/thy	θy	θy	šy
sw	hw	xw	(h)uw
dw/dhw	dw	b	d

5.5 Avestan

The phonological system that one arrives at for Avestan, subsequent to the appropriate sound changes posited in Chapters Four and Five, is very similar to that of Proto-Iranian. I claim that this is the system that one ought to expect to find in the oldest Gatha Avestan text. There are a few other phonetic segments in Gatha Avestan which are conditional variants of the GAv. sounds. These rules are derived by lower level phonological rules. One of these is the presence of $\underline{x^w}$ sounds which correspond to PIr. /hw/ and Med. $\underline{f}$. Morgenstierne (1942a) correctly analyzes $\underline{x^w}$ as /xw/ cluster. The allophonic change can be

characterized by the following rule:

$$(28)\ \begin{bmatrix}-\text{syll}\\-\text{cons}\\-\text{high}\end{bmatrix} \longrightarrow [+\text{obst}] \Big/ [\text{——}]\ \begin{bmatrix}-\text{syll}\\+\text{back}\\+\text{high}\end{bmatrix}$$

This changes [h] to [x] before /w/.

There are a number of other changes such as fricativization of g after sibilants and the appearance of fɣ for fθ. These and many other variations, mostly orthographic, are described in Morgenstierne (1942a), and I shall not discuss them here.

In Late Avestan there are two important issues worth discussing. One is the nonapplication of "Bartholomae's law" in Late Avestan texts. I shall discuss it later in 5.7. The other is the fricativization of voiced stops in intervocalic position (cf. 2.3.1.1). Morgenstierne (1942a) calls the new voiced fricatives, phonemes, while Hamp (1952) considers them as allophonic. Hamp is obviously correct in analyzing these fricatives as variants of voiced stops. Their occurrence can easily be predicated by a late rule, such as,

$$(29)\ \begin{bmatrix}+\text{obst}\\+\text{voiced}\end{bmatrix} \longrightarrow [-\text{int}] \Big/ [+\text{syll}]\ [\text{——}]\ [+\text{syll}]$$

This innovation is considered to be a late development in Avestan--a distinguishing feature of the Late Avestan language.

Morgenstierne (1942a) calls a number of other sounds, Late Avestan phonemes. For example, his LAv. [r̥] phoneme, a voiceless liquid, is a natural consequence of normal application of the regressive voicing assimilation rule. Rule (2) seems to have expanded its domain of application to nonobstruent segments in the following way:

$$(30)\ \begin{bmatrix} +\text{cons} \\ -\text{nasal} \end{bmatrix} \longrightarrow [\alpha\text{voiced}] \Big/ [\text{——}]\ [\alpha\text{voiced}]$$

His LAv. ñ phonemes are already accounted for by rule (23).

5.6 Old Persian

Old Persian and Avestan have identical inventories of contrastive sounds. The innovations that are presented in this chapter develop the PIr. sounds in a slightly different fashion. The most important change is the further development of the PIr. reflexes of PIE palatals in Old Persian and the merging of them with reflexes of PIE dentals. Some of the innovations are strictly phonetic and must be considered as late developments, e.g. the development of OP c.

One strictly Old Persian change is the development of some of the OP θy clusters to šy clusters (Gershevitch, 1964). The only OP θ's that change are those that are reflexes of PIE dentals. The θ's that remain unchanged are the reflexes of PIE palatals. Hoffmann (1958) correctly

describes the situation by assigning the sound change to a period when rule (14) had not taken place. The change can be characterized as:

$$(31)\ \begin{bmatrix} +\text{obst} \\ -\text{int} \\ -\text{strid} \\ +\text{ant} \end{bmatrix} \longrightarrow [+\text{high}] \ / \ [\text{——}] \begin{bmatrix} -\text{cons} \\ +\text{high} \\ -\text{back} \end{bmatrix}$$

Meillet and Benveniste (1931: §127-9) propose that in intervocalic places the voiced stops could be fricatives. Kent (1953:25) also ascribes to this view. There is, of course, no orthographic evidence to support such a claim, but, if it is accepted, Old Persian would look very much like Late Avestan.

5.7 The antiquity of Avestan and Old Persian

Few Iranists have taken a definite stand on the relative antiquity of Avestan and Old Persian. But most students of Avestan have recognized the presence of two dialects--Gatha Avestan and Late Avestan--which are believed to be from different times and places. Most of the available comments on the subject of the relative antiquity of Avestan and Old Persian are noncommittal and often limited to superficial observations based on the well-established sound correspondences. In 3.5.3 I discussed Meillet and Benveniste's (1931) view concerning the similarity of Old Persian and Late Avestan phonology. Their observations, although not well documented by actual systematic analysis,

are among the best that are available.

Sokolov (1967:38) points out the phonetic differences between Avestan and Old Persian and offers the following remarks:

> ...in some cases (to which θr : c can, incidentally, be referred) Old Persian is simply a further modification while the Avestan vulgate presents more ancient forms. Thus the Avestan θy, θn ...are initial forms from which there must develop the forms corresponding to these groups in Old Persian šy, šn: Av. mərəθyus..., OP maršyuš 'death'; Av. arəθna-, OP aršni- 'elbow'.... In this case the Avestan tradition preserves more ancient sound forms, while in other cases it is on the contrary Old Persian that presents more ancient forms, e.g., in the word martiya-, Av. mašya- 'man' of the same root as MṚTYUŠ 'death'. Here we have a diachronic rather than dialectal difference. While the sound system of the Avestan vulgate as a whole represents, owing to transmission changes, forms later than those in Old Persian and approaching Middle Persian forms, the Avesta preserves, on the other hand, many archaic features such as the relative conservation of the ends of words:....

It is clear that Sokolov's examples of Av. θy, θn versus OP šy, šn show the conservative character of Avestan or the innovativeness of Old Persian, from which one can infer that the latter language must be of more recent times. However, his statement that the difference between Old Persian rt in martiya- and Av. š in mašya- is a diachronic change, indicates that Gatha Avestan is not as old as Old Persian.

Risch (1954), while not referring to Avestan,

comments on the innovativeness of the Old Persian phonological system. He gives two examples where Old Persian simplifies consonant clusters, namely, the change of θr to c and the insertion of anaptytic vowels. He considers these as evidence for saying that the Old Persian phonological system is of a more recent stage, removed from the Iranian system. Kent (1953) is silent on this issue.

In the analysis presented in part two of this dissertation, it is clear that in terms of sound change Gatha Avestan is the most conservative of the three languages; Late Avestan and Old Persian undergo further phonetic changes that are absent in Gatha Avestan. The manner in which these languages are derived from a single PIE sound system within the framework of part two, strongly suggests that the archaic character of Gatha Avestan is a reflection of its degree of antiquity. The main reasons which force me to such a conclusion are the way in which the framework produces the different reflexes of PIE palatals, the non-phonemic interpretation of rt/š alternation in Avestan, the place of Bartholomae's law in different languages, and a few other minor changes.

The sound changes characterized by rules (1), (15), and (17) of Chapter Four produce /s z š ž/ reflexes of PIE palatals in a stage of Indo-European language development which is traditionally called Proto-Iranian. In Chapter Five a few of these reflexes are further changed (by rules

(1), (4), and (14), resulting in a few alternations between /s z š ž/ which are common to both Avestan and Old Persian.

In the phonological system of Avestan, the reflexes of PIE palatals, i.e. /s z š̌ ž̌/, appear under almost identical restrictions as are found in Proto-Iranian. In Old Persian, however, one finds /θ/ and /d/ also correspond to the PIE palatals. In this chapter Old Persian /θ/ and /d/ are derived in a natural way from the Proto-Iranian (and Avestan) /s/ and /z/ correspondences of PIE palatals through (14). This innovation, involved in the derivation of these Old Persian sounds, is the result of the change of one distinctive feature, which seems to be chronologically of later times, even later than the Late Avestan period. This conclusion is in line with the theoretical assumption which considers diachronic phonological change as a change in the least number of and perhaps in only one distinctive feature in the phonological segments. Rules (1), (15), and (17) of Chapter Four and (14) of this chapter each change one natural distinctive feature. The change in any other feature would require the change of more than one feature.

As an example, below I shall review the alternative solution proposed by Morgenstierne (1942b) and adopted by Sokolov (1967). Due to the ambiguities involved in the interpretation of Morgenstierne's (1942b) tabular representation, especially in his mixing of phonetic and phonemic

levels, it is possible to interpret his table of correspondences in two ways. The first alternative can be represented by:

(32) a. PIE $\underline{\hat{k}}$ ⟶ PIIr. $\underline{t'}$

b. PIIr. $\underline{t'}$ ⟶ { CIr. $\underline{\check{s}}$ before obstruents ; CIr. $\underline{\theta'}$ elsewhere }

c. CIr. $\underline{\theta'}$ ⟶ { OP $\underline{\theta}$; Av. $\underline{s}$ }

d. CIr. $\underline{\check{s}}$ remains unchanged in Old Persian and Avestan.

The above (a-d) represent Morgenstierne's phonemic representation. In distinctive feature terms (a-d) can be represented by (33a-d).

(33) a. $\begin{bmatrix} +\text{high} \\ -\text{ant} \\ +\text{int} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{ant} \end{bmatrix}$

b. $\begin{bmatrix} +\text{high} \\ +\text{coro} \\ +\text{ant} \end{bmatrix} \longrightarrow \left\{ \begin{bmatrix} -\text{int} \\ -\text{ant} \end{bmatrix} / \begin{bmatrix} \text{———} \end{bmatrix} \begin{bmatrix} +\text{obst} \end{bmatrix} ; \begin{bmatrix} -\text{int} \end{bmatrix} \text{ elsewhere} \right\}$

c. $\begin{bmatrix} -\text{int} \\ +\text{ant} \\ +\text{high} \end{bmatrix} \longrightarrow \left\{ \begin{bmatrix} -\text{high} \end{bmatrix} \text{ in Old Persian} ; \begin{bmatrix} -\text{high} \\ +\text{strid} \end{bmatrix} \text{ in Avestan} \right\}$

d. $\begin{bmatrix} +\text{high} \\ +\text{coro} \\ -\text{ant} \end{bmatrix}$ remains unchanged

In (33), (a) involves the change of one feature; the top part of (b) involves the change of two features, one of which reverses the change of (a); and the bottom part of (c) changes two features.

The second alternative interpretation can be illustrated by (34):

(34) a. PIE $\underline{\hat{k}}$ ⟶ PIIr. $\underline{t'}$

b. PIIr. $\underline{t'}$ ⟶ PIr. $\begin{cases} \underline{\check{s}} \text{ before obstruents} \\ \underline{\theta'} \text{ elsewhere} \end{cases}$

c. PIr. $\underline{\theta'}$ ⟶ OP $\underline{\theta}$

d. OP $\underline{\theta}$ ⟶ Av. $\underline{s}$

e. PIIr. $\underline{\check{s}}$ remains unchanged.

In terms of distinctive feature analysis (34a-e) can be represented by (35).

(35) a. the same as (33a)

b. the same as (33b), involves the change of two features on the top

c. $\begin{bmatrix} +\text{ant} \\ +\text{high} \\ -\text{int} \end{bmatrix}$ ⟶ [-high] in Old Persian

d. $\begin{bmatrix} +\text{ant} \\ -\text{strid} \\ -\text{int} \end{bmatrix}$ ⟶ [+strid] in Avestan

e. the same as (33d)

Both alternatives (32/33) and (34/35) have rules which

involve more than one distinctive feature, namely, the (b) part of (33) or (35) has one change which reverses the change of the preceding (a). In the absence of any hard linguistic evidence from any of the Old Iranian languages, such change and the reverse of the change seem completely redundant. Alternative (32) is similar to Sokolov's (1967:32) table of correspondences, but (34) is not explicitly proposed by any scholar studied here. Morgenstierne himself is ambiguous. Gershevitch (1964) comes short of assigning such an interpretation to Morgenstierne's view.

Other objections to Morgenstierne's above analysis were presented in 3.4.1.3. But the relevance of the above interpretation to the subject of relative antiquity of Old Persian and Avestan is obvious; while (32) derives both languages from the same underlying forms as possible contemporary dialects, (34) indicates that Old Persian is a more antiquated language, which gives rise to Avestan at a later time.

The fact that in both (32) and (34) there are rules which alter more than one feature at a time makes either alternative a complex change and thus less acceptable as a characterization of diachronic phonological change in contrast to a third alternative--namely, the one assumed in this study--which changes one distinctive feature at a time. It should also be noted here that the consistent occurrence of /ǰ/ as a reflex of PIE palatals in Old Persian is almost

ignored by most Iranists. The vague explanations which consider this sound as a case of dialect mixture hardly do anything more than acknowledge the appearance of /š̌/ in Old Persian texts. I shall discuss this subject later (see pages 220-221).

Another evidence for my claim to the antiquity of Gatha Avestan over Old Persian is the behavior of Bartholomae's law (cf. Chapter Four, rules (7) and (8)). The fact that this rule was operative in Proto-Iranian times is acknowledged by all Indo-Europeanists. (For a full discussion of this subject see Kiparsky, 1965.) Its operation in Gatha Avestan is evident (cf. 3.5.3); however, in Late Avestan and Old Persian, this rule seems to have been completely lost. For example, PIE augh+ta would undergo the following sound changes from Chapter Four: by (7) aughdha > by (8) augdha > by (26) augda, in order to appear as GAv. augəda. But in Late Avestan one finds aoxta. Rules (6), (7), and (8) of Chapter Four are so specified that (6) is mutually exclusive from (7) and (8). That is, the specification of rule (6), although placed before (7) and (8), would not allow it to operate if the sounds met the structural analysis of rules (7) and (8). Rule (6), however, can be simplified, as illustrated by (2) in this chapter, and then reordered to be placed after (7) and (8). This suggestion of reordering (6), which is of Proto-Indo-European origin (cf. 1.2.1), to come after (7) and (8),

which are of the Proto-Indo-Iranian period, goes against the accepted view of historical sound change.

The appearance of LAv. aoxta along with the older form of GAv. augəda has been a confusing phenomenon. The sudden devoicing of the cluster gd and the fricativization of the first stop in line with the normal Iranian development, has not been explained to anybody's satisfaction. Miller (1968) describes the appearance of xt instead of gd as an example of restoration of an older form along with the occurrence of LAv. rt instead of GAv. [x́] from CIr. rt. However, the sound change which produces GAv. [x́] from rt is a very specific late rule in Avestan, but the processes which produce GAv. gd cluster are quite different and are believed to belong to two different stages, namely, PIIr. (7) and (8) from Chapter Four and PIr. (2) from Chapter Five. The question is, which linguistic level is restored? In fact, xt (or kt) does not represent any of the following: PIE augh+t, PIIr. aughdh or augda, or PIr. augda.

This as yet confusing situation can easily be explained if one is willing to extend the traditional theory of linguistics, which defines the process of sound change as additions of rules, to allow for the reordering and deletion of rules as possible mechanisms of linguistic change. In 5.2.1, I presented a case of deletion of a rule in the creation of Median /š/ and Old Persian č in d+č clusters. In 5.3.1 I discuss the deletion of rule (21)

in Late Avestan, which is responsible for producing GAv. [ɣ š] from rt clusters. However, the situation under consideration here presents a clear example of the operation of both deletion and reordering in linguistic change.

It should be recalled that the voicing assimilation rule of Chapter Four, rule (6), was revised to rule (2) of the present chapter. In order to account for devoicing of /r/ before voiceless stops, (2) can once more be revised to have a wider range of application:

$$(36)\quad \begin{bmatrix} +\text{cons} \\ -\text{nasal} \end{bmatrix} \longrightarrow [\text{voiced}] \Big/ [\text{——}] \begin{bmatrix} \alpha\text{voiced} \\ +\text{cons} \end{bmatrix}$$

Now if we reorder the original correct order of:

(7) } both of Chapter Four
(8) }
(36)

to

(36)
(7)
(8)

and then delete rule (7) from the grammar, the following forms will appear: PIE augh-ta by (38) > aukhta by (8) > aukta. The latter form will then undergo fricativization rule (26) of Chapter Four to become LAv. aoxta. The same ordering and rules apply to Old Persian. This explanation of the process involved in the appearance of LAv. xt cluster

instead of GAv. gd clearly shows that Miller's (1968) notion of restoration of the older form in the above cases is little more than empty linguistic jargon used to cover the inability of a linguistic theory to explain the complicated process of sound change.

If one accepts the claim made by some linguists working within the generative framework--scholars such as, Kiparsky (1965, 1968, 1968) and King (1969)--that linguistic change tends toward simplification of the grammar, then the further simplification of the rule changing PIE /s/ to /h/ reflects the degree of innovation in the different Old Iranian languages. It was noticed that the PIr. [s] reflex of PIE /s/ underwent further changes in line with rule (14) of Chapter Four. It seems that that innovation which produced PIr. /h/ was extending its domain of operation by changing more PIE /s/'s. In Avestan (rule (9)), this extension is much more limited than that of Old Persian (rule (10)). This points to the conservative nature of Avestan and the innovative or perhaps less antiquated character of Old Persian.

More can be said about the conservatism of Gatha Avestan and the innovations (e.g. PIr. $\underline{\theta} > \underline{c}$) of Old Persian, but I shall conclude this subject by discussing the subject of dialect mixture in relation to the antiquity and archaic character of Avestan.

A view is commonly held that most instances of [s]

and [š] from PIE palatals in Old Persian are due to mixture of other Old Iranian dialects. For example, words with /s/ instead of /θ/, e.g., asa for *aθa or *aθwa or *aθpa, asan or aθaga, are borrowed into Old Persian from Avestan or Median. This, perhaps, implies that Old Persian is a contemporary of Avestan or a geographically adjacent dialect. There is another way of interpreting the simultaneous appearance of s, θ, and š in Old Persian. If one accepts the claim that the order of application of the rules characterizing the sound changes (see appendix) indicates the relative chronology, rather than dialect mixture on the basis of "wave theory," then Old Persian would appear as a later stage of the Old Iranian languages having rule (14) which applies in a well-defined context to change PIr. or Av. /s/ to /θ/. The other /s/ and /š/ reflexes of PIE palatals then, besides the /θ/, would be part of the grammar of the language not affected by rule (14). The fact that Gatha Avestan does not have any example of /θ/ corresponding to PIE palatals shows that (14) is of a much later time and not of a geographical neighboring dialect. The few instances of /θ/ in Late Avestan, a chronologically later language, is perhaps another support for my claim.

CHAPTER 5

FOOTNOTES

[1]This OP sound has been transcribed in the following ways by different scholars: Bartholomae, θr; Meillet and Benveniste, ss; and Kent, ç. For typographical reasons I transcribe it as a simple c.

[2]Additional phonological rules are necessary to produce the long/short variants of the syllabic resonants (see Keiler, 1970).

[3]Sokolov (1967:38) states that PIr. dw corresponds to Av. b and OP d. He describes the Avestan development as elision of the initial consonants. The change of PIr. /w/ to Av. /b/ is very similar to the change characterized by rule (24). I shall not discuss it any further.

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