ARABIC PHONOLOGY:
Implications for Phonological Theory and Historical Semitic

by

Michael K. Brame

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF
PHILOSOPHY
at the
MASSACHUSETTS INSTITUTE OF
TECHNOLOGY

June, 1970

Signature of Author .....

Certified by .....
Thesis Supervisor

Accepted by .....
Chairman, Departmental Committee
on Graduate Students

ARABIC PHONOLOGY

by

Michael K. Brame

submitted to the Department of Modern Languages and Linguistics on June 15, 1970 in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

ABSTRACT

This thesis treats the phonology of Arabic in some detail. Emphasis is placed on rule orderings and there is a good deal of discussion of cyclic and local ordering theories. It is concluded that probably both types of ordering are needed to adequately generate the phonology of Arabic. The thesis touches on some recent issues in syntactic theory, but from the phonological point of view.

to my mother, for making it possible

to my wife, for seeing me through

to my daughter, for giving me renewed hope

I dedicate this thesis

ACKNOWLEDGEMENTS

This dissertation was written under the direction of Professor Morris Halle, my teacher. I have benefited from his suggestions and owe him the greatest debt of all. He, more than anyone else in my graduate career, has given me the impression that not only could I learn from him, but that he also could learn from me. This, it seems to me, is all that anyone desires. Also, I must thank Hugh Matthews and Noam Chomsky for valuable criticism of earlier parts of this work. In addition, Ken Hale, Paul Kiparsky, and Haj Ross have lent their time to reading some of the earlier work of this dissertation, and I am grateful.

I should also thank the faculty for giving me the opportunity of teaching some of the contents of this thesis in my last year at M.I.T. And I thank those students who helped clarify some of my ideas, especially John Makhoul.

Finally, I lovingly express my appreciation to Luise for putting up with this in the first place. She too has read some of this dissertation, and her background in Arabic has been particularly helpful.

PREFACE

This work was undertaken with two goals in mind: (1) to contribute to our rapidly expanding body of knowledge of phonological theory, and (2) to contribute to the field of Semitic linguistics by giving a more comprehensive treatment of a Semitic language than has hitherto been attempted.

Concerning the first aim--it seems to me that although isolated examples can shed light on real issues in the theory of phonology, it is only the comprehensive deep phonology of a language which must be considered reliable in the final reckoning. I place emphasis on this point, for in my own experience I have found that questions concerning the treatment of a specific segment of the phonology become clarified, or at least clearer, only when viewed in the more comprehensive scheme of the total phonological component of the grammar. Radical changes in the theory must not be motivated in terms of isolated examples. With this in mind, I have looked at a good many rules of Arabic phonology in order to test the adequacy of the present theory of generative phonology and so as to determine where,

complex data from Arabic.

There is to be found in these pages an overriding concern with the interaction of phonological rules. The thesis becomes interesting when several apparent ordering contradictions arise in Chapter VI. From here on it is my task to determine how these contradictions are to be accounted for. We discuss the possibility of a stem cycle and the possibility of adopting the theory of local ordering of Anderson. In the long run, at least one rule must be cyclic, that of Stress Assignment. But here the constituents relevant to the correct definition of the cycle in Arabic are of some interest. It seems that the subject pronoun suffixes must be considered as part of the first cycle, whereas the dual suffix plus the object pronoun suffixes must constitute, along with the first cycle material, the second or final cycle. Although the implications are not drawn in the main text, it appears that this may be explained by assuming subject pronoun suffixes to be lexical. And there seems to be no reason to eschew this result. Only a priori notions about subject-verb agreement will cause the reader to feel queasy at the mention of this result.

if anywhere, this theory is in need of revision. The current theory is structured so as to rule out many theoretically conceivable phonologies. At the same time it allows for much which is theoretically possible, but not supported by empirical evidence. For example, the present theory makes the rather interesting claim that rules are linearly ordered. This rules out many conceivable orderings. It prohibits a situation where Rule A precedes Rule B, Rule B precedes Rule C, and Rule C precedes Rule A. By and large this claim has not been refuted by examples from natural languages. If this constraining device is correct, it is very interesting, for it tells us more about what human language is. The theory also allows for cyclic application of phonological rules, without, however, making any claims about what kinds of rules can be cyclic and what kind not. If the phonological cycle is necessary, it also is interesting. But as presently conceived, it is probably too powerful a device, for it allows for too many possible phonologies. The task of theoretical linguistics is, then, to constrain. The theory is obviously to be formulated on the basis of empirical examples. I therefore have attempted to understand better how human language works by investigating some

Concerning the second aim--it seems to me that the state of historical Semitic linguistics is bankrupt. There is not even one good phonology of one Semitic language in existence today which goes beyond the important insights of the Arab grammarians. Indeed it is my belief that Arabic grammar in particular has reached its lowest ebb under the thumbs of Western scholars. Much of the subtlety and insight into the nature of the language which the Arab grammarians give us has been almost totally neglected by Western linguists. I would like to think that I am approaching this work in the spirit of the Arab grammarians. At least this is true in one regard--the problem that so enthused the Arab grammarians, that of determining the *'asl*, or deep representation, of the language. I feel justified in attempting to go beyond these grammarians only as a result of advances made in phonology in recent times.

TABLE OF CONTENTS

Chapter I

PRELIMINARIES

1.0 This work is devoted to the phonology of Arabic--to discovering the deep representations of this phonology and to postulating a set of phonological rules which adequately maps the deep representations into the phonetic representations. There are numerous varieties of Arabic, and it should be make clear from the outset that the Arabic treated in this work is not dialectal, i.e. not the type of Arabic generally spoken in the home. However the Arabic investigated in the following pages is very much alive. It is the unifying literary language of all Arab nations, and it is very much in use in schools, lectures, radio, newspaper, drama, and other formal functions. To claim that this literary language Arabic is artificial is to betray one's ignorance. Indeed, the differences which separate literary Arabic from the various colloquial varieties of Arabic have been exaggerated in the past. In fact, the only really difficult problem for the Arab approaching literary Arabic is the problem of supplying the correct case endings to nouns and mood endings to verbs, as, understandably, he has none in his native dialect. The other difficulties are rather minimal,

and probably do not present a more difficult task for the Arab learning literary Arabic, than for the American learning literary English.

The Arabic described above has been designated MODERN STANDARD ARABIC in recent times. But there is another ''variety'' of Arabic termed CLASSICAL ARABIC. The latter is the language found in texts beginning with say the Koran, and proceeding through the medieval works to the present. There is no definite point in history separating Modern Standard Arabic from Classical Arabic, and again the differences between the two tongues have been exaggerated by some. What differences do exist reside in the main in the vocabulary, and to a lesser degree, in certain syntactic locutions. But the phonology is by and large, one and the same. It is for this reason that our use of Arabic is intended to encompass both Modern Standard Arabic and Classical Arabic.

1.1 Terminology and Basic Paradigms

To facilitate the exposition for those unfamiliar with Semitic terminology, and particularly for those unfamiliar with Arabic, we introduce below some of the basic terminology to follow, along with some of the more basic paradigms of the language, which the reader may want to check with the step-by-step development of the major text.

All students of Semitic are familiar with the so-called principle of triplicity of consonants. This is to say that the vast majority of all Semitic stems are composed of three root consonants, or radicals. By consonant, we mean to include the obstruents, liquids, and glides. The following set of forms nicely illustrates this tri-consonantal principle.

1)	a.	salima	it was safe
	b.	sallama	he greeted
	c.	sālamā	they m.d. made up
	d.	'aslamat	she surrendered, became a Muslim
	e.	tasallamtu	I received
	f.	'istalamti	you f.s. received
	g.	tastaslimu	you m.s. surrender
	h.	silm	peace
	i.	salām	greeting, soundness
	j.	'islām	submission, Islam
	k.	muslim	Muslim, one who gives himself over
	l.	sālim	safe

To 1) could be added numerous additional examples. What unites all the examples of 1) is the fact that they all possess the three basic radicals s, l, and m, along with a core of meaning which is not easy to explicate, but which nontheless is there, this meaning

having to do with submissiveness and safety, etc. But there are grammatical elements added to every example of 1). Example a. is the basic verb form, with the so-called infixes a and i added along with the third person masculine marker a as suffix. Examples b. through g. are derived verb forms, with derivational prefixes such as the 'a of d., the gemination of l of e. along with the prefix ta, the prefix sta of g., another derivational affix, along with the inflectional prefix ta and the mood marker u of the same example, the lengthened a of c., the infixed t of f., and so on. Let us henceforth call that part of the word including the underlying radicals with any infixes which may be accompanying, the stem. Thus, the stem of g. is slim, that of b. is sallam, that of f. is stalam, and that of k. is slim. The stem taken together with all other affixes will be called the word. These three terms root (or radicals), stem, and word will bear these precise meanings in the following pages.

Since a good deal of the phonology of this work is motivated in terms of verb alternations, it may help the uninitiated reader to briefly learn how it is that verbs are conjugated in Arabic. Briefly, there are two major conjugations, the perfective

conjugation and the imperfective conjugation. The perfective conjugation requires that the set of person markers be suffixed to the stem. These markers may be summarized as 2) below, where X represents the stem to which the person markers are suffixed.

2)

singular		plural		dual	
X tu	I	X nā	we		
X ta	you m.	X tum	you m.	X tumā	you m.
X ti	you f.	X tunna	you f.	X tumā	you f.
X a	he	X ū	they m.	X ā	they m.
X at	she	X na	they f.	X atā	they f.

We need only substitute a perfective stem for X to obtain the desired person. Thus, we might substitute the stem of 1)b., sallam, for X followed by ū in 2), to obtain sallamū, 'they m.p. greeted', or 'istalam of 1)f. for X followed by tunna of 2), to obtain 'istalamtunna, 'you f.p. received', and so on.

The imperfective conjugation requires prefixes of person as opposed to the perfective conjugation, which as noted above requires suffixes of person. The relevant prefixes are summarized in 3).

3) Imperfective Prefixes

singular		plural		dual	
'a X	I	na X	we		
ta X	you m.	ta X	you m.	ta X	you m.
ta X	you f.	ta X	you f.	ta X	you f.
ya X	he	ya X	they m.	ya X	they m.
ta X	she	ya X	they f.	ta X	they f.

In addition to these prefixes, however, there are some suffixes which must accompany several of the prefixes of 3). These include ī, which must follow the stem of the f.s. second person, ū, which must follow the m. p. of the second and third persons, na, which must follow the f.p. of the second and third persons, ā, which must follow the m.d. of the second and third persons, and ā, which must follow the f.d. of the second and third persons. Thus, 3) is more completely represented as 4).

4) Imperfective Affixes

singular		plural		dual	
'a X	I	na X	we		
ta X	you m.	ta X ū	you m.	ta X ā	you m.
ta X ī	you f.	ta X na	you f.	ta X ā	you f.
ya X	he	ya X ū	they m.	ya X ā	they m.
ta X	she	ya X na	they f.	ta X ā	they f.

It seems clear that these suffixes mark gender and number, whereas the prefixes marke person. Note that where we would have expected ta as the prefix of the f.p. third person, we actually obtain ya.

There is yet a further wrinkle. To the imperfective stem or stem plus affix of 4), must be added the indicative marker to mark the indicative mood, the subjunctive marker to mark the subjunctive mood, the jussive marker to mark the jussive mood, and the energetic marker to mark the energetic mood. The indicative marker is u if there is no suffix, and na, if there is,unless the suffix is already na, in which case there is no mood marker.[1] The indicative, then is

5) Imperfective Indicative

sg.	pl.	dl.
'a X u	na X u	
ta X u	ta X ū na	ta X ā ni[2]
ta X ī na	ta X na	ta X ā ni
ya X u	ya X ū na	ya X ā ni
ta X u	ya X na	ta X ā ni

The imperfective stem varies predictably given the perfective stems. Excluding the derived stems for the moment, we may note that the base stem for

the perfective conjugation is CVCVC. For the imperfective conjugation it is CCVC. Thus, taking the imperfective stem ktub, we may conjugate it in the indicative according to 6), where we substitute ktub for the X of 5). Morphemes are separated by +.

Imperfect Indicative

6) sg.	pl.	dl.
'a+ktub+u	na+ktub+u	
ta+ktub+u	ta+ktub+ū+na	ta+ktub+ā+ni
ta+ktub+ī+na	ta+ktub+na	ta+ktub+ā+ni
ya+ktub+u	ya+ktub+ū+na	ya+ktub+ā+ni
ta+ktub+u	ya+ktub+na	ta+ktub+ā+ni

The subjunctive conjugation differs slightly. The subjunctive a marker shows up just where indicative u normally shows up. However where na (and ni) and Ø represent the indicative in 6) or 5), the subjunctive has Ø. Thus, the imperfective stem ktub, conjugated in the subjunctive mood, runs as follows:

Imperfect Subjunctive

7) sg.	pl.	dl.
'a+ktub+a	na+ktub+a	
ta+ktub+a	ta+ktub+ū	ta+ktub+ā
ta+ktub+ī	ta+ktub+na	ta+ktub+ā
ya+ktub+a	ya+ktub+ū	ya+ktub+ā
ta+ktub+a	ya+ktub+na	ta+ktub+ā

It is to be noted that the second and third person feminine plurals are neutralized in the indicative and subjunctive moods, i.e. there is no overt distinguishing characteristic between these forms in the two moods.

The jussive mood is marked by omission of any overt mood marker whatsoever. The imperfective stem ktub, conjugated in the jussive is as follows:

8) Imperfective Jussive

sg.	pl.	dl.
'a+ktub	na+ktub	
ta+ktub	ta+ktub+ū	ta+ktub+ā
ta+ktub+ī	ta+ktub+na	ta+ktub+ā
ya+ktub	ya+ktub+ū	ya+ktub+ā
ta+ktub	ya+ktub+na	ta+ktub+ā

Here all forms but the suffixless ones are neutralized with those of the subjunctive.

The energetic mood is far less common than the three moods covered above. Here we have the option of appending anna or an, so that imperfective ktub may be conjugated in this mood in the first person as illustrated in 9).

9) Imperfective Energetic

sg.	pl.
'a+ktub+an(na)	na+ktub+an(na)

Those persons with additional suffixes, such as i and ū, are operated on by certain phonological rules which are brought up in the following chapters. The energetic mood is related in rather subtle ways to the jussive and subjunctive moods, and there is good reason for suspecting that all derive from a single phonological base. But these questions will not be entered into in this study for lack of time, and the energetic mood will not be discussed in any detail.

The unmarked mood is the indicative, and the subjunctive and jussive moods can be predicted on the basis of syntactic considerations alone. The exact mechanism for doing this is beyond the scope of a purely phonological study such as this.

The only imperfective stem listed among the examples of 1) is example g., where the person prefix ta, 'you m.s.', precedes the derivational prefix sta plus the stem slim, followed by the indicative marker u. The near complete set of stems, basic and derived, perfective and imperfective, may now be listed as 10).

10)

	Perfective	Imperfective
I.	$CaC\begin{Bmatrix}a\\u\\i\end{Bmatrix}C$	$CC\begin{Bmatrix}i\\a\\u\end{Bmatrix}C$
II.	CaC_iC_iaC	CaC_iC_iiC
III.	$C\bar{a}CaC$	$C\bar{a}CiC$
IV.	'a+CCaC	CCiC
V.	ta+CaC_iC_iaC	ta+CaC_iC_iaC
VI.	ta+$C\bar{a}CaC$	ta+$C\bar{a}CaC$
VII.	'i+n+CaCaC	n+CaCiC
VIII.	'i+CtaCaC	CtaCiC
IX.	'i+$CCaC_iaC_i$	$CCaC_iiC_i$
X.	'i+sta+CCaC	sta+CCiC

These forms are listed according to the traditional Western system of numbering. The forms listed as I are basic non-derived stems. Notice that these may take one of three possible stem vowels in the position adjacent to the second and third radicals. This vowel we shall henceforth call <u>the stem vowel</u>. The stem vowel must be learned for the particular form in question, i.e. it is normal that only one stem vowel is taken per root. Thus, the root <u>ktb</u> takes <u>a</u> in the perfective, viz. <u>katab</u>, the root <u>rkb</u> takes <u>i</u> in the perfective, viz. <u>rakib</u>, the root <u>kbr</u> takes <u>u</u>, <u>kabur</u>, etc. Form classes II-X are the more common derived stems plus derivational affixes. Note that the

subscript i indicates that the radical in question has been doubled, so that forms III and V bear a doubled second radical, while form IX bears a doubled third radical. To conjugate any of these classes in all persons, we simply substitute the form in question for the X of 2) or 5) above, or for the stem of 7) or 8). Thus, taking a representative of class X as an example, we may conjugate 'istaqbal as follows in the perfective and imperfective indicative.

11)

Perfective

'i+sta+qbal+tu	'i+sta+qbal+nā	
'i+sta+qbal+ta	'i+sta+qbal+tum	'i+sta+qbal+tumā
'i+sta+qbal+ti	'i+sta+qbal+tunna	'i+sta+qbal+tumā
'i+sta+qbal+a	'i+sta+qbal+ū	'i+sta+qbal+ā
'i+sta+qbal+at	'i+sta+qbal+na	'i+sta+qbal+atā

Imperfective Indicative

'a+sta+qbil+u	na+sta+qbil+u	
ta+sta+qbil+u	ta+sta+qbil+ū+na	ta+sta+qbil+ā+ni
ta+sta+qbil+ī+na	ta+sta+qbil+na	ta+sta+qbil+ā+ni
ya+sta+qbil+u	ya+sta+qbil+ū+na	ya+sta+qbil+ā+ni
ta+sta+qbil+u	ya+sta+qbil+na	ta+sta+qbil+ā+ni

It is rather obvious from a casual inspection of 10) that the intial 'i of the perfectives of VII-X is epenthetic, i.e. is predictable by a phonological rule. This rule will be taken up in Chapter VI in another connection. Also to be noted is the fact that there is an implicational relation holding between the stem vowel of the perfective of I and the stem vowel of the imperfective of I. This alternation is taken up in Chapter V, where an attempt at generalizing perfective and imperfective stems is undertaken.

The perfective and imperfective verbal forms offer the richest source for alternations bearing on the correct statement of the phonology of Arabic. We shall draw extensively from forms belonging to one of the classes of 10) throughout the text.[3] With this much said, let us pass on to some general remarks about the form of the phonological theory utilized in this study.

1.2 The Phonological Component

The theoretical model which forms the basis of this work is the phonological theory espoused by Chomsky and Halle (1968) in its most articulated form. It is assumed that a linear ordering is imposed on the rules of the grammar, although Anderson's theory of local ordering is discussed at various junctures

throughout this work.

There is little that the reader unfamiliar with generative phonology need learn to understand this text. All he really need familiarize himself with is the set of conventions used to collapse rules. These conventions include the slash-dash notation, the parentheses, braces, and angle notations, and finally the distinctive feature notation. A quick reading of Chomsky and Halle (1968), Chapter 8, is sufficient prerequisite for this work, but even this is really unnecessary, for the interested reader should be able to make out the conventions from the examples adduced in the text. Further, to facilitate the exposition, we have held back in our use of the feature notation. It is simple enough to state these rules in the distinctive feature notation, which we do finally in Chapter XIII, so that nothing hangs on our informal statements of rules. Some comment on the boundaries utilized herein is necessary. The symbol $\underline{\Psi}$ is used to represent the word boundary, which is more conventionally symbolized by the double cross. The morpheme boundary will be marked by the usual $\underline{+}$, and this boundary will be carried forth in all derivations to the phonetic representation itself, although it is understood that this boundary has no phonetic reflexes whatsoever. In

fact, it seems that the psychological reality of this boundary can be questioned. This issue is only touched upon in several footnotes to follow, and our use of this boundary is no more than heuristic, i.e. to help the reader unfamiliar with Arabic to identify the morphemes in question, and thus to better follow the exposition.[4]

Below is presented a phonetic classificatory matrix of the obstruents of Arabic. Certain irrelevant features have been omitted. Several comments concerning these features are in order. Those segments of the form Ċ, which the exception of ḥ, are the so-called ''emphatics'' of Arabic. The emphatics have been variously described as pharyngealized and velarized in the Western literature, a fact which in itself describes the lack of understanding of this mechanism. It is our belief that the major defining characteristic of these sounds is the tensing of the root of the tongue. For this reason we have decided on the feature [+rhz] to distinguish them from their non-emphatic counterparts. This feature, rhizo-lingual, is favored over the feature complex [-hi, +lo, +bk] proposed by Chomsky and Halle for pharyngeal and pharyngealized segments because of the reasons we present below in conjunction with the vowel system. It may be the case that our [+rhz] is the same as Chomsky and Halle's [+covered],

proposed to account for vowel harmony phenomena found in many West African languages. Because we are unfamiliar with these languages, we cannot identify or distinguish the two features, although we suspect that there is in fact a difference. It must also be reckoned that no distinction exists between the traditional phrayngealization and the traditional velarization,[5] terms often used to describe the Arabic emphatics. And further, it may be that our [+rhz] is the feature needed to define this type of articulation. If this is the case, then Chomsky and Halle's [-hi, +lo, +bk] is inadequate to represent pharyngeals and pharyngealized segments.[6] Incidentally, it should be noted that the mechanisms for producing the pharyngeals ḥ and ʕ of Arabic, i.e. the voiceless and voiced pharyngeal fricatives, is of a totally different sort than that utilized to produce the emphatics or so-called phrayngealized segments, supporting our choice of the feature [+rhz]. Although 12) constitutes the phonetic defining characteristics of the obstruents of Arabic, with certain irrelevant features omitted, these segments, with perhaps one or two exceptions, are also deep representations. The possible exceptions to this statement are j, usually written ǰ, and f. It will be noted that the only

	t	t̪	k	q	b	d	d̪	f	θ	ð	ð̪	s	s̪	z	š	j	x	ɣ	h	ʔ
son.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cns.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
voc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
syl.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cnt.	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	+	+	+	+
ant.	+	+	-	-	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-
cor.	+	+	-	-	-	+	+	-	+	+	+	+	+	+	+	+	-	-	-	-
voi.	-	-	-	-	+	+	+	-	-	+	+	-	-	+	-	+	-	+	-	+
str.	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-
rhz.	-	+	-	+	-	-	+	-	-	-	+	-	+	-	-	-	-	-	-	-
lyn.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+

non-continuant fricative in 12) is j. That is, j is the only affricate found in the Arabic under investigation, having no voiceless counterpart č. The [-rhz] obstruents may be listed below in a taxonomic arrangement as to manner and place of articulation.

13) stops:	vl.			t		k		
	voi.	b		d				
fricatives:	vl.	f	θ	s	s	x	h	
	voi.		ð	z		γ	ʕ	
affricates:	vl.							
	voi.				j			

It is to be expected that a language possessing t-d should also possess k-g and p-b. However, such is not the case with 13). These gaps may be filled by the segments j and f respectively. That is, by claiming that p --> f and g --> j, we may round the total phonological system out in a desirable way. Of course this is the case historically. That is, phonetic f did derive from Semitic p, and phonetic j did derive from Semitic g.[7] However, the distributional argument just presented must be supported by additional phonological evidence if these changes are to be considered synchronic. Some evidence does exist indicating that j is to be derived from the more abstract g.

This evidence concerns the definite article 'al and the well-known rule of Arabic which assimilates the l of this morpheme[8] to certain following consonants.

14)

'al	'al --> 'aC_i/ __C_i
'al+bāb+u	'al+tamar+u --> 'at+tamar+u
'al+kabīr+u	'al+ṭifl+u --> 'aṭ+ṭifl+u
'al+qur'ān+u	'al+dūd+u --> 'ad+dūd+u
'al+faras+u	'al+ḍil9+u --> 'aḍ+ḍil9+u
'al+xāl+u	'al+θawb+u --> 'aθ+θawb+u
'al+ḥāl+u	'al+samak+u --> 'as+samak+u
'al+ɣār+u	'al+sīn+u --> 'as+sīn+u
'al+9ayn+u	'al+ðanab+u --> 'að+ðanab+u
'al+walad+u	'al+ðuhr+u --> 'að+ðuhr+u
'al+yamīn+u	'al+zirr+u --> 'az+zirr+u
'al+'alif+u	'al+ra'īs+u --> 'ar+ra'īs+u
'al+hadaf+u	'al+lawn+u --> 'al+lawn+u
'al+malik+u	'al+maml+u --> 'an+naml+u

In the left-hand column we find no assimilation, but in the right-hand column we find that l completely assimilates to the following segment. It appears, then, that 'al assimilates to [+cns, +cor] segments, but never to [-cor] or [-cns] segments. We may now test to see what happens to 'al when placed before words beginning with j. That is, does 'al+jamal+u be-

come 'aj+jamal+u as predicted, since j is [+cor] and [+cns]? The answer is no. The word 'al+jamal+u remains the same in phonetic representations, i.e. 'al does not assimilate to j as expected. But now the explanation for this discrepancy is apparent. If we derive j from underlying g, then we may allow the assimilation rule to apply, followed by the rule taking g to j.

15) l-Assimilation: l [+def] --> C_i / __ $\begin{matrix} C_i \\ [+cns] \\ [+cor] \end{matrix}$

g-to-j: g --> j

This explains why it is that 'al does not assimilate to j. At the point when l-Assimilation is applicable j is represented as g, and g is [-cor], so that l-Assimilation may not apply. Later g is changed to j in all environments.[9]

There seems to be no independent justification for deriving phonetic f from underlying p. Until such evidence is found, it must be assumed that f is the underlying segment in the synchronic grammar of Arabic, for the gap argument noted above is extremely weak evidence. To conclude this rapid survey of the

	m	n	l	r	w	y	h	'	i	i̇	ī	ī̇	u	u̇	ū	ū̇	a	ȧ	ā	ā̇
son.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
cns.	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
voc.	-	-	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+
syl.	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+
cnt.	+	+	-	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
ant.	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cor.	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
voi.	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+
rhz.	-	-	-	-	-	-	-	-	-	+	-	+	-	+	-	+	-	+	-	+
lyn.	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
hi.	-	-	-	-	+	+	-	-	+	+	+	+	+	+	+	+	-	-	-	-
lo.	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	+	+	+
bk.	-	-	-	-	+	-	-	-	-	+	-	+	+	+	+	+	-	+	-	+
lg.	-	-	-	-	-	-	-	-	-	-	+	+	-	-	+	+	-	-	+	+
rd.	-	-	-	-	+	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-

obstruent system of Arabic, we note that all of the obstruents of 12) are underlying with the exception of j, and possibly f.[10] Let us now turn to the sonorant system of Arabic, which may be listed below as 16).

Table 16) is, once again, a phonetic classificatory matrix. Those vowels of the shape Ṿ are emphatic in nature. However, these vowels can be predicted by a general rule. That is, there is a rule which assimilates vowels to adjacent emphatic obstruents in the feature [+rhz].[11] For example, underlying ṭi becomes ṭi, etc.[12] The rule is of little consequence to this study. Yet, it is of some moment that the vowels which become emphatic are back and somewhat lower than the plain vowels. The following diagram will illustrate this.

17)

	front	back
high	i	i̇ u u̇
low	a	ạ

The diagram 17) is only rough and impressionistic. Nevertheless, it approaches accuracy. The symbol a is more usually represented by æ in phonetic notation, although the Arabic a is slightly higher and more retracted than English æ. It is important to note that

neither the feature complex [-hi, +bk, +lo], Chomsky and Halle's pharyngealization, nor the complex [-hi, +bk, -lo], their velarization, can adequately be assigned to the emphatic vowels by an assimilation rule. This follows from the fact that there are emphatic vowels differing in the feature [lo] in phonetic representations.[13] The feature [+rhz], however, does not commit one to claiming that all emphatics are [+lo] or [-lo]. Therefore, this feature, must be favored over the proposal of Chomsky and Halle, giving us the valuable clue that [+rhz] is the appropriate feature to be associated with emphatic obstruents. Moreover, some investigators of Arabic have claimed that underlying $\underline{t\dot{9}}$ --> $\underline{t\ddot{9}}$, i.e. that all segments may be assimilated to emphatic obstruents. If this is correct, then [+rhz] must be favored over the features of Chomsky and Halle, for according to them, pharyngeals may not be pharyngealized, velars may not be velarized, etc. The feature [+rhz] may, however, be distributed to all segments, or not, as the facts require. Finally, we repeat that $\underline{9i}$ and $\underline{\dot{h}i}$ do not become $\underline{\dot{9}i}$ and $\underline{\ddot{h}i}$, bearing out the remarks of footnote 6.

Our real concern in this study is with the deeper rules of Arabic phonology. We may now pass to this more interesting topic.

Footnotes to Chapter I

1. To avoid suppletion in this latter case, we may assume that na is suffixed to forms such as ya+ktub+na, giving ya+ktub+na+na, which by a rule of haplology yields the correct phonetic results.

   (i) Haplology: na [+indicative] --> Ø / na__

   If this is a synchronic rule of Arabic, it is of little or no interest.

2. We assume that ni derives from underlying na and is changed to ni when occurring after āC. Such a rule seems to be a play in Arabic.

3. Form IX of 10) is given in abstract representations. Thus whereas underlying ('i)hmarar+ta remains just this in underlying representations, underlying ('i)hmarar+at becomes ('i)hmarr+at by processes to be disclosed in 4.4. It is also to be noted that the most abstract representations are not always present in 10). For example, imperfective ta+CaC$_i$C$_i$aC and ta+CāCaC are derived from the more abstract ta+CaC$_i$C$_i$iC and ta+CāCiC, as a glance at the other derived forms of 10) will indicate. These minor details may be glossed over without any effect on what is to come.

4. According to Chomsky (1951), if a morpheme boundary is present in the statement of a phonological rule, then that morpheme boundary must be present in the form under analysis if the rule is to apply. However if no morpheme boundary is present in the rule, then a morpheme boundary may or may not be present in the form under analysis for the rule to be applicable. This convention is carried over in Chomsky and Halle, (1968).

5. Much less the non-existent uvularization made a theoretical possibility by Chomsky and Halle's new features. The older feature system of Jakobson, Halle, and Fant is superior in this regard.

6. It may be claimed that the Arabic emphatics are velarized rather than pharyngealized, and that therefore the feature complex [-hi, +bk, -lo] is to be associated with these sounds, this being the representation Chomsky and Halle assign velars and velarized segments. Certainly the claim that Arabic emphatics are velarized segments comes closer to the truth than the claim that they are pharyngealized, assuming the traditional use of these terms, but still the Chomsky-Halle feature proposal [-hi, +bk, -lo] is incorrect because of the vowel phenomena mentioned below. We assume that many investigators of Arabic misled and continue to mislead the public in their use of 'pharyngealization' due to the fact that Arabic possesses pharyngeals. However, pharyngeals and emphatic consonants are quite different. In particular pharyngeals do not affect surrounding vowels in the same way as do emphatics. See below.

7. The Egyptian colloquial dialect of Arabic (and some Saudi dialects) retains g, whereas most other dialects exhibit j or ž. It is curious that some Western Arabists should argue, on the basis of no independent evidence, that j > g is an historical change of Egyptian.

8. Actually l may be the underlying representation of this morpheme.

9. This runs contrary to the claim of Kiparsky (1968), where it is argued that no synchronic rules lacking environments should be countenanced by linguistic theory. See my answer to this article, Brame (1969).

10. There are ample grounds for quibbling with some aspects of 12). For example, one may argue that θ is strident, that z is not, etc. These details do not affect the rules of the text in any way. Similar points of disagreement will no doubt exist as regards the sonorant matrix 16), where it may be argued that nasals are [-cnt], liquids are [+cnt], etc. Again nothing rides on these changes.

11. The statement of this rule is more complex, but the details will not be investigated here.

12. Since vowels are infixes, we may conclude that the consonants are the underlying emphatic segments, not the vowels. That is, if the vowels were taken as the underlying emphatics, then there would be two variants of every infixal morpheme, one emphatic, and one plain.

13. To consign these facts to low-level phenomena in this particular case is tantamount to abandoning empiricism, although there are good reasons for distinguishing low-level processes from more truly phonological ones in other areas. It should be noted here, that while Chomsky and Halle's features are wrong for this case in Arabic, they are nevertheless correct in a relative sense. That is, the emphatic vowels are backer and lower than their plain counterparts.

Chapter II

SOME PRELIMINARY RULES OF ARABIC

2.0 It is well known that the high glides w and y are susceptible to various phonological processes. Because of their inherent instability, these segments are destined to play a central role in the phonology of Arabic. The number of rules effecting this whole complex of alternations in Arabic is not minimal, causing what at first blush appears to be a paradoxical state of affairs, but from which emerges upon scrutiny, an underlying theme which pervades most of the phonology. This will become clearer as the exposition unfolds. For the moment, we may initiate the reader by citing evidence bearing on the treatment of just one facet of the problem of high glide alternations--the following paradigms:

1)

I			
katabtu	I wrote	da9awtu	I called
katabta	you m.s. wrote	da9awta	you m.s. called
katabti	you f.s. wrote	da9awti	you f.s. called
kataba	he wrote	da9ā	he called
katabat	she wrote	da9at	she called

The endings tu, ta, ti, a, and at of the forms listed under column I are clearly enough subject markers, i.e. the singular pronominal suffixes discussed in section 1.1 of Chapter I. From this it may be concluded that the stem of the perfective verb 'to write' is katab.

Identical first and second person singular suffixes are associated with the citations of column II. That is, 'I', 'you m.s.', and 'you f.s.' are marked by tu, ta, and ti respectively. This distribution of data indicates that the stem underlying the perfective verb 'to call' is da9aw.

The characteristics which distinguish the entries of column II from those of column I reside in the third person forms da9ā and da9at, for if the stem of 'to call' is indeed da9aw and if the third person singular suffixes are a, 'he', and at, 'she', then one would have expected to find da9awa and da9awat for 'he called' and 'she called', analogous to kataba and katabat, 'he wrote', and 'she wrote'. Let us assume, then, that da9aw+a and da9aw+at do in fact constitute the underlying third person representations of the perfective verb 'to call'. It now becomes apparent that there is a factor distinguishing the underlying third person singular forms of 'to call' from the first and second person singular forms of the

same verb: the third person forms contain awa sequences, whereas the first and second person forms do not. This observation allows us to acknowledge the following phonological rules which correctly account for phonetic da9ā, 'he called':

2) Rule I: w --> Ø / a__a

Rule II: aa --> ā

Rule I deletes w when it occurs between two a-grade vowels, i.e. awa becomes aa. Rule II turns any two contiguous a-grade vowels into a single long a-grade vowel, which may be represented as ā. Thus, underlying da9aw+a becomes phonetic da9ā in the following fashion:

3)	da9aw+a	underlying representation
	da9a+a	by Rule I
	da9ā	by Rule II

Rule II must follow Rule I in the order of application of these processes since the environment of Rule II is created by Rule I. If the ordering were the reverse, i.e. Rule II first, the result would be da9aa.

The problem of deriving the third person feminine form, da9at, entails the postulation of an additional

rule.[1]

4) Rule III: ā --> a / __CV

This rule allows for the derivation of phonetic da9at from underlying da9aw+at according to the following steps:

5) da9aw+at underlying representation
   da9a+at Rule I
   da9ā t Rule II
   da9at Rule III

As 5) demonstrates, Rule III must apply after Rules I and II have applied.

Rule I-III are by no means unnatural phonological processes. Such rules are probably to be encountered in various languages of the world. That phonetic da9ā and da9at are to be derived from da9aw+a and da9aw+at by means of these rules is, therefore, a reasonable hypothesis. Moreover, given no additional supporting evidence, one must favor da9aw+a and da9aw+at over all other possibilities as the underlying representations of the desired phonetic sequences, a conclusion which of itself lends a certain degree of credibility to the rules postulated above. The plausibility of

this analysis follows from the fact that such an analysis captures a number of important generalizations: (i) All the stems of the verbs listed under column II of 1) are related, viz. da9aw; (ii) Just as only one suffix is needed for each case of the first and second person endings, whether for the forms of column II or column I, just so only one suffix is required in the case of third person morphemes, namely a and at; (iii) The canonical shapes of all the stems of paradigm 1) are generalized to a simple CVCVC sequence of segments, viz. katab and da9aw; (iv) Finally, this analysis explains the absence of awa, aa, and āCV in the phonetics of Arabic, since such sequences do not normally elude Rules I-III. In other words, these rules apply not only to underlying da9aw+a and da9aw+at, but to all words with phonological sequences relevant to the above postulated rules. Thus, danaw+tu, 'I approached', but danā, 'he approached', danat, 'she approached', and so forth, from danaw+a and danaw+at via a route identical to that of 5).

On the basis of some very limited data, i.e. those of 1), it is possible to make some plausible suggestions as to their explanation. The crucial examples of 1) are those involving the glide w where this segment occupies the third radical position of the underlying

root. In succeeding chapters we shall have occasion to investigate those glides which do not function as the third radical. The remainder of this chapter, however, will be given over to an examination of the evidence further motivating underlying representations of the type posited above, along with the phonological processes discussed above, particularly the glide elision process, i.e. Rule I. Before turning to such cases, it will not be out of order to devise some terminology which will be useful in referring to specific classes of examples involving the high glides w and y. This terminology will serve no other purpose than that of avoiding circumlocutions. Let us hereafter designate any verb whose root includes at least one high glide in underlying representations a weak verb, and those verbs whose roots do not include at least one high glide strong verbs. We may define weak nouns, strong nouns, etc. similarly. The mnemonics blind and lame will be used to refer to a special class of weak forms, those which employ a weak segment w or y in the first root position (=blind) and those which employ a weak segment in the third radical position (=lame). Those stems whose middle or second root position is occupied by a weak segment will be

termed hollow, the term favored by the Arab grammarians.[2] Underlying da9aw+a and da9aw+at are weak verbs according to this terminology, and more precisely, lame verbs. Underlying wasal+a and kawan+a, examples which we shall encounter at a later juncture, are examples of blind and hollow verbs respectively. We may now turn to some evidence related to the analysis presented above.

2.1 Perfective Verbs

The rules mentioned above were conceived so as to handle alternations involving verb stems ending in w. Alongside the forms of paradigm 1) should be added the following:

6)

ramaytu	I threw
ramayta	you m.s. threw
ramayti	you f.s. threw
ramā	he threw
ramat	she threw

Considerations similar to those advanced earlier seem to indicate that the stem of the verb 'to throw' is ramay. A simple extension of Rule I towards the direction of greater generality will adequately account for

the third person forms ramā, 'he threw', and ramat, 'she threw'. Accordingly, Rule I may be replaced by Rule I'.

7) Rule I': G --> Ø / a__a

The symbol G is an informal cover for w and y and is more appropriately represented as the feature specification [-cns, -syl, +hi]. The third person forms of 'to throw' are now derivable without further ado.

8)	ramay+a	ramay+at	
	rama+a	rama+at	Rule I'
	ramā	ramāt	Rule II
	ramā	ramat	Rule III

2.2 Nouns

It has been shown that Rule I' applies to one class of weak verbs--those perfective verb forms displaying w or y as underlying third radical. Examples may now be adduced demonstrating that the rules postulated above are needed for an analogous class of nouns, i.e. lame nouns. As pointed out in section 1.1 of Chapter I, the accusative marker for nouns in Arabic is a, the indefinite marker, n. Bearers of these suffixes include nouns such as baṭalan, 'hero',

mataran, 'rain', and baytan, 'house', which are segmented as batal+a+n, matar+a+n, and bayt+a+n. There are lame nouns declined in the accusative case such as hudan, 'religious guidance', xazan, 'shame', himan, 'protection', and ridan, 'contentment'. The final n of such forms is clearly the indefinite marker. In addition it is known that such forms possess underlying third radical glides because of alternations such as hadaytu, 'I lead', xazaytu, 'I embarassed', hamaytu, 'I protected', and ridwānan, 'approval (acc.)'. If it is assumed that such forms are to be represented as underlying huday+a+n, xazay+a+n, himay+a+n, and ridaw+a+n as indicated by the relevant alternations and the strong nouns cited above, then the phonetic sequences may be accounted for by simply invoking the rules already postulated.

9)	huday+a+n	xazay+a+n	himay+a+n	ridaw+a+n	
	huda+a+n	xaza+a+n	hima+a+n	rida+a+n	Rule I'
	hudā+n	xazā+n	himā+n	ridā+n	Rule II
	huda+n	xaza+n	hima+n	rida+n	Rule III

There are other endings which may be added to lame noun stems so as to bring about similar distortions of the underlying sequences. Consider in this regard the feminine ending at, also found in verbs. The suffix can be found in strong forms such as

maktabatan, 'library', mil9aqatan, 'spoon', etc. Such forms segment into mV+CCaC+at+a+n sequences, at being the morpheme of interest, a the accusative case marker, n the indefinite marker, and mV a common noun-forming prefix, often associated with nouns of place and instrument, but also with more abstract nouns as well. Electing a root such as xzy (cf. paradigm 9)), we would expect to be able to construct a form such as ma+xzay+at+a+n. The rules postulated above predict that such an underlying sequence will pass through the stages of the following derivation:

10) ma+xzay+at+a+n

ma+xza+at+a+n Rule I'

ma+xzāt+a+n Rule II

ma+xzāt+a+n Rule III inapplicable

It is to the credit of the above analysis that we do in fact find phonetic maxzātan meaning 'disgrace'. This form is obviously related to the noun xazan cited earlier.

Words such as those discussed in this section add additional confirmation to the analysis presented earlier, particularly to the glide elision process which interests us most at the present. There are

additional formative types, however, which also support this analysis. Some of these additional examples will be presented directly.

2.3 Passive Participles

The rules presented above may be utilized in the case of numerous classes of derived passive participles. One such case will adequately serve as an illustration. Take first the strong verb 'istaqbaltu, 'I received (a guest)', which is a member of the sta-class of derived verbs and listed under class X in the chart of derived verbs in Chapter I. The initial 'i of this verb is a prosthetic element which will be discussed later. The sta prefix we might term the benefactive prefix. The suffix tu is the familiar first person marker. The passive participle associated with this verb is mustaqbalan in the accusative indefinite declension, the mu apparently being a participial prefix. The form can be segmented as mu+sta+qbal+a+n.

The interesting set of examples of derived formatives are those which are underlying weak, i.e. those involving high glides. The verb 'istaqdaytu, 'I required (s.th. from s.o.)', is an example of a

weak sta-class verb analogous to the strong verb 'istaqbaltu. It can be segmented as 'ista+qday+tu. We now wish to determine the passive participle of the verb 'to require'. The answer is readily deducible from a routine comparison of the strong forms noted in this section with the weak verb also cited above.

11)

strong	weak
'ista+qbal+tu	'ista+qday+tu
mu+sta+qbal+a+n	X

Clearly the X of 11) should turn out to be mu+sta+qday+a+n, all other things being equal. But all other things are not equal since Rules I', II, and III must be considered. These rules predict that underlying mu+sta+qday+a+n will be converted to phonetic mustaqdan, which is in fact true. The derivation runs as follows:

12)

mu+sta+qday+a+n	
mu+sta+qda+a+n	Rule I'
mu+sta+qdā+n	Rule II
mu+sta+qda+n	Rule III

2.4 Imperfective Verbs

Perfective verbs were considered in sections 2.0

and 2.1 above. An examination of imperfective verbs will shed new light on the correct statement of the glide elision process. As noted in Chapter I, the non-derived imperfective verbs require prefixes to mark person along with stems of the shape CCVC. For the time being we may assume that non-derived imperfective stems take on this CCVC shape at all levels of analysis, even though this assumption will prove to be incorrect later.

It will do best to first consider a paradigm involving a strong imperfective verb such as that represented in 13).

13)	'a+ktub+u	I write
	ta+ktub+u	you m.s. write
	ya+ktub+u	he writes
	ta+ktub+u	she writes

The prefixes are obviously equated 'a='I', ta='you m.s.', ya='he', and ta='she'. The phone u̯ is the indicative mood marker. The forms listed in 13) are, minus morpheme boundaries, the actual phonetic representations of the appropriate verb. Paradigm 13) should be compared with one involving a weak stem, e.g. 14).

14) 'a+d9ū I call
ta+d9ū you call
ya+d9ū he calls
ta+d9ū she calls

We know from section 2.0 that 'to call' has a third radical w in underlying representations, and we know from paradigms such as 13) that u is the indicative mood marker. We should therefore expect in place of 14) to find forms such as those listed in 15).

15) 'a+d9uw+u
ta+d9uw+u
ya+d9uw+u
ta+d9uw+u

If Rule I' is generalized so as to permit glides to elide between identical vowels and if Rule II is also generalized so as to apply to identical vowels, we may in fact derive 14) from what seems to be the true underlying representations 15). The derivations would proceed simply enough.

16)

'a+d9uw+u	ta+d9uw+u	ya+d9uw+u	
'a+d9u+u	ta+d9u+u	ya+d9u+u	Glide Elision
'a+d9ū	ta+d9ū	ya+d9ū	Lengthening

As indicated by 16), the rules may be restated as follows:

17) a. Glide Elision: $G \rightarrow \emptyset \; / \; V_i \_\_ V_i$

b. Lengthening: $V_i V_i \rightarrow \bar{V}_i$

c. Shortening: $\bar{V} \rightarrow V \; / \; \_\_ C\Psi$

The subscripts are meant to signify that the vowels must be identical in quality for the rules to be applicable. Rule 17)a., Glide Elision, replaces the earlier Rule I'; 17)b., Lengthening, replaces Rule II; and 17)c., Shortening, replaces Rule III. If these new statements are adopted, phonetic 'ad9ū, tad9ū, etc. will derive from the natural underlying sequences 'a+d9uw+u, ta+d9uw+u, etc., forms which are completely analogous to the strong forms 'a+ktub+u, ta+ktub+u, etc. Thus, the ū of paradigm 14) is seen to be a conflation of the imperfect stem vowel u, the third radical glide w, and the indicative marker u. This analysis is attractive, since not only is one indicative morpheme now required, viz. u, but also the stems of weak verbs of the above mentioned type are identical to those of strong verbs at the more abstract level of analysis. Imperfective verbs, it may be

concluded, add additional confirmation to our approach.

2.5 Active Participles

Cases have been cited where glides elide between two occurrences of the vowel a and two occurrences of the vowel u. If the identity condition placed on the rule of Glide Elision is correct, we would expect to find cases requiring elision of glides between two occurrences of i. Such examples may now be adduced, thus rounding out the distributional evidence.

To illustrate such cases, we may draw from a grammatical type heretofore neglected in our discussion. This is the so-called active participle, which takes on the shape CāCiC with respect to strong stems. For example 'writing' in Arabic would be formed from the root ktb encountered above by substituting the root consonants into the pattern CāCiC. This yields kātib, which does means 'writing'. The form may be declined in the genitive case, indefinite deixis, to yield kātib+i+n. It will now become clear that should we substitute the root d9w or rmy for ktb of the latter example, the final w and y will be in a position meeting the conditions for elision by the rule of Glide Elision. That is, the active participles meaning

'calling' and 'throwing' respectively (cf. 1) and 6)) would be dā9iw+i+n and rāmiy+i+n from which w and y should elide. The derivations would proceed as indicated in 18).

18)	dā9iw+i+n	rāmiy+i+n	
	dā9i+i+n	rāmi+i+n	Glide Elision (17a.)
	dā9Ī+n	rāmĪ+n	Lengthening (17b.)
	dā9i+n	rāmi+n	Shortening (17c.)

The rules listed in 17) do represent the correct approach since we do find phonetic dā9in, 'calling' and rāmin, 'throwing'.

Summarizing, it becomes evident that the rules listed in 17) do serve to relate alternations involving all major categories of speech. With these three rules, we explain much seemingly paradigmatic irregularity. This is accomplished by postulating abstract representations which are morphologically parallel to the ''regular'' strong forms and by allowing the phonological rules to operate on these abstract representations in an ordered sequence. It is no coincidence that a large body of evidence converges in the ways sketched out in this chapter.

Footnotes to Chapter II

1. The symbol $\underline{\Psi}$ represents what is usually represented by the double cross, i.e. the word boundary. The approach to the shortening process will take on a new formulation in Chapter IV.

2. That term being fi9l 'ajwaf. Unfortunately the designations for first and third weak stems traditionally adopted by the Arab grammarians do not mnemonically reflect the respective root position focused upon. For this reason the new terminology.

Chapter III

GLIDE ELISION REVISITED

3.0 In Chapter II it was noted that the high glides elide when they occur between identical vowels in underlying representations. The exact statement of the glide elision process was motivated on the basis of examples involving the changes listed in 1).

1) aGa --> aa
   uGu --> uu
   iGi --> ii

In this chapter we shall confront some new data in order to learn just what happens to glides which are adjacent to two vowels which are not identical in underlying representations. This evidence will lead to further revisions of the glide elision process stated in 17) of Chapter II.

3.1 Conditions on Height

We know from Chapter II that the normal pattern for active participles of non-derived verbs is CāCiC. Thus, it was argued that phonetic dā9in and rāmin in the genitive indefinite declension must be derived from underlying dā9iw+i+n and rāmiy+i+n by processes which by now are familiar. Recall that the nominative

case marker is u, which shows up in strong active participles such as kātib+u+n, 'writing', nāzil+u+n, 'descending', and so on. One would naturally expect the weak roots d9w, rmy, etc. to take on analogous shapes when they become active participles declined in the nominative case. That is, one expects to find alongside the strong forms kātib+u+n and nāzil+u+n, dā9iw+u+n and rāmiy+u+n. The actual phonetic representations of both strong and weak active participles of the nominative declension are listed below.

2)

strong	weak
kātibun	dā9in
nāzilun	rāmin

Notice that the nominative weak forms of 2) are completely neutralized with the genitive weak forms discussed in section 2.5 of Chapter II (cf. 18) therein). We may account for the differences in phonetic representations between the strong and weak entries of 2), and consequently for the neutralization of nominative and genitive active participles as dā9in, rāmin, etc., by allowing the rule of Glide Elision to apply to underlying dā9iw+u+n and rāmiy+u+n (as well as to dā9iw+i+n and rāmiy+i+n) if we also add

to the phonology of Arabic, the following new rule, which may be called i-Assimilation.

3) i-Assimilation: u --> i / i__

This proposal allows for the derivation of dā9in and rāmin from the natural underlying sequences dā9iw+u+n and rāmiy+u+n.

4)	dā9iw+u+n	rāmiy+u+n	
	dā9i+u+n	rāmi+u+n	Glide Elision (revised)
	dā9i+i+n	rāmi+i+n	i-Assimilation (3)
	dā9ī+n	rāmī+n	Lengthening (17b.)
	dā9i+n	rāmi+n	Shortening (17c.)

It is evident from this derivation that the new rule of i-Assimilation must follow Glide Elision and precede Lengthening.[1]

In order to allow for the syncopation of the glides from the underlying entries of 4), we must give up the identity condition placed on the rule of Glide Elision in Chapter II. The rule, it will be recalled, was stated in such a way so as to allow glides to drop just in case the adjacent vowels were identical in all feature specifications. This was accomplished by resorting to the notation of subscripts.

But since changes such as iwu --> iu and iyu --> iu are apparently necessary to derive dā9in, rāmin, etc., we must relax the identity condition so that what is now required is simply that the vowels appearing on either side of the relevant glide agree in height. This conclusion leads to the following restatement of Glide Elision:

5) Glide Elision: $G \text{ --> } \emptyset \; / \; \overset{V}{[\alpha hi]} \_\_ \overset{V}{[\alpha hi]}$

The symbol α is a variable ranging over the coefficients ''+'' and ''-'' which are associated with the feature [hi]. We interpret the notation as follows: If the left-most V is [+hi], then the right-most V must also be [+hi] for the rule to apply. Alternatively if the left-most V is [-hi], then the right-most V must be [-hi]. Similarly, if the right-most V is [+hi], then the left-most V must be [+hi], and if the right-most V is [-hi], then the left-most V must be [-hi]. This is to say that the vowels must agree in the feature [hi]. Returning to the underlying sequences dā9iw+u+n and rāmiy+u+n of 4), we see that both i and u are specified as [+hi], i.e. both are high vowels. Consequently, the new rule of Glide Elision will apply to such sequences allowing for the generation of

of phonetic dā9in and rāmin.

The new rule of i-Assimilation receives additional motivation from some phenomena we shall now discuss. In section 2.4 of Chapter II we discussed imperfective weak verbs with third radical w. Omitted from that discussion were any examples involving third radical y. Such examples do in fact exist. Before pointing to the relevance of such examples, it would not be misleading to recall that the indicative mood marker is manifested by the simple high rounded vowel u. The examples bearing this suffix discussed above included examples such as ta+ktub+u, 'she writes', and ta+d9uw+u, the latter of which becomes ta+d9ū, 'she calls'. Note that both underlying ta+ktub+u and ta+d9uw+u possess a stem vowel u as well as the indicative marker u. Not all imperfective verbs possess this stem-vowel. We also find numerous examples of strong verbs with i or a in addition to u, as e.g. ta+nzil+u, 'she descends' or ta+šrab+u, 'she drinks'. Of interest for the present discussion is the fact that there are some weak verbs which must have the imperfect stem vowel i if we are to explain the actual phonetic representation of such forms. Thus, taking the root rmy, we find corresponding to those imperfect

verbs cited above, ta+rmī, 'she throws', in the indicative mood. We should have expected ta+rmiy+u if i is indeed the stem-vowel of such cases. The assumption that i is the stem-vowel, however, allows for the derivation of phonetic tarmī from the plausible underlying representation ta+rmiy+u, given the rules postulated up to this point.

6) ta+rmiy+u

ta+rmi+u	Glide Elision (5)
ta+rmi+i	i-Assimilation (3)
ta+rmī	Lengthening (17b.)

A derivation such as this explains why it is that the normal indicative morpheme u does not appear phonetically as such in examples such as tarmī. In addition, the stem of such weak verbs is generalized with that of the strong stems nzil, ktub, etc., as well as with the stem d9uw motivated earlier. Examples such as tarmī, then, add considerable plausibility to the rule of i-Assimilation, and with it, to derivations such as 4) and 6).

3.2 Some Confirming Evidence

In the preceding section a new, somewhat more general condition was proposed for the rule of Glide Elision. In this section some evidence will be discussed which confirms to some extent this earlier move.

First we are concerned with the subjunctive mood marker a. Like the indicative marker u, the subjunctive marker is associated with imperfective verb forms. Alongside indicative ta+ktub+u, 'she writes' and ta+nzil+u, 'she descends', one discovers examples such as ta+ktub+a, 'that she write', and ta+nzil+a, 'that she descend'. This subjunctive marker a provides us with a test for validating or disconfirming much of what has been said up to now. For if underlying representations such as ta+d9uw+u and ta+rmiy+u are truly the deep representations of phonetic tad9ū and tarmī and if the rule of Glide Elision has been revised so as to approximate the true nature of Arabic phonology, then one need only substitute subjunctive a for indicative u in the latter underlying shapes ta+d9uw+u and ta+rmiy+u to see if our theory predicts what phonetic 'that she call' and 'that she throw' actually turn out to be.

Our theory of course predicts that underlying ta+d9uw+a and ta+rmiy+a will not be affected by any of the processes discussed above, i.e. that these (with the irrelevant exception of boundaries) are in fact the phonetic representations for the subjunctive forms corresponding to tad9ū and tarmī. This prediction follows from the underlying stems postulated for phonetic tad9ū and tarmī and from the new condition placed on Glide Elision, which requires that the vowels adjacent to the relevant glides be identical in height. However the vowels between which w and y appear in the case of ta+d9uw+a and ta+rmiy+a do not agree in the feature [hi]. Therefore Glide Elision should be inapplicable. Our analysis correctly anticipates the phonetic facts in this case, for we do indeed find tad9uwa, 'that she call' and tarmiya, 'that she throw'. Such forms confirm our theory, then, in that they are precisely what our theory predicts.

Allied to the above facts are some facts concerning once again the active participle. More specifically, the relevant active participles are those declined in the accusative case. The nominative and genitive cases are u and i respectively and we

have already proposed rāmiy+u+n and rāmiy+i+n as the underlying representations for rāmin, 'throwing (nom. and gen.)'. It should be possible to substitute the accusative case marker a for the nominative or genitive case markers in the above-stated underlying representations to yield rāmiy+a+n, which, for reasons discussed directly above, should not be alterable. Once again, what obtains in this instance is phonetic rāmiyan, 'throwing (acc.)', which is in every way parallel to strong forms such as kātib+a+n, 'writing (acc.)', nāzil+a+n, 'descending (acc.)', and so forth.

The following derivations illuminate all important phenomena discussed to this point:

7) A: Imperfectives

indicative	subjunctive	
ta+rmiy+u	ta+rmiy+a	
ta+rmi+u	ta+rmiy+a	Glide Elision
ta+rmi+i	ta+rmiy+a	i-Assimilation
ta+rmī	ta+rmiy+a	Lengthening

7) B: Active Participles

nominative	genitive	accusative	
rāmiy+u+n	rāmiy+i+n	rāmiy+a+n	
rāmi+u+n	rāmi+i+n	---	Glide Elision
rāmi+i+n	---	---	i-Assimilation
rāmī+n	rāmī+n	---	Lengthening
rāmi+n	rāmi+n	---	Shortening

As pointed out in Chapter I, the definite and indefinite deictic particles of Arabic are mutually exclusive, the definite marker being a prefix, 'al, the indefinite marker being a suffix, the n of 7)B. It is not inappropriate at this point to note what happens to the definite paradigms corresponding to 7)B.

8)

nominative	genitive	accusative	
'al+rāmiy+u	'al+rāmiy+i	'al+rāmiy+a	
'al+rāmi+u	'al+rāmi+i	---	Glide Elision
'al+rāmi+i	---	---	i-Assimilation
'al+rāmī	'al+rāmī	---	Lengthening

The definite forms differ from their indefinite counterparts in only one respect: The definite forms are not susceptible to Shortening as is of

course predicted.[2] A rule of no interest for the moment will assimilate the l of the definite article to the r of the stems listed in 8). The actual phonetic are therefore 'arrāmī, nom., 'arrāmī, gen., and 'arrāmiya, acc.

3.3 An If-Then Condition

In section 3.1 of this chapter, it was noted that in addition to imperfective verbs of the stem-type CCuC, e.g. ta+ktub+u, there exist stems of the shapes CCiC and CCaC. It is the latter type which will be of interest in this section. This class of stems is exemplified by examples such as ta+šrab+u, 'she drinks', mentioned earlier, as well as numerous others, e.g. ta+9lam+u, 'she knows', ta+rkab+u, 'she rides', etc. Examples of weak stems characterized by the stem vowels u and i have already been cited. That is, we have already witnessed examples of stems CCiG and CCuG, which in some cases were distorted to some extent in the course of the phonological derivation. Given that CCaC is a possible stem-type, we would now expect to find lame stems of the analogous type, namely CCaG. Absence of such stems would constitute a gap in the total distribution of morphological as well as phonological data. It is not surprising, then, that the

evidence does suggest underlying CCaG stems.

Consider by way of illustration the following paradigms incorporating imperfective verbs conjugated in the subjunctive mood:

9)

I		II	
'a+rkab+a	that I ride	'a+lqā	that I meet
ta+rkab+a	that you ride	ta+lqā	that you meet
ya+rkab+a	that he ride	ya+lqā	that he meet
ta+rkab+a	that she ride	ta+lqā	that she meet

The forms listed under I are perfectly regular strong forms and cause no problems. We must analyze those forms in column II further however. One thing is certain. These forms should possess the subjunctive a in underlying representations. Moreover, we know that the stem underlying the verb 'to meet' is a lame stem since in the perfective conjugation we find forms such as laqiy+a, 'he met', laqiy+at, 'she met', and so forth. Indeed we also find nouns such as luqy+at+u+n, 'encounter', which prove beyond doubt that the underlying root is of the CCG variety. We gather, then, that the underlying stem of the forms listed under II of 9) is at least lqVy. It remains only to determine the stem vowel itself. This is

straightforward, given what has been said earlier. Thus, we know that if the V of underlying lgVy were a high vowel, i.e. u or i, then the y would not elide. This follows since the identity condition on Glide Elision is violated. Thus, putative 'a+lqiy+a, ta+lqiy+a, etc. would not, under the present analysis, be susceptible to Glide Elision. The most obvious deduction at this point is that the stem vowel of these forms is not a high vowel, which leaves only a. But if a is chosen, we see that the correct surface representations are immediately derivable. Consider the third person forms.

10)	ya+lqay+a	ta+lqay+a	
	ya+lqa+a	ta+lqa+a	Glide Elision
	ya+lqā	ta+lqā	Lengthening

The choice of a over all other possibilities is given further confirmation by the following observation: Typically when the stem vowel of the perfective is i, the stem vowel of the imperfective is a. Thus, we find rakIb+at, 'she rode', but ta+rkAb+a, 'that she ride'; 9alIm+at, 'she knew', but ta+9lAm+a; and šarIb+at, 'she drank', but ta+šrAb+a, 'that she drink'. The relevant stem vowels have been capitalized for clarity. Now since the perfective stem vowel of the

verb 'to meet' is i, cf. laqiy+at noted above, we conclude that a is indeed the imperfective stem vowel of this verb. Consequently lqay must be the underlying stem, which of course confirms the derivations listed in 10).

It has been noted earlier in the exposition and on numerous occasions that u is the indicative mood marker. Once again, we find ourselves in a position to test the set of rules posited above. We need only inquire into the status of the indicative imperfect forms corresponding to the subjunctive forms listed in 9) under II. We know that such forms must take on the following underlying traits:

11) 'a+lqay+u
ta+lqay+u
ya+lqay+u
ta+lqay+u

The present statement of Glide Elision prohibits the glides of 11) to elide since the surrounding vowels do not agree in height. Thus, we predict that 11) as stands are the phonetic representations for indicative 'I meet', 'you meet', etc. Here, however, the phonetic representations turn out to be other than

those predicted, for we find the following:

12) 'a+lqā I meet
ta+lqā you meet
ya+lqā he meets
ta+lqā she meets

Here the indicative forms are neutralized with those listed under column II of 9), i.e. with the subjunctive forms. This state of affairs is reminiscent of the neutralization of the weak stems of the active participles discussed earlier. Here, as was done in section 3.1 of this chapter, we must revise our set of rules so as to be consistent with the new data.

Consider what this means. Clearly 11) subsumes the natural and obvious underlying representations of the indicative forms we are presently treating. And to go from 11) to 12), the most obvious route is via elision of the glide. This entails (i) once again relaxing the conditions for the application of Glide Elision, 5), and (ii) postulating a new rule which will assimilate u to a in the event au sequences arise. That is to say, we wish the following derivations to obtain:

13)	a.	ya+lqay+u	ta+lqay+u	
	b.	ya+lqa+u	ta+lqa+u	Glide Elision (revised)
	c.	ya+lqa+a	ta+lqa+a	new rule
	d.	ya+lqā	ta+lqā	Lengthening

The new rule needed to derive the output listed as 13)c. may be tenatively stated as 14).

14) u --> a / a__

This rule is an assimilatory process quite similar to the rule of i-Assimilation stated as 3) above. Not only is the process similar to the earlier one of i-Assimilation, in addition, the relative position of Rule 14) with respect to the other rules in the ordered set is identical to that of i-Assimilation. Both rules follow Glide Elision and precede Lengthening. The functional similarity together with these ordering relations indicate that 14) and i-Assimilation are to be collapsed as a single process. If this is done, then it is seen that derivations such as 13) entail not the addition of a new rule to the grammar, but rather a generalization of an already existing rule. Thus, the step from 13)b. to 13)c. is exactly what is to be expected. Rule 14) can be collapsed with

i-Assimilation according to the following scheme:

15) A:: i-Assimilation: u --> i / i__

Rule 14): u --> a / a__

B:: i-Assimilation: $\begin{matrix} V \\ [+hi] \end{matrix}$ --> $\begin{matrix} [\alpha bk] \\ [-rd] \end{matrix}$ / $\begin{matrix} V \\ [\alpha bk]\text{——} \end{matrix}$

Rule 14):[3] $\begin{matrix} V \\ [+hi] \end{matrix}$ --> $\begin{matrix} [\beta hi] \\ [-rd] \end{matrix}$ / $\begin{matrix} V \\ [\beta hi]\text{——} \end{matrix}$

C:: Collapsed Version:

$$\begin{matrix} V \\ [+hi] \end{matrix} \text{ --> } \begin{matrix} [\alpha bk] \\ [\beta hi] \\ [-rd] \end{matrix} \text{ / } \begin{matrix} V \\ [\alpha bk] \\ [\beta hi]\text{——} \end{matrix}$$

Step A represents the two rules stated in informal segment notation. More formally, A is to be represented as B. Both the rules of B affect the high vowel u although as stated, these rules will also apply to i preceded by the relevant vowels. The vowel i could be excluded by simply including the feature [+rd] or [+bk] in the feature specification of the V to the left of the arrows. However, this question will be decided on the basis of data which will follow eventually. Notice that by including the feature [+hi] in this segment, we effectively exclude the vowel a from becoming i or u when preceded by i or u. If such changes are empirically motivated, the

feature [+hi] must be omitted, or if it turns out that no ia or ua exist in underlying representations or come about in the course of the phonological derivation, then the feature [+hi] may also be removed, although if the ia and ua sequences do not arise and we remove [+hi] from the V to the left of the arrow, we would predict that should such sequences arise at a later point in time, they would be disposed to become ii and uu respectively. This is not the prediction if [+hi] remains. Clearly, empirical evidence will have to decide this issue and we will have more to say concerning these matters later. Turning to C, we see that this schema correctly abbreviates the rules listed as B. One more comment is apropos here. The examples u --> i and u --> a both involve the change of the feature [+rd] to [-rd]. How this change is effected is not clear at this point. We have simply assumed that all high vowels which are assimilated to preceding vowels lose their rounding, although what is more probable is that such vowels actually assimilate their roundness to the roundness of the preceding vowel. A crucial sequence then to decide this question is ui. Rule 15)C predicts that ui will become ui. If in fact uu is desired, then 15)C must be restated as 16):[4]

16) $\begin{matrix} V \\ [+hi] \end{matrix} \text{ --> } \begin{matrix} [\alpha bk] \\ [\beta hi] \\ [\gamma rd] \end{matrix} / \begin{matrix} V \\ [\alpha bk] \\ [\beta hi] \\ [\gamma rd] \end{matrix} \_\_$

Let us continue to use the informal specifications of the assimilatory processes stated as 15)A for the time being, keeping in mind that a conflation of the two rules as either 15)C or 16) is mandatory, all other things being equal. Why we do not choose to collapse the rules at this point will become clearer as we proceed.

Returning to the main thread of the discussion, we must consider the consequences of derivations such as 13) for the most recent statement of Glide Elision, Rule 5). Obviously 5) cannot be correct if derivations such as 13) are to be allowed. Let us therefore review the relevant data presented in 17) according to the preceding presentation.

17) A: aGa --> aa
uGu --> uu
iGi --> ii
B: iGu --> iu
C: uGa --> uGa
iGa --> iGa
D: aGu --> au (--> aa)

The changes listed under A are those involving identical vowels and were originally handled by 17)a. of Chapter II. The change represented as B occasioned a revision of 17)a. in the direction of greater generality. This refinement constituted Rule 5) of section 3.1 above. This restatement of Glide Elision correctly predicted the output of the examples listed as C in 17). We now must again revise the rule of Glide Elision so as to account for the change represented as D. Notice that such a revision will again result in a more generalized rule since the new rule will subsume yet another case. However, the new rule must be formulated so as to prevent the glides from eliding in the C cases of 17). The desired condition is obvious. The condition is a one-way implication, an if-then condition. If the right-most vowel of a VGV sequence is a low vowel, then the left-most vowel of that sequence must also be a low vowel for Glide Elision to be applicable. Or alternatively, if the left-most vowel of a VGV sequence is a high vowel, then the right-most vowel of that sequence must be a high vowel for Glide Elision to be applicable. The rule may be informally stated as 18).

18) Glide Elision: G --> Ø / V_i__V_j, if j=[+lo], then i=[+lo].

This more generalized statement of Glide Elision correctly accounts for the data tabulated in 17). It, together with the new assimilatory process 14), provides for 13) as a possible derivation in Arabic. It is to be emphasized that this analysis represents a complication of the phonology of Arabic only in the event that Rule 14) turns out not to be collapsible as 15)C or 16) in addition to receiving no independent motivation over and beyond that reflected by examples such as ya+lqā, ta+lqā, etc.

There is some further evidence motivating the process of assimilation mentioned above. Recall that in section 2.2 of Chapter II we noted the existence of a particular noun pattern mV+CCaC+at+V+n. The feminine ending at along with the case and deixis suffixes are inflectional endings. The derived stem of such forms includes mV+CCaC, the mV being a derived prefix associated with nouns of place, instrument, etc. We find numerous examples of this pattern: ma+ktab+u+n, 'office', ma+xraj+u+n, 'exit', ma+ʔmal+u+n, 'factory', etc. It should be possible to substitute a root containing a third radical glide (i.e. a lame root) into the pattern ma+CCaC+V+n. Suppose we choose the root qhw to undergo the substitution. We know that the third radical of this root is w because is shows up as such in some forms, e.g. qahw+at+u+n, 'coffee'.

The accusative case marker is a. Consequently the noun of place involving the root qhw and the pattern ma+CCaC declined in the accusative indefinite should be ma+qhaw+an. From earlier discussion we know that such a form would undergo Glide Elision, Lengthening, and Shortening to yield ma+qhan. This is in fact the correct representation of 'coffee house' declined in the accusative indefinite. The test resides in the nominative indefinite of this word. According to what has preceded we know that the nominative indefinite of 'coffee house' should be in underlying representations ma+qhaw+u+n. Given the new statement of Glide Elision and the new assimilation rule 14), we would guess that ma+qhaw+u+n would undergo the following derivation:

19) ma+qhaw+u+n

ma+qha+u+n	Glide Elision (18)
ma+qha+a+n	Rule 14)
ma+qhā+n	Lengthening
ma+qha+n	Shortening

Phonetic maqhan is the nominative indefinite realization of 'coffee house'. In other words the accusative and the nominative indefinites of this word are neutral-

ized, a result which our rules correctly predict. Forms such as maqhan therefore serve to confirm the new assimilatory process.

Actually the assimilatory process 14) is somewhat more general, as in fact anticipated by the restatement of this rule, 15C and 16). The generalization involves the sequence ai. If au becomes aa, then it is not implausible that ai should become aa as well. That this is the case can readily be demonstrated. We need only consider what happens when the genitive case marker i is appended to the underlying sequence ma+qhaw discussed above. In the indefinite declension, we would expect underlying ma+qhaw+i+n in the genitive. If 14) is generalized along the lines just discussed, we would expect the following derivation to obtain.

20) ma+qhaw+i+n

ma+qha+i+n	Glide Elision (18)
ma+qha+a+n	new statement of 14)
ma+qhā+n	Lengthening
ma+qha+n	Shortening

Thus, if we are correct in our speculation that 14) incorporates the change of ai to aa, then maqhan should

be neutralized with the accusative ma+qhaw+a+n and the nominative ma+qhaw+u+n yielding phonetic maqhan for all three cases. The genitive realization of this word is, not surprisingly, maqhan, which no doubt validates derivation 20), and with it, the conjecture that ai becomes aa, just as au becomes aa. Let us accordingly restate 14), again quite informally, as 21) and give it the new name a-Assimilation.[5]

21) a-Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix}$ --> a / a__

Surface maqhan may derive from any of three underlying representations, which we may recapitulate as 22).

22)

nominative	accusative	genitive	
ma+qhaw+u+n	ma+qhaw+a+n	ma+qhaw+i+n	
ma+qha+u+n	ma+qha+a+n	ma+qha+i+n	Glide Elision (18)
ma+qha+a+n	---	ma+qha+a+n	Rule 21)
ma+qhā+n	ma+qnā+n	ma+qhā+n	Lengthening
ma+qha+n	ma+qha+n	ma+qha+n	Shortening

One more set of examples may be adduced which serves to further motivate the new assimilation process of a-Assimilation. These examples involve verbs of a type not considered in earlier sections. Such cases as we are interested in are imperfective verbs of the

passive voice. The following paradigm will illustrate how these forms are created.

23)

active		passive	
'a+ktub+u	I write	'u+ktab+u	I am written[6]
ta+ktub+u	you write	tu+ktab+u	you are written[6]
ya+ktub+u	he writes	yu+ktab+u	it m. is written
ta+ktub+u	she writes	tu+ktab+u	it f. is written
'a+ḥliq+u	I shave	'u+ḥlaq+u	I am shaved
ta+ḥliq+u	you shave	tu+ḥlaq+u	you are shaved
ya+ḥliq+u	he shaves	yu+ḥlaq+u	he is shaved
ta+ḥliq+u	she shaves	tu+ḥlaq+u	she is shaved

It has been pointed out already that active imperfects generally possess stems of the shape CCVC, where the stem vowel may be one of u, i, or a. Cases of the former two are listed under the column headed ''active'' in 23). The prefixes of the active forms are always of the shape Ca. The passive forms, however, invariably display the stem vowel a and prefixes of the shape Cu. Such passive canonical representations as Cu+CCaC+u now provide us with an additional test for our rules, since once again it is possible to substitute a lame root for the stem radicals of the

passive stem. Recall that much earlier (cf. 15) of Chapter II) we argued for underlying 'a+d9uw+u, ta+d9uw+u, and ya+d9uw+u as well as for underlying 'a+rmiy+u, ta+rmiy+u, and ya+rmiy+u (cf. 6) of this chapter). The passives corresponding to such actives in underlying representations should be, given 23), just those passives listed in 24).

24)

active	passive
'a+d9uw+u	'u+d9aw+u
ta+d9uw+u	tu+d9aw+u
ya+d9uw+u	yu+d9aw+u
ta+d9uw+u	tu+d9aw+u
'a+rmiy+u	'u+rmay+u
ta+rmiy+u	tu+rmay+u
ya+rmiy+u	yu+rmay+u
ta+rmiy+u	tu+rmay+u

The active forms are operated on by various rules motivated earlier giving phonetic 'ad9ū, 'I call', tad9ū, 'you call', etc., 'armī, 'I throw', tarmī, 'you throw', etc. What do the passive forms become? Given the new statement of Glide Elision and the a-Assimilation process, we would expect the following

derivations:

25)	yu+d9aw+u	tu+d9aw+u	yu+rmay+u	tu+rmay+u	
	yu+d9a+u	tu+d9a+u	yu+rma+u	tu+rma+u	Glide Elision
	yu+d9a+a	tu+d9a+a	yu+rma+a	tu+rma+a	a-Assimilation
	yu+d9ā	tu+d9ā	yu+rmā	tu+rmā	Lengthening

The forms constituting the final step of these derivations are the correct phonetic representations of 'he is called', 'she is called', 'he is thrown', and 'she is thrown' respectively. Because our rules predict just this, we may conclude with these examples that the revised version of Glide Elision and the rule of a-Assimilation are motivated processes of Arabic phonology.

3.4 A Final Condition on Glide Elision: Length

There are many instances of long vowels occurring adjacent to glides. Such examples must be taken into consideration if the Glide Elision process is to function properly. In this section we shall adduce one such set of examples involving $\underline{VG\bar{V}}$ sequences. Even this discussion will be highly tentative, but a complete discussion of all such sequences presupposes a deeper knowledge of the phonology than heretofore

illustrated. Hence we shall hold off certain relevant examples until later, among which are those sequences displaying a long vowel to the left of the glide.

Some imperfectives involve not only prefixes, but suffixes as well. One such suffix which is relevant to this discussion is the dual marker ā, which can be illustrated by regular strong forms such as those listed below.

26)

ya+ktub+u	he writes
ya+ktub+ā+ni	they m.d. write
ta+ktub+u	she writes
ta+ktub+ā+ni	they f.d. write
ya+nzil+u	he descends
ya+nzil+ā+ni	they m.d. descend
ta+nzil+u	she descends
ta+nzil+ā+ni	they f.d. descend
ya+rkab+u	he rides
ya+rkab+ā+ni	they m.d. ride
ta+rkab+u	she rides
ta+rkab+ā+ni	they f.d. ride

Clearly ā is the dual marker in six of the above

cases. Notice that in place of the familiar indicative marker u, those forms possessing dual ā take ni instead. We may proceed on the assumption that u and ni are suppletive variants of the indicative morpheme and that little more of interest need be said concerning this alternation. As we shall see later, this is not exactly right, but our discussion will in no way be seriously affected by this assumption.

We may now consider a paradigm analogous to 26) but with weak stems.

27)

ya+d9uw+u --> ya+d9ū	he calls
ya+d9uw+ā+ni	they m.d. call
ta+d9uw+u --> ta+d9ū	she calls
ta+d9uw+ā+ni	they f.d. call
ya+rmiy+u --> ya+rmī	he throws
ya+rmiy+ā+ni	they m.d. throw
ta+rmiy+u --> ta+rmī	she throws
ta+rmiy+ā+ni	they f.d. throw
ya+lqay+u --> ya+lqā	he meets
ya+lqay+ā+ni	they m.d. meet
ta+lqay+u --> ta+lqā	she meets
ta+lqay+ā+ni	they f.d. meet

Of interest here is the fact that the glides do not elide from those forms possessing long vowels in underlying representations, i.e. from the forms involving dual inflections. The fact that underlying ta+d9uw+ā+ni and ta+rmiy+ā+ni along with ya+d9uw+ā+ni and ya+rmiy+ā+ni are not affected by Glide Elision may be accounted for by the if-then condition placed on this rule, for both i and u are [-lo] while ā is [+lo]. However, the if-then condition is not violated in the case of ta+lqay+ā+ni or ya+lqay+ā+ni. It appears clear from such examples as the latter that a new condition must be placed on Glide Elision if it is to function properly. The condition will prohibit glides from eliding from VGV̄ sequences. The new statement of Glide Elision required is stated below.

28) Glide Elision: G --> Ø / V_i __ $\breve{V}_j$, if j=[+lo], then i=[+lo]

The symbol V̆ signifies that the right-most vowel of any VGV sequence must be [-lg] for the rule to be applicable.

There is some additional evidence confirming this new condition. Recall the derivation cited as 10) in Chapter II where ma+xzay+at+a+n --> ma+xzāt+a+n.

There are a number of examples involving similar derivations. Thus, it can be demonstrated that salāt+a+n <-- salaw+at+a+n, 'prayer', fatāt+a+n <-- fatay+at+a+n, 'girl', etc. The plurals of such forms, however, turn out to be salaw+āt+a+n, 'prayers', fatay+āt+a+n, 'girls', etc. by lengthening of the feminine ending at to āt. The glides do not elide from the plurals presumably because of the new condition placed on the rule of Glide Elision.

In addition to the examples with long a, one could point to examples such as tawīl+u+n, 'long' and buyūt+u+n, 'houses', where once again the glides remain. We shall, then, tenatively assume that the length condition as indicated in 28) is correct. More on this matter will arise at a later point in the discussion.

3.5.0 Alternative Proposals

In this section we shall discuss two alternative proposals. First it might be assumed that the assimilatory processes of i-Assimilation and a-Assimilation in fact precede Glide Elision, which would entail a restatement of the assimilation processes. This possibility is discussed in 3.5.1. Second, one might propose eliminating the if-then condition

altogether from the rule of Glide Elision in favor of a process of diphthonization. This possibility is mentioned in 3.5.2 without serious debate since the merits of this proposal will not become clear until the important rule of I.D. Metathesis is motivated later.

3.5.1 On Reordering Glide Elision and Assimilation

Instead of derivations such as 6) one might propose the following:

29)
ta+rmiy+u	
ta+rmiy+i	new statement of i-Assimilation
ta+rmi+i	Glide Elision
ta+rmī	Lengthening

And instead of 19) and 20), one might propose the following derivations:

30)
ma+qhaw+u+n	ma+qhaw+i+n	
ma+qhaw+a+n	ma+qhaw+a+n	new statement of a-Assimilation
ma+qha+a+n	ma+qha+a+n	Glide Elision
ma+qhā+n	ma+qhā+n	Lengthening
ma+qha+n	ma+qha+n	Shortening

Such derivations require that the two assimilation rules be restated as 31).

31) i-Assimilation: u --> i / iG__

a-Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix}$ --> a / aG__

On the other hand, this proposal allows us to jettison the if-then condition in favor of the original identity condition utilized in the statement of Glide Elision as 17)a. of Chapter II, which may be restated as 32) for clarity.

32) G --> Ø / V_i__V_i

So there are two possibilities: (i) Rules 31) and 32), giving rise to derivations such as 29) and 30), and (ii) rules 18) [=28)], 3), and 21), providing for the earlier derivations listed in 6), 19), 20), etc. Both possibilities account for the same data presented up to now. Which is to be favored? At first it might appear that elimination of the if-then condition is to be favored. However, this must be elusive, for the formal statement of rule 32), i.e. without the if-then condition, but with the identity condition, is more appropriately viewed as rule 33).

33) Glide Elision: $G \rightarrow \emptyset \; / \; \begin{matrix} V & V \\ [\alpha hi] & [\alpha hi] \\ [\beta bk] & [\beta bk] \end{matrix}$

Rule 33) involves at least two if-and-only-if conditions, i.e. at least two bi-conditional statements, whereas rule 18) contains a single if-then condition. Thus, it is clear that 18) is the more general statement of the two possibilities. This was clarified to some extent in 3.3 above (cf. 17)). Thus, all other things being equal, 18) [or 28)] is to be favored over 32) [=33)]. All other things are not equal however. We have in addition to two distinct statements of Glide Elision, two differing versions of the assimilation processes. It is important to take note of the fact that reordering the assimilation process before Glide Elision with their subsequent restatement as 31) allows for the elimination of the iff conditions on Glide Elision, 33). This is clear. The rules listed as 31) guarantee that no sequences such as iGu, aGu, or aGi will be available at the point in the phonological derivation where Glide Elision is applicable. Thus, the only sequences that Glide Elision in conjunction with 33) must shun are those sequences involving VGV, where the left-most vowel is high, and the right-most vowel low, i.e. uGa and iGa. But this reduces to

precisely the if-then condition needed in the case that the assimilation processes follow Glide Elision. This possibility is represented as 34).

34) i-Assimilation: u --> i / iG__

a-Assimilation: $\overset{u}{i}$ --> a / aG__

Glide Elision: G --> Ø / V_i__V_j, if $\underset{i=[+lo]}{j=[+lo]}$, then

Recapitulating, we have three theoretical possibilities: (i) Glide Elision 18) [=28] precedes i-Assimilation 3) and a-Assimilation 21); (ii) i-Assimilation and a-Assimilation 31) precede Glide Elision 32) [=33)]; and (iii) the same ordering with a more general statement of Glide Elision 34). The second solution, i.e. (ii), involves a more complex statement of Glide Elision, whereas the rule of Glide Elision in the case of both (i) and (iii) is identical. Let us therefore decide between (i), the original proposal, and (iii), the new proposal.

Solution (iii), i.e. that embodied in 34), is given some intial plausibility by the following alternations:

35) kitāb+u+hu

book nom. his = his book (nom.)

kitāb+i+hi

book gen. his = his book (gen.)

In 35) we find an alternation in the pronominal suffixal vowel, i.e. u∿i. Clearly it is the case vowel which determines the quality of the pronominal vowel. We suspect that u is the underlying vowel since the independent pronoun 'he' is huwa. Thus, there seems to be a rule turning i+hu to i+hi, something like rule 36).

36) u --> i / i+h__

It may be supposed that this rule is to be collapsed with the i-Assimilation rule listed in 34). If this were correct, then of course (iii) would be borne out and the other possibilities could be dismissed. There are several reasons, however, for thinking that 36) is a distinct rule of Arabic. First, we must realize that the morpheme boundary included in 36) is necessary to prevent the rule from applying to examples such as karih+u, 'loathsome', yu+šbih+u, 'he resembles', and many others. In other words, ihu becomes ihi only

when h is part of the suffix. But clearly a morpheme boundary cannot be placed before the glide in the case of i-Assimilation of 34), for here the glide is the third root consonant, i.e. part of the stem. If any morpheme boundary were to be entered in the i-Assimilation rule 34) it would have to be placed after the glide since iG+u becomes iG+i. Rules 36) and 34) [i-Assimilation] may not be collapsed in view of this difference. Moreover, recall that there is a good possibility that i-Assimilation and a-Assimlation are to be collapsed. But let us take a look at what happens to cases involving h analogous to those involving G with respect to the a-Assmilation process. aGu and aGi do become aGa (cf. putative 30)), but a+hu does not become a+ha as witness kitāb+a+hu, 'his book (acc.)', the one declension omitted from paradigm 35). This restriction on the assimilation process involving h indicates that a-Assimilation of 34) and the assimilation process 36) are definitely distinct. From this conclusion it follows that it is also reasonable that the i-Assimilation process of 34) and the assimilation process 36) are distinct rules. Thus, examples such as those listed in 35) offer no support for (iii), i.e. for 34) over (i), i.e. over rules 18), 3), and 21). Additional

considerations will bear on the resolution of this question.

There are several reasons which lead us to opt for (i) over (iii), i.e. to opt for 37)A over 37)B.

37) A:: Glide Elision: G --> Ø / V_i__V_j, if-then (cf. 18)
i-Assimilation: u --> i / i__
a-Assimilation: $\overset{u}{i}$ --> a / a__

B:: i-Assimilation: u --> i / iG__
a-Assimilation: $\overset{u}{i}$ --> a / aG__
Glide Elision: G --> Ø / V_i__V_j, if-then (cf. 34)

If we found that the change of iw to iy was a motivated process of Arabic phonology, this itself would constitute some evidence for A, for the change of iw to iy is quite similar to that of iu to ii entailed by i-Assimilation in 37)A. There is some evidence for the change of iw to iy in Arabic. To show this, let us turn to the perfective passive conjugation. A strong verb such as katab+a may be passivized by simply substituting u for the first a of the stem and i for the second a. This gives kutib+a, which means 'it was written'. Weak forms undergo the identical substitution process. Thus, we find rumiy+a, 'it was thrown', from the familiar root rmy. The glide does not elide from the latter form since the

if-then condition is violated. Now suppose we select the root d9w discussed in several contexts earlier. The passive of this root corresponding to those forms presented directly above should be du9iw+a. However, we actually find phonetic du9iy+a, 'he was called', i.e. with y in place of w. We know w to be the underlying segment from alternations such as da9aw+tu, 'I called', da9aw+ta, 'you called', etc. What is apparently going on here is this: the segment w is changed to y after i. Call this rule w-to-y.

38) w-to-y: w --> y / i__

Clearly the change of iw to iy and iu to ii are similar processes--in both cases a high back rounded sonorant is changed to a high front unrounded sonorant. And in both cases i is the affecting element. All other things being equal, 38) would be collapsed with i-Assimilation as a single rule. In fact 38), i-Assimilation and a-Assimilation could all be collapsed as a single rule by simply substituting the feature [-cns] for V in rule 15)C or 16) to the left of the arrow. But we shall not take this step at the present. We only wish to point out that 38) offers some support for 37)A.

A second reason for favoring 37)A over 37)B is evident from 37) alone, but becomes clearer still when we do not make use of the slash-dash notation familiar to generative phonology. Consider 39), which repeats 37) without such notation.

39) A: V_iGV_j --> V_iV_j, if-then (i)

iu --> ii (ii)

$a\begin{Bmatrix}u\\i\end{Bmatrix}$ --> aa (iii)

B: iGu --> iGi (i)

$aG\begin{Bmatrix}u\\i\end{Bmatrix}$ --> aGa (ii)

V_iGV_j --> V_iV_j, if-then (iii)

Here 39)A corresponds to 37)A while 39)B corresponds to 37)B. Notice that the structural descriptions 39)B.i and 39)B.ii are subsequences of the structural description of 39)B.iii, whereas those of 39)A.ii and 39)A.iii are not subsequences of 39)A.i. All of the structural descriptions listed as B, involve the segment G, but G is mentioned in only one structural description in the A cases. In other words, 37)B involves repetion of material; 37)A does not. Thus, it would seem that 37)A is to be more highly valued.

Of course the repetition is diminished if the two assimilation processes are collapsed, but nevertheless there remains some loss of generalization.

A third reason for favoring 39)A over 39)B, which will have to be reconsidered at a later point, concerns the length condition placed on Glide Elision in section 3.4 (cf. 28)). Recall examples such as tawīl+u+n, 'tall, long'. Here not only do we not find the glide eliding, we also do not find ī becoming ā. But this is just what 39)B predicts. Thus, those opting for 39)B will be forced to place a length condition on a-Assimilation which is identical to that placed on Glide Elision. This is necessary to prevent tawīl+u+n from becoming tawāl+u+n. In other words, 39)B must be replaced by 40).

40) iGu --> iGi

$$aG\begin{Bmatrix} u \\ i \end{Bmatrix} \text{ --> } aGa$$

This constitutes more repetition and is to be avoided.

A fourth a final reason for dismissing 39)B as a serious contender concerns certain exceptions to Glide Elision. One class of exceptions to Glide Elision is the class of verbs of color and defect. Thus, sawid+a, 'it became black', and ʔawir+a, 'he became one-eyed', are exceptions to Glide Elision. Note carefully that 39)A automatically predicts that the

stem vowel i of such examples remains i. Indeed there is no reason for it to become anything else, given as much as we have said up to now, and given 39)A. However, 39)B predicts that i will become a, and thus must mark such examples as exceptions not only to Glide Elision, but to a-Assimilation as well.

It should be noted that several of these points do not constitute arguments against the analysis involving 31) in conjunction with 32) or 33), where the less general condition is placed on Glide Elision. But even here, there is a loss of generalization, for once again the second reason discussed directly above holds. That is, such an analysis still involves the repetion of certain material in the structural descriptions of the rules. We shall, therefore, consider 39)A to be the correct approach to this area of the phonology. The whole discussion, however, must be reviewed at a later point when additional relevant material is forthcoming. For now, we may consider the matter decided.

3.5.2 Eliminating If-Then

There is one further possibility which deserves to be discussed. But the possibility will simply be

mentioned at this point, awaiting, as it were, some additional data which will bear directly on this problem. The possibility is this: Why not eliminate the if-then condition altogether. That is, allow the glides to elide in all the cases listed in 17), including those listed as 17)C, i.e. uGa --> ua and iGa --> ia? This is certainly possible. We need only provide for phonetic uwa and iya and this can be done by resorting to a new rule of Diphthonization which will have the effect of epenthesizing w between u and a, and y between i and a. A priori there is really no way to weigh the relative merits of one solution against the other. That is, it is not really clear whether an if-then condition is to be more highly valued than an extra rule of Diphthonization, or vice-versa, i.e. whether one is less complex than the other. Only independent evidence from Arabic can decide this issue. For example, if the Diphthonization rule can be independently justified, then scrapping the if-then condition will be highly plausible. Thus, the solution to this problem must await a more detailed discussion of relevant examples. For now, let us proceed as if the statement of Glide Elision 28) were correct, keeping in mind the new proposal.

Footnotes to Chapter III

1. Although the converse ordering with the revision of i-Assimilation attendant on this change is possible, we argue against this possibility in 3.5.1 below.

2. In rapid speech final long vowels such as these are often shortened, but this is certainly a low level process and is irrelevant to this discussion. Its irrelevance is proved by the fact that even though the vowel may have a shorter duration, it nevertheless retains the quality of the long vowel as opposed to that of the short vowel brought about by Shortening, or the short vowels which are present in underlying representations, which are not so close and tense as are the former. These observations are also irrelevant due to the fact that in careful speech the final long vowels are pronounced as long. The vowels shortened by what we are now calling Shortening, however, must be short in careful pronunciation. The orthography supports this interpretation of the facts, for the vowel shortened by Shortening is written short, the final ones, not. It is also to be noted that the definite article of 8) is in these cases 'ar, and not 'al, because of the assimilation rule discussed in Chapter I.

3. In Chapter I it was noted that a represents a phonetically low front vowel. Thus, Rule 14) may be more appropriately stated to include [αbk] in the structural change and in the environment, so as to turn u, not to a low back vowel, but rather to a low front vowel. It is also possible to assume that a is an underlying low back vowel which becomes front at a late point in the derivation. The only evidence for the latter move is that of naturalness, which can be given little weight, given our present understanding of this matter. Note that the collapsing effectuated in C takes care of this problem.

4. Probably the rounding assimilation is to be given by universal conventions, whether of the ''linking'' variety proposed by Chomsky and Halle(1968, Chap. 9) or of the ''interpretative'' variety proposed by Kisseberth (1969) or whatever turns out to be the correct approach. That is to say, from the fact that backing assimilation is involved in 16), we should be able to deduce that rounding assimilation is also involved in the simplest or most natural case. Such notions of markedness and naturalness have been discussed most coherently, although somewhat sketchily, in the above mentioned works.

5. We continue in this manner rather than immediately adopting 15)C or 16) so as to facilitate later discussion where we shall have occasion to fix on these assimilation processes at length (cf. Chap. VI in this regard).

6. Of course, as in English, this is not normally said, but, nevertheless, it is sayable and proves the phonological point. Other verbs with first and second person passives could be found, so that nothing crucial rests on the semantic anomaly of these particular examples.

Chapter IV

SHORTENING VS. TRUNCATION

4.0 In the preceding chapters it was assumed that long vowels become short before a single consonant followed by a word boundary. The rule postulated in Chapter II [Rule 17c.] is repeated here as 1).

1) $\bar{V}$ --> V / __C#

A derivation requiring this rule is the change of ramay+at to ramat [cf. 2.1], which is repeated as 2).

2) ramay+at
   rama+at Glide Elision
   ramāt Lengthening
   ramat Shortening

Rule 1) must be altered to cover a new set of examples. Such examples as we are now interested in include verbs such as ramat to which are suffixed object pronouns such as hu, 'him, it m.s.', nā, 'us', etc. Such pronouns may be appended to the strong verbs such as katab+at, 'she wrote', to yield katab+at+hu, 'she wrote it m.s.'. Suppose hu or nā is suffixed to

underlying ramay+at however. Given the present rule of Shortening, we would expect the following derivations:

3)	ramay+at+hu	ramay+at+nā	
	rama+at+hu	rama+at+nā	Glide Elision
	ramāt+hu	ramāt+nā	Lengthening

This is wrong, for the correct output should be ramat+hu, 'she threw it m.s.', and ramat+nā, 'she threw us'. Apparently, then, Shortening is to be extended so as to cause the long vowels of 3) to become short when occurring before two consonants. Accordingly 1) may be abandoned in favor of 4), the new rule of Shortening.

4) $\bar{V} \rightarrow V \; / \; \_\_ C \left\{ \begin{matrix} \# \\ C \end{matrix} \right\}$

Now in place of 3), we find 5).

5)	ramay+at+hu	ramay+at+nā	
	rama+at+hu	rama+at+nā	Glide Elision
	ramāt+hu	ramāt+nā	Lengthening
	ramat+hu	ramat+nā	Shortening (4)

Thus, the new rule of Shortening enables us to attain a level of observational adequacy not attainable, so far as we presently know, by the earlier version of this rule, 1). By way of review we may repeat the complete set of rules discussed up to now as 6).

6) Glide Elision: $G \rightarrow \emptyset \; / \; V_i \_\_ V_j$, if j=[+lo], then i=[+lo]

i-Assimilation: $u \rightarrow i \; / \; i\_\_$

a-Assimilation: $\left\{ \begin{matrix} u \\ i \end{matrix} \right\} \rightarrow a \; / \; a\_\_$

Lengthening:[1] $V_i V_i \rightarrow \bar{V}_i$

Shortening: $\bar{V} \rightarrow V \; / \; \_\_ C \left\{ \begin{matrix} \# \\ C \end{matrix} \right\}$

Typical derivations illustrating the operation of these are those listed in 7) and 8) of Chapter III. Two of those derivations are repeated below.

7)	rāmiy+u+n	'al+rāmiy+u	
	rāmi+u+n	'al+rāmi+u	Glide Elision
	rāmi+i+n	'al+rāmi+i	i-Assimilation
	rāmī+n	'al+rāmī	Lengthening
	rami+n	'al+rāmī	Shortening

All along, without any real justification, we have assumed that Lengthening precedes Shortening as duplicated in 6) above. There is an approach which

is equally plausible however. Why not assume an ordering Shortening-Lengthening? The rule corresponding to Shortening would then have the effect of truncating a single mora rather than switching the feature [+lg] to [-lg] as is implied by Shortening 1). The new rule can be stated as 8). It will be called Truncation.

8) Truncation: $V \rightarrow \emptyset \; / \; V\_\_C \left\{ \begin{matrix} \# \\ C \end{matrix} \right\}$

Truncation, because of its formal statement, must precede Lengthening. Consequently, in place of derivations such as those listed in 7), we find the following:

9)	rāmiy+u+n	'al+rāmiy+u	
	rāmi+u+n	'al+rāmi+u	Glide Elision
	rāmi+i+n	'al+rāmi+i	i-Assimilation
	rāmi+n	'al+rāmi+i	Truncation[2]
	rāmi+n	'al+rāmī	Lengthening

If one reviews all the relevant preceding derivations which involve Lengthening-Shortening, one will find that either solution, Lengthening-Shortening or Truncation-Lengthening, will correctly account for the desired phonetic representations given the under-

lying representations. We must therefore determine which possibility is correct for Arabic phonology. We shall attempt to satisfactorily answer this question in this chapter. Before arriving at the answer we shall have occasion to discuss some new data and new rules needed to handle the new examples.

4.1 Syllabicity Assimilation

In section 3.1 it was noted that the imperfective stem vowel can be one of i, u, and a. The same is true of perfectives. For example, the strong verb katAb+tu, 'I wrote', possesses the a stem-vowel which has been capitalized for clarity. The stem vowels i and u can be observed in perfectives such as rakIb+tu, 'I rode', and kabUr+tu, 'I became big'. A similar distribution should obtain in the case of the weak verb stems. This can be demonstrated by examples such as ramat, 'she threw', from underlying ramAy+at (cf. 2.1) with stem-vowel a; laqIy+at, 'she met', with stem-vowel i; and sarUw+at, 'she became noble', with u as the stem vowel. Whereas the glide elides from underlying ramay+at, this is not possible in the case of laqiy+at and saruw+at, since the sequences iya and uwa violate the if-then condition placed on Glide Elision.

The first person corresponding to third person ramat is, as noted much earlier, ramay+tu, 'I threw'. But it is interesting to note that the first person forms corresponding to third person laqiy+at and saruw+at are laqī+tu, 'I met' and sarū+tu, 'I became noble'. Thus, whereas the glide appears phonetically only in the case of i and u stems with respect to the third person forms, the opposite is true with respect to the first person forms. That is, we find a third radical glide only in the case of the a stem with respect to the first person forms. The data are repeated below.

10)

third person	first person
ramay+at --> ramat	ramay+tu
laqiy+at	X --> laqī+tu
saruw+at	Y --> sarū+tu

It is not difficult to deduce that X and Y stand for underlying laqiy+tu and saruw+tu respectively, for such representations not only square with phonetic laqiy+at and saruw+at but, moreover, bring these first person stems in line with the usual canonical shape CVCVC found in the case of ramay+tu as well as the strong stems like katab+tu, rakib+tu, etc. From

here we need only propose the means by which underlying laqiy+tu and saruw+tu are converted to laqī+tu and sarū+tu. The most straightforward proposal is embodied in the following rule, which will be called Syllabicity Assimilation.

11) Syllabicity Assimilation: $\begin{Bmatrix} y \\ w \end{Bmatrix} \rightarrow \begin{Bmatrix} i \\ u \end{Bmatrix} / \begin{Bmatrix} i \\ u \end{Bmatrix} \_\_ C$

This rule, stated in informal segment notation, is to be interpreted as follows: Switch y to i after i and before C, and switch w to u after u and before C.[3] The segment C is needed in the environment of this rule so as to prevent laqiy+a from becoming laqii+a, etc. Rule 11 in conjunction with the underlying forms laqiy+tu and saruw+tu will yield the correct phonetic representations, for Lengthening will also be applicable. The derivations are simply

12)	laqiy+tu	saruw+tu	
	laqii+tu	saruu+tu	Syllabicity Assimilation
	laqī+tu	sarū+tu	Lengthening

The rule of Syllabicity Assimilation is needed to account for a good many alternations in the phonology of Arabic. To cite just one such case, consider

passives such as rumiy+a, 'he was thrown', and rumiy+at, 'she was thrown'. Such examples illustrate the regular process of perfective passive formation which involves changing the first vowel of the stem CVCVC to u and the second vowel, the stem-vowel, to i. For example, the strong verb katab+a, 'he wrote', can be converted to kutib+a, 'it (he) was written'. It is expected that we should find first person passives as well. In the case of the verb 'to throw', the perfective passive should be rumiy+tu, but given rule 11, Syllabicity Assimilation, we guess that 'I was thrown' is phonetically rumī+tu. This is in fact the case, confirming Syllabicity Assimilation. Other relevant examples requiring this rule will be encountered not only in this chapter, but throughout the work.

4.2 Some Implications of Syllabicity Assimilation

The rule of Syllabicity Assimilation is crucial in the explanation of a rather important set of examples. These examples embrace, among others, the masculine plural conjugations of the perfective and imperfective verbs. As a model of this conjugation type, we may point to the strong verb conjugated in the imperfective third person plural.

13) ya+ktub+ū+na they write
ya+nzil+ū+na they descend
ya+rkab+ū+na they ride

The prefix ya is the familiar third person masculine marker. The final na may be assumed to be the indicative mood marker suppletive with u mentioned earlier. Of interest is the plural morpheme ū. How is it to be analyzed? Is it to be represented at the most abstract level just as it appears phonetically, i.e. as ū? Or is it perhaps to be analyzed as underlying uu, a sequence of two morae, which would by Lengthening be turned to phonetic ū? Or is the correct analysis uw, which by Syllabicity Assimilation and Lengthening would be converted to phonetic ū? Obviously a decision cannot be made on the basis of 13 alone. Only evidence internal to the language can decide this question. All three possibilities entail no extra apparatus in the case of the examples listed as 13. Let us therefore turn to a more revealing citation--the imperfect of the root lqy in the third person masculine plural conjugation. Phonetically we find yalqawna, 'they meet'. Alternations such as laqiy+at, 'she met', and luqy+at+u+n, 'encounter' (cf. 3.3), have already proven that y is the third root segment. It has also been demonstrated

that ta+lqā, 'she meets', derives from underlying ta+lqay+u by Glide Elision, a-Assimilation, and Lengthening [cf. 13) of 3.3]. Therefore we know that the imperfective stem of 'to meet' is lqay. Obviously, then, the w of ya+lqawna, 'they meet', is not part of the stem, but rather a remnant of the underlying plural marker, i.e. of whatever underlies ū of the examples listed in 13. This reasoning leads one to suspect that uw is the true underlying representation of the plural marker and that the examples of 13 are derived according to 14).

14)

ya+ktub+uw+na	ya+nzil+uw+na	ya+rkab+uw+na	
ya+ktub+uu+na	ya+nzil+uu+na	ya+rkab+uu+na	Rule 11
ya+ktub+ū+na	ya+nzil+ū+na	ya+rkab+ū+na	Lengthening

But if uw is indeed the underlying plural marker, then underlying ya+lqawna is ya+lqay+uw+na. It is important to realize that the derivation of ya+lqawna from ya+lqay+uw+na is just that predicted by the rules postulated up to now.

15)

ya+lqay+uw+na	
ya+lqa+uw+na	Glide Elision
ya+lqa+aw+na	a-Assimilation
ya+lqāw+na	Lengthening
ya+lqaw+na	Shortening

Or if Truncation, 8), is the correct approach

16) ya+lqay+uw+na
ya+lqa+uw+na Glide Elision
ya+lqa+aw+na a-Assimilation
ya+lqa+w+na Truncation

The fact that ya+lqawna is derivable with no additional complication of the grammar tends to support the claim that uw underlies ū of the examples listed in 13). Moreover uw represents the canonical shape VC which is found elsewhere, e.g. as in the suffix at, 'f.s.'. If ū, or even uu, were adopted as the underlying representation of the plural marker, then one more possible suffix type is entailed, thus complicating the morpheme structure conditions associated with the lexicon. Let us investigate further, however, the possibility that ū or uu is the underlying plural marker.

First suppose that ū is the underlying plural marker rather than uw. To derive ya+lqawna, underlying ya+lqay+ū+na would have to undergo the following series of steps.

17) ya+lqay+ū+na

ya+lqa+ū+na Glide Elision

ya+lqa+w+na some new rule(s)

A new rule must be postulated turning ū to w after a if 17) is to prevail, i.e. if ū is the correct underlying representation for the plural marker. This process is somewhat suspicious, however, since we already know that short u becomes a after a, as we have already witnessed derivations such as 13) of 3.3 where ya+lqay+u --> ya+lqa+u --> ya+lqa+a, etc. It is of course possible to turn only long ū to w or only short u to a, but nevertheless this should be regarded with some suspicion. Thus, not only is ū to be less favored than uw on grounds of economy, i.e. it requires an extra rule turning ū to w, it is also probably to be rejected because of the implausibility of such a rule. Next it must be pointed out that 17) could not even constitute a derivation given the statement of Glide Elision in 6) above, for as was pointed out in 3.4 glides do not normally elide before long vowels. Since ū is a long vowel, the y of ya+lqay+ū+na should not be elidable.[4]

Let us now discuss the relative merits of having

uu as the underlying representation for the plural marker. This is a more serious possibility and cannot be dismissed so easily. Nevertheless it does require additional complications in the grammar. Thus, if uu were the underlying plural marker, we would expect ya+lqawna to derive from ya+lqay+uu+na according to 18).

18) ya+lqay+uu+na

ya+lqa+uu+na	Glide Elision
ya+lqa+au+na	a-Assimilation
ya+lqa+aw+na	new rule
ya+lqāw+na	Lengthening
ya+lqaw+na	Shortening

Again this derivation requires a new rule to be added to the grammar. Unless this new rule can be independently motivated, 18) must be rejected, and with it uu in favor of uw. It should also be pointed out that 18) entails a dubious move. This is the fact that the derivation of 18) requires that u be changed to a after a to be followed by a change of the second u to w. Whether such a change is natural is by no means obvious, however, at a later point we shall attempt to demonstrate that aai sequences do not

become aay as 18) would indicate.[5]

In view of the above remarks we shall opt for uw and turn to the question of which of 15) and 16) is to be preferred, i.e. the question of whether Lengthening-Shortening or Truncation-Lengthening most closely approximates the truth about Arabic phonology. Before turning to that discussion, however, we point out that an analogous set of facts and arguments hold for the feminine singular imperfective marker as do for the masculine plural imperfective marker. The latter was argued to be uw. By similar arguments the former can be shown to be iy. Consider the following:

19)

strong verbs		weak verbs	
ta+ktub+ī+na	you f.s. write	ta+lqạyna	you f.s. meet
ta+nzil+ī+na	you f.s. descend		
ta+rkab+ī+na	you f.s. ride		

Just as the w of ya+lqawna was shown to be a remnant of the plural morpheme uw, so could the y of the weak verb listed in 19) be shown to be a remnant of the feminine singular imperfective marker iy, for in every way underlying iy parallels underlying uw. Thus, the derivations needed to derive the strong verbs of

19) parallel those listed in 14).

20) ta+ktub+iy+na	ta+nzil+iy+na	ta+rkab+iy+na	
ta+ktub+ii+na	ta+nzil+ii+na	ta+rkab+ii+na	Rule 11
ta+ktub+$\bar{\text{i}}$+na	ta+nzil+$\bar{\text{i}}$+na	ta+rkab+$\bar{\text{i}}$+na	Lengthening

Likewise the derivation needed to derive ta+lqayna from underlying ta+lqay+iy+na parallels that listed in 15).

21) ta+lqay+iy+na	
ta+lqa+iy+na	Glide Elision
ta+lqa+ay+na	a-Assimilation
ta+lqā́y+na	Lengthening
ta+lqay+na	Shortening

Or if Truncation is the correct approach, then 22) parallels 16).

22) ta+lqay+iy+na	
ta+lqa+iy+na	Glide Elision
ta+lqa+ay+na	a-Assimilation
ta+lqa+y+na	Truncation

The sequences $\underline{\bar{\text{i}}}$ and ii can be ruled out as possibilites for the same reason as $\underline{\bar{\text{u}}}$ and uu were.

4.3 u- and i-Stem Vowels

In the preceding section examples of weak imperfect stems with stem-vowel a followed by the suffixes uw and iy were encountered. What about weak imperfect stems with stem vowels u and i, i.e. stems such as d9uw and rmiy? These stems should also combine with uw and iy in the deep phonology. It is of course such combinations which should yield 'they m.p. call' and 'you f.s. throw'. The respective phonetic forms corresponding to these meanings are ya+d9ūna and ta+rmīna. Such forms must derive from ya+d9uw+uw+na and ta+rmiy+iy+na if we follow the arguments in preceding sections. But here once again the derivations precede smoothly under the assumption that Truncation is the true contraction process.

23)	ya+d9uw+uw+na	ta+rmiy+iy+na	
	ya+d9u+uw+na	ta+rmi+iy+na	Glide Elision
	ya+d9u+w+na	ta+rmi+y+na	Truncation
	ya+d9u+u+na	ta+rmi+i+na	Syl. Assim. (11)
	ya+d9ū+na	ta+rmī+na	Lengthening

Thus, by assuming that Truncation is the correct

approach to the matter of contraction in Arabic, and by assuming the Truncation precedes Lengthening (and Syllabicity Assimilation), nothing new need be said about such derivations. Phonetic yad9ūna and tarmīna are immediately derivable from the motivated underlying representations ya+d9uw+uw+na and ta+rmiy+iy+na. On the other hand, if we revert back to the original proposal, that of Lengthening-Shortening, then something new must be said; otherwise, yad9ūna and tarmīna are not correctly derived, for the following derivations would be necessary.

24)	ya+d9uw+uw+na	ta+rmiy+iy+na	
	ya+d9u+uw+na	ta+rmi+iy+na	Glide Elision
	ya+d9u+uu+na	ta+rmi+ii+na	Syl. Assim. (11)
	ya+d9ū+na	ta+rmī+na	new rule of Lengthening

We already know that Syllabicity Assimilation precedes Lengthening because of examples such as laqī+tu and sarū+tu from laqiy+tu and saruw+tu, cf. 12) above. This is rather obvious, for Syllabicity Assimilation creats new environments upon which Lengthening may operate. However, such ordering in the case of 24) brings about sequences of three consecutive morae. Hence the old rule of Lengthening, which operated

on sequences of two morae only, must be revised so as to treat three or more consecutive morae if 24) is to go through. The Lengthening rule could be revised as 25).

25) Lengthening: $V_iV_i \dashrightarrow \bar{V}_i$

The new rule of Lengthening, 25), is stated so as to apply to arbitrarily long sequences of identical morae. We could equally well have stated the rule to apply to either of two or three morae. There is no overpowering argument for choosing between 25) and a rule taking three morae into a single long vowel. However, the new statement of Lengthening may be interpreted as evidence against the Lengthening-Shortening solution, since 25) constitutes a new complication in the grammar, whereas the Truncation-Lengthening solution involves no new statements whatsoever. This may be a small point, however, for it may turn out that sequences of three or more morae are to be converted to a single long vowel. But notice that there is another point to be made with respect to derivations such as 24) vs. 23) and that is this: 23), involving Truncation, parallels the earlier derivation 22), also involving

Truncation, in a way which 24), not involving Shortening, does not parallel the earlier derivation 21), involving Shortening. The parallelism is just this. Both 23) and 22) involve Truncation and in both derivations it is the presence of the glide followed by a single consonant which accounts for the contraction. In other words, up to a certain point in the derivation, both a- and high vowel stems behave alike, differing only in the lower level rules. Again, this may be a small point, for it is true that Lengthening applies in both derivations 24) and 21), but not in both 23) and 22). But here Lengthening applies in one case to a sequence of two morae and in the other to a sequence of three, i.e. the two applications of this rule are not parallel.

We have now discussed stems of the shape CCuw followed by uw and of the shape CCiy followed by iy, as well as those of the shape CCay followed by both uw and iy. Still to be considered are the cases of CCiy followed by uw and CCuw followed by iy. Taking the stems rmiy and d9uw once again as models, we would expect to find ya+rmiy+uw+na for 'they m.p. throw', and ta+d9uw+iy+na for 'you f.s. call', if no rules were to apply. The actual phonetic representations turn out to be ya+rmūna and ta+d9īna. Let us now attempt to

determine the intermediate steps in the derivations involved in turning ya+rmiy+uw+na to ya+rmūna and ta+d9uw+iy+na to ta+d9īna. After Glide Elision applies we are left with ya+rmi+uw+na and ta+d9u+iy+na. The rule of i-Assimilation may apply to ya+rmi+uw+na giving ya+rmi+iw+na, whereupon Truncation could apply so as to give ya+rmi+w+na. At this point we need a rule switching i to u before w, for then the rules of Syllabicity Assimilation and Lengthening would bring about the correct result. The derivation would run as follows:

26) ya+rmiy+uw+na

ya+rmi+uw+na	Glide Elision
ya+rmi+iw+na	i-Assimilation
ya+rmi+w+na	Truncation
ya+rmu+w+na	new rule
ya+rmu+u+na	Syllabicity Assimilation
ya+rmū+na	Lengthening

Thus, to derive yarmūna, 'they m.p. throw', from motivated underlying ya+rmiy+uw+na, we must add one new rule to the grammar.

The derivation of tad9īna, 'you f.s. call', from

underlying ta+d9uw+iy+na could proceed in a manner analogous to 26). After Glide Elision, ta+d9u+iy+na could be converted to ta+d9u+uy+na by an obvious extension of i-Assimilation. The result ta+d9u+uy+na would then undergo Truncation leaving ta+d9u+y+na. By a logical extension of the new rule needed in 26), the latter stage could be converted to ta+d9i+y+na, which by Syllabicity Assimilation and Lengthening would yield the correct tad9Ina. The derivation is repeated in 27).

27) ta+d9uw+iy+na

ta+d9u+iy+na	Glide Elision
ta+d9u+uy+na	i-Assimilation extended
ta+d9u+y+na	Truncation
ta+d9i+y+na	new rule
ta+d9i+i+na	Syllabicity Assimilation
ta+d9I+na	Lengthening

The new rule needed for derivations such as 26) and 27) is informally stated as 28). Call it Vocalic Assimilation.

28) Vocalic Assimilation: $\left\{ \begin{matrix} u \\ i \end{matrix} \right\} \text{--}> \left\{ \begin{matrix} \dot{i} \\ \dot{u} \end{matrix} \right. \; / \; \underset{w}{\underline{\quad}}\, y \left. \right\}$

Derivations 26) and 27) in conjunction with the new rule of Vocalic Assimilation constitute a quite natural extension of derivations already motivated earlier. However, 26) and 27) do entail adding a new rule, 28), to the grammar. Thus, the new derivations will be given stronger confirmation if we can find idependent motivation for 28). Such motivation is, in fact, accessible. Consider the following paradigm.

29)

m.s.	f.s.	p.	
'aḥmar+u	ḥamrā'+u	ḥumr+u	red
'axḍar+u	xaḍrā'+u	xuḍr+u	green
'aṣfar+u	ṣafrā'+u	ṣufr+u	yellow

The first column includes adjectives of color of the pattern 'aCCaC, declined in the masculine singular definite. In column two, we find feminine adjectives of color of the shape CaCCā' and the next column includes the plural color adjectives of the pattern CuCC. We are not interested here in accounting for these alternations. Rather we are interested in pointing out that masculines of the shape 'aCCaC form their plurals according to the pattern CuCC.

For given the alternation 'aCCaC ~ CuCC, one can draw an interesting result from the next paradigm.

30)

m.s.	f.s.	p.	
'aswad+u	sawd+ā'+u	sūd+u	black
'abyaḍ+u	bayḍ+ā'+u	bīḍ+u	white

Here the masculine and feminine adjectives of color are the perfectly regular 'aCCaC and CaCCā'. However, the plural pattern of the two adjectives listed in 30) are not the expected CuCC shape, but rather of the pattern CV̄C. What we would expect the plural of these forms to have been, given no further operations, is suwd+u and bùyḍ+u. But clearly sūd+u is derivable from suwd+u already. The rule of Syllabicity Assimilation, 11), along with Lengthening accomplishes this.

31)

suwd+u	
suud+u	Syllabicity Assimilation (11)
sūd+u	Lengthening

In order to derive bīḍ+u, however, from underlying buyḍ+u, one must assume one additional change, this being the switching of u to i before y. If this is done, then Syllabicity Assimilation will be applicable

along with Lengthening, accounting for phonetic bīd+u.

32) buyd+u
biyd+u new rule
biid+u Syllabicity Assimilation (11)
bīd+u Lengthening

The point is that the new rule needed in the preceding derivation is just that rule stated as Vocalic Assimilation, 28). The fact that this rule is needed elsewhere in the grammar of Arabic gives a good deal more plausibility to the derivations discussed above, including 26) and 27).

The logical step to take at this point is to consider how phonetic ya+rmūna and ta+d9īna can be derived from underlying ya+rmiy+uw+na and ta+d9uw+iy+na under the assumption that it is Lengthening-Shortening that is relevant rather than Truncation-Lengthening as in 26) and 27).

The derivation of ya+rmūna from ya+rmiy+uw+na would be something approximating 33).

33) ya+rmiy+uw+na
ya+rmi+uw+na Glide Elision
ya+rmi+iw+na i-Assimilation
ya+rmu+uw+na new rule
ya+rmu+uu+na Syllabicity Assimilation
ya+rmū+na Lengthening restated as 25)

In this derivation, once again Shortening does not apply, missing the parallelism with 21), whereas such parallelism is captured by derivations such as 26) and 22) where in both derivations Truncation serves to eliminate a single mora. This aside, however, note that 33) once again requires the restatement of Lengthening as 25). In addition it requires a new, and perhaps more complex statement of Vocalic Assimilation. That is, instead of 28), we need a rule something like 34).

34) $\begin{Bmatrix} i* \\ u* \end{Bmatrix}$ --> $\begin{Bmatrix} \dot{u} \\ \dot{i} \end{Bmatrix}$ / $\_\_ \begin{matrix} w \\ y \end{matrix}$

Rule 34) would be interpreted in the obvious way. Any number of i's would be converted to u's before w and any number of u's would be converted to i's before y. Actually the examples under discussion involve sequences of only two vowels which are so converted, so that 34) could be stated so as to apply to one or two vowels. Whichever, the solution involving Shortening must restate 28), whereas the solution involving Truncation entails no such restatement.

Turning to the derivation of ta+d9ī́na from underlying ta+d9uw+iy+na, we see that once again

the new statements of Lengthening and Vocalic Assimilation are required.

35) ta+d9uw+iy+na

ta+d9u+iy+na	Glide Elision
ta+d9u+uy+na	i-Assimilation extended
ta+d9i+iy+na	new rule (34)
ta+d9i+ii+na	Syllabicity Assimilation
ta+d9ī+na	Lengthening restated as 25)

Once again it should be pointed out that whereas Truncation applies both in 27) and 22), Shortening does not apply in 35) although it does apply in 21).

Let us now recapitulate the discussion of this section. We have looked at two possible analyses for treating various data, one utilizing Lengthening-Shortening, the other, Truncation-Lengthening. The former possibility is the one assumed throughout the opening chapters. But this possibility entails restating original Lengthening as 25), along with a new statement of Vocalic Assimilation as 34). The solution involving Truncation requires no such restatements and is, perhaps, for this reason to be favored. In addition, the Truncation solution brings out a parallelism in the phonological derivations of

various weak forms, which in terms of the Shortening solution is not present. This again indicates that the latter possibility is to be rejected in favor of Truncation. Another point is to be made here, although little weight can be attached to it. This is the fact that the rule of Lengthening is just the type of rule one finds time and again in the phonology of languages, which is quite low-level and of little relevance for constructing ordering arguments. On the other hand, rules of Truncation are quite commonly of more import in that they typically enter into ordering relations in quite crucial ways. This is, of course, not a hard and fast rule. Nevertheless it does seem to be the unmarked situation in language. From these arguments, we may tentatively conclude that Truncation is the true process operative in Arabic phonology. In the next section this will be borne out by a more powerful argument resulting from the investigation of a new type of case.

4.4 Identical Consonant Metathesis

In order to show that Truncation definitely is the true contraction process of Arabic, we must first motivate a new rule, a rule which may be called Identical Consonant Metathesis or I.D. Metathesis for short.

This rule will play a major role in later discussions where it will be discussed in detail. In this section, however, we wish merely to give an account of the process insofar as it is relevant to the main theme of this chapter, that of demonstrating the untenability of Shortening and the correctness of Truncation.

All of the verbs adduced in preceding chapters displayed the typical tri-consonantal root pattern of Semitic. For example katab+a, 'he wrote' employs ktb; laqiy+a, 'he met', lqy; da9ā (<-- da9aw+a), 'he called', d9w; and so forth. Now there is an interesting class of roots, referred to as doubled or geminate roots, for which the second and third radicals are represented by identical segments. Thus, the root mdd is identifiable in the verb madd+a, 'he stretched', and madd+at, 'she stretched'. Since perfective non-derived verbs are typically of the shape CaCVC, we might suspect that madd+a and madd+at are underlying madVd+a and madVd+at respectively. We determine that this is so and furthermore identify V as a by noting the first and second person forms: madad+tu, 'I stretched', madad+ta, 'you m.s. stretched', and madad+ti, 'you f.s. stretched'. Compare these forms involving the root mdd with those of a verb not involving a doubled root, such as katab.

36)

strong verb		doubled verb	
katab+tu	I wrote	madad+tu	I stretched
katab+ta	you m.s. wrote	madad+ta	you m.s. stretched
katab+ti	you f.s. wrote	madad+ti	you f.s. stretched
katab+a	he wrote	madd+a	he stretched
katab+at	she wrote	madd+at	she stretched

From this set of paradigms it is possible to conclude that the stem underlying the verb 'to stretch' is madad. This follows since it permits us to generalize the doubled stem to the typical CVCVC pattern found in the case of strong stems such as katab. Thus, it is only the third person singular forms which deviate from this pattern in the doubled verb paradigm of 36). Recall that this is precisely the deviant class with respect to the class of lame verbs discussed earlier (cf. 1) of Chapter II), a fact which bears out our hypothesis further. If this is correct, then madd+a and madd+at derive from underlying madad+a and madad+at. We must now determine what process(es) is a work distorting these underlying sequences. Again, as with the lame verbs, it is obvious that the suffix plays an important role in determining whether or not the stem will undergo the relevant phonological process(es). Here both the masculine and feminine

third person markers begin with a vowel, whereas all other listed in 36) begin with a consonant. A first guess at the means by which madad+a and madad+at are converted to madd+a and madd+at is represented by 37).

37) a --> Ø / VC__C+V

This rule accomplishes just what is desired. It elides a vowel just in case the stem is followed by a suffix beginning with a vowel.

38)	madad+tu	madad+a	madad+at	
	madad+tu	madd+a	madd+at	Rule 37)

As indicated in 38), madad+tu (as well as madad+ta and madad+ti) will not be affected by Rule 37). However madad+a and madad+at will be correctly converted to madd+a and madd+at as required.

It is to be noted that 37) is not at all an unnatural type of rule. Such rules are really quite commonly encountered in natural languages. However, there is some strong evidence proving that 37) is not the process by which madad+a and madad+at are converted to madd+a and madd+at. This evidence will now be presented.

One of the plural patterns for singular stems

of the shape CaCīC is 'aCCiCā'. We are not interested here in the details of the rule(s) effectuating this change, rather, we are interested simply in noting the alternation.

39)	singular CaCīC		plural 'aCCiCā'	
	ṣadīq+u	friend	'aṣdiqā'+u	friends
	qarīb+u	relative	'aqribā'+u	relatives

The suffix u of course is the familiar case ending. In order to show that Rule 37) is irrelevant, we must now consider doubled stems of the pattern CaCīC, such as ṭabīb+u, 'doctor', xalīl+u, 'friend', ḥabīb+u, 'loved one', raqīq+u, 'slave', and so forth. These forms all contain doubled roots--ṭbb, xll, ḥbb, and rqq respectively. Since the singular stems are all of the pattern CaCīC, we would expect plurals of the shape 'aCCiCā', as in 39). That is, we should expect 'aṭbibā'+u, 'axlilā'+u, 'aḥbibā'+u, and 'arqiqā'+u. However, the actual plurals are those listed in the following table.

40)	singular	expected plural	actual plural	
	ṭabīb+u	'aṭbibā'+u	'aṭibbā'+u	doctors
	xalīl+u	'axlilā'+u	'axillā'+u	friends
	ḥabīb+u	'aḥbibā'+u	'aḥibbā'+u	loved ones
	raqīq+u	'arqiqā'+u	'ariqqā'+u	slaves

Instead of the expected plural 'aCCiCā', we find 'aCiCCā'. Instead of finding Ci as the fourth and fifth segments, we find iC. It is of course possible to assume a new pluralization process taking CaCīC into 'aCiCCā', but this certainly misses the point, for it is just the class of doubled roots for which we find the plural pattern 'aCiCCā'. We may explain this distribution of data if we assume one pluralization process, namely CaCīC --> 'aCCiCā', along with a metathesis rule which turns Ci of the plural pattern to iC just in case this C is identical to the third radical C. In other words the expected plural 'atbibā' will be generated, at which point the new metathesis rule will convert the sequence to the correct 'atibbā'. On the other hand, the metathesis rule will not affect 'asdiqā' or 'aqribā' by virtue of the fact that the latter sequences do not contain identical second and third radical consonants. The rule, then, may be stated as 41).

41) Identical Consonant Metathesis (I.D. Metathesis):

$$C_kVC_kV \rightarrow VC_kC_kV$$

Here of course there is no question of a vowel being deleted by Rule 37) since the i remains.[6] Returning to

the question of the process by which madad+a and and madad+at become madd+a and madd+at, we see now that the rule of I.D. Metathesis in conjunction with Truncation accomplishes the desired results.

42)	madad+a	madad+at	
	maadd+a	maadd+at	I.D. Metathesis (41)
	madd+a	madd+at	Truncation

But once again the Lengthening-Shortening approach will also yield the correct results.

43)	madad+a	madad+at	
	maadd+a	maadd+at	I.D. Metathesis (41)
	mādd+a	mādd+at	Lengthening
	madd+a	madd+at	Shortening

To decide the question of which of 42) and 43) is the correct approach, and with it the question posed in this chapter--which of Truncation-Lengthening and Lengthening-Shortening is correct, we must consider the active participle once again. It was pointed out earlier that active participles are formed according to the pattern CāCiC. Thus, in 1.5 we noted the participle kātib+i+n declined in the genitive indefinite, as well as dā9iw+i+n and

rāmiy+i+n, which are converted to dā9in and rāmin by additional rules. Given the pattern CāCiC as the usual one representing non-derived active participles, one expects to find doubled roots such as mdd also to participate in the participle forming process. Thus, 'stretching' should be mādid+i+n in the genitive indefinite, mādid+u+n in the nominative, and mādid+a+n in the accusative. However, the true phonetic representations turn out to be not the latter, but rather mādd+i+n, mādd+u+n and mādd+a+n in all cases. If we invoke the rule of I.D. Metathesis along with the Truncation approach, these forms are predicted.

44)	mādid+u+n	mādid+i+n	mādid+a+n	
	māidd+u+n	māidd+i+n	māidd+a+n	I.D. Metathesis
	māadd+u+n	māadd+i+n	māadd+a+n	a-Assimilation
	mādd+u+n	mādd+i+n	mādd+a+n	Truncation

It is important to notice that only one mora is truncated by Truncation, thus accounting for the fact that in these cases we find long vowels followed by two consonants. How would such forms be accounted for in terms of an approach utilizing Shortening? Clearly such an approach can account for mādd+u+n,

etc., only in a clumsy way, for at present the following derivations would obtain.

45)	mādid+u+n	mādid+i+n	mādid+a+n	
	māidd+u+n	māidd+i+n	māidd+a+n	I.D. Metathesis
	māadd+u+n	māadd+i+n	māadd+a+n	a-Assimilation
	mādd+u+n	mādd+i+n	mādd+a+n	Lengthening
	madd+u+n	madd+i+n	madd+a+n	Shortening

Of course these derivations lead to incorrect results, predicting short vowels where there should be long vowels. In order to secure the correct results and still utilize Lengthening-Shortening, one could devise a new feature [extra long] and claim that āa becomes an extra long vowel, which by Shortening is converted to a long vowel. However such a move is clearly ad hoc, for only in cases such as 45) will the feature [extra long] be needed. Nothing new need be said if the Truncation solution is adopted. Therefore, the role of Truncation vs. Shortening with respect to active participles to which I.D. Metathesis has applied constitutes rather strong evidence for the truncation process stated as 8) above. This means that 26) and 27) are to be favored over 33) and 35), that 16) and 22) are favored over 15) and 21), and that 23) is favored over 24). This also indicates that Lengthening

and Vocalic Assimilation are to retain their intial statements as in 6) and 28), and not be revised according to 25) and 34). The matter of which of Lengthening-Shortening or Truncation-Lengthening is to be favored is settled in favor of the latter. All derivations in Chapters II and III utilizing Lengthening-Shortening may be revised to undergo Truncation(-Lengthening) instead. The reader can carry out this revision easily enough so that those derivations need not be repeated here.

4.5 Passive Imperfectives

In this chapter we have suggested the means by which the following changes are effectuated:

46)
aG+uw+na --> a+w+na
aG+iy+na --> a+y+na
uw+uw+na ---> ū+na
iy+iy+na --> ī+na
uw+iy+na --> ī+na
iy+uw+na --> ū+na

All stems involved in these changes were active stems. No passive stems were included in the derivations. However we may now test the adequacy of the rules presented up to now by considering what the underlying representa-

tions corresponding to the active stems involved in the changes listed in 46) must be, and by determining if the predictions given by our rules coincides with the actual phonetic sequences found. The means of forming the imperfect passive from the imperfect active has already been touched on in section 3.3 (cf. 23) and 24) of that section). Once again, this process involves changing the a of the person prefixes to u and switching the stem vowel to a. Corresponding to active ya+ktub+u, then, is yu+ktab+u, 'it is written'. Corresponding to underlying ya+lqay+uw+na and ta+lqay+iy+na (cf. 16) and 22) above), then, should be yu+lqay+uw+na for 'they are met' and tu+lqay+iy+na, for 'you f.s. are met'. Our rules predict the following:

46)	yu+lqay+uw+na	tu+lqay+iy+na	
	yu+lqa+uw+na	tu+lqa+iy+na	Glide Elision
	yu+lqa+aw+na	tu+lqa+ay+na	a-Assimilation
	yu+lqa+w+na	tu+lqa+y+na	Truncation

The correct forms for 'they are met' and 'you f.s. are met' are indeed those predicted.

Corresponding to active ta+d9uw+uw+na, ta+d9uw+iy+na, ta+rmiy+uw+na, and ta+rmiy+iy+na, we would expect passive

yu+d9aw+uw+na for 'they are called', tu+d9aw+iy+na for 'you f.s. are called', yu+rmay+uw+na for 'they are thrown', and tu+rmay+iy+na for 'you f.s. are thrown'. The rules postulated thus far predict the following:

47)	yu+d9aw+uw+na	tu+d9aw+iy+na	yu+rmay+uw+na	tu+rmay+iy+na	
	yu+d9a+uw+na	tu+d9a+iy+na	yu+rma+uw+na	tu+rma+iy+na	Glide Elis.
	yu+d9a+aw+na	tu+d9a+ay+na	yu+rma+aw+na	tu+rma+ay+na	a-Ass.
	yu+d9a+w+na	tu+d9a+y+na	yu+rma+w+na	tu+rma+y+na	Trun.

Again the final step of these derivations is the correct phonetic sequence desired in each case. The rules proposed thus far consequently go beyond the data presented earlier to make correct predictions about new data.

4.6 A Further Observation Concerning Syllabicity Assimilation

In preceding sections, we have argued that the plural morpheme in Arabic is uw. This morpheme was combined with imperfective stems and the mood marker na in many examples given above. The plural marker may also be combined with perfective stems, without any indicative marker, however, as only imperfectives select for mood. Thus, to katab, we should be able to append uw, to form the word meaning 'they wrote'. To the stem nazal, we should be able to append uw to yield the form meaning 'they descended',

and so on. The actual representations of 'they wrote' and 'they descended' are katab+ū and nazal+ū. One can account for the long vowel in place of uw in such forms by a simple and quite natural extension of the rule of Syllabicity Assimilation. In place of the earlier 11), we propose 48).

48) Syllabicity Assimilation: $\begin{Bmatrix} y \\ w \end{Bmatrix} \text{--->} \begin{Bmatrix} i \\ u \end{Bmatrix} / \begin{Bmatrix} i \\ u \end{Bmatrix} \_ \begin{Bmatrix} C \\ \Psi \end{Bmatrix}$

Rule 48) is an informal abbreviation[7] having the effect of turning y to i after i and before either C or Ψ, or w to u after u and before either C or Ψ. Since underlying katab+uw and nazal+uw are followed by word boundaries, Rule 48) will apply giving katab+uu and nazal+uu, whereupon Lengthening will yield the correct results.

We are now once again in a position to test the rules postulated up to now. This test involves stems such as ramay, da9aw, and laqiy, all active stems encountered several times at earlier points in the exposition. To such stems we should be able to suffix the plural marker uw. Let us now determine what our predictions are.

49)	ramay+uw	da9aw+uw	laqiy+uw	
	rama+uw	da9a+uw	laqi+uw	Glide Elision
	rama+aw	da9a+aw	laqi+iw	a-Assim. and i-Assim.
	rama+w	da9a+w	laqi+w	Truncation
	--	--	laqu+w	Vocalic Assim.
	--	--	laqu+u	Syllabicity Assim.
	--	--	laqū	Lengthening

Phonetically we find ramaw, 'they threw', da9aw, 'they called', and laqū, 'they met', exactly as predicted by our rules.

As noted in 4.1 above, perfective passives may be formed by changing the first a of the stem to u and the second a or stem vowel to i. For example katab+a, 'he wrote', becomes kutib+a, 'it m. was written'. The same should be possible in the cases listed in 49). That is, we should find underlying rumiy+uw, du9iw+uw, and luqiy+uw. We predict the following:

50)	rumiy+uw	du9iw+uw	luqiy+uw	
	rumi+uw	du9i+uw	luqi+uw	Glide Elision
	rumi+iw	du9i+iw	luqi+iw	i-Assim.
	rumi+w	du9i+w	luqi+w	Truncation
	rumu+w	du9u+w	luqu+w	Vocalic Assim.
	rumu+u	du9u+u	luqu+u	Syllabicity Assim.
	rumū	du9ū	luqū	Lengthening

'They were thrown' is in fact rumū, 'they were called' is du9ū, and 'they were met' is luqū, bearing out the predictions of 50) and further confirming our rules.

Footnotes to Chapter IV

1. Because of the assimilation processes, the subscripts included in the Lengthening rule are superfluous, since all vowels which are adjacent will by this time be identical.

2. Technically, after Truncation, we are left with rāmi++n, and not rāmi+n. It may be assumed that a general convention gives the latter. However, this is of little consequence. More realistically I would claim that the morpheme boundary is no more than an expository device, and that rules which are stated so as to rely crucially on the presence of this boundary are more correctly stated in terms of the relevant feature associated with the affix, or in terms of the stem boundary, which we utilize in our later discussion. The point is not worth dwelling upon at this point.

3. In feature notation, this reads as follows:

$$\text{(i)} \begin{matrix}[-\text{cns}]\\[+\text{hi}]\end{matrix} \text{ --> } [+\text{syl}] \;/\; \begin{matrix}[+\text{hi}]\\[+\text{syl}]\end{matrix}\text{—}C$$

4. The blanket statement that Glide Elision does not ever apply when there is a right-most long vowel is discussed more in Chapter VIII, where some evidence is forthcoming suggesting that we do get Glide Elision before ā. However, at a later point this is disproven.

5. In Chapter XII it will become clear that there are no long vowels in underlying representations. Thus, the long vowels cited earlier, before which Glide Elision does not apply, are actually sequences of two morae. The length condition must be changed accordingly, which we do at a later point. If this is correct, then it follows that there should be no elision in the case of ya+lqay+uu+na, etc.

6. Those still bent on maintaining 37), and rejecting 41), may claim that 'atbibā'+u first becomes 'atbbā'+u by 37), and later, 'atibbā'+u by an epenthesis rule having the effect of breaking up tri-consonantal clusters. This fails, however, in view of the fact that it is not possible to predict which vowel is to be epenthesized. For example, ma+htat+at+u+n becomes ma+hatt+at+u+n, and not ma+hitt+at+u+n.

. Cf. footnote 3. for a more adequate statement in terms of features. The boundary $\underline{Y}$ need only be added to that rule.

Chapter V

ABLAUT IN NON-DERIVED VERB CLASSES

5.0 The major rules discussed up to this point are repeated in 1).

1) I.D. Metathesis: C_kVC_kV --> VC_kC_kV

Glide Elision: G --> Ø / V_i__$\breve{V}_j$, if j=[+lo], then i=[+lo]

i-Assimilation: u --> i / i__

(u-Assimilation: i --> u / u__)

a-Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix}$ --> a / a__

Truncation: V --> Ø / V__C $\begin{Bmatrix} C \\ \Psi \end{Bmatrix}$

Vocalic Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix}$ --> $\begin{Bmatrix} i \\ u \end{Bmatrix}$ / __ $\begin{Bmatrix} y \\ w \end{Bmatrix}$

Syllabicity Assimilation: $\begin{Bmatrix} w \\ y \end{Bmatrix}$ --> $\begin{Bmatrix} \dot{u} \\ i \end{Bmatrix}$ / $\begin{Bmatrix} u \\ i \end{Bmatrix}$ __ $\begin{Bmatrix} C \\ \Psi \end{Bmatrix}$

Lengthening: VV --> $\bar{V}$

The rule of u-Assimilation could be collapsed with i-Assimilation (as could a-Assimilation as noted earlier), and this is the rule indicated in derivation 27) of the last chapter, which applies after Glide Elision. All rule orderings established thus far are indicated in 1) by lines connecting the two rules for which the ordering relation holds. Notice that there is no argument establishing the prior order of i-, u-,

and a-Assimilation with respect to Truncation. The latter rule could just as well have preceded these rules in all derivations presented above, and all the desired results would still have been obtained. Thus, underlying ta+lqay+iy+na could have been converted to talqayna, 'you f.s. meet', via 2) rather than 22) of Chapter IV.

2) ta+lqay+iy+na
ta+lqa+iy+na Glide Elision
ta+lqa+y+na Truncation

In 2) we assume the ordering Truncation-a-Assimilation, in 22) of Chapter IV, the opposite. For this reason, the rule of u-Assimilation of 1) has been parenthesized, for if Truncation does the assimilation processes, then there is no independent support for u-Assimilation. Thus, under this interpretation, derivation 27) of the last chapter, repeated here as 3), would be replaced by 4).[1]

3) ta+d9uw+iy+na
ta+d9u+iy+na Glide Elision
ta+d9u+uy+na u-Assimilation
ta+d9u+y+na Truncation
ta+d9i+y+na Vocalic Assimilation
ta+d9i+i+na Syllabicity Assimilation
ta+d9ī+na Lengthening

4) ta+d9uw+iy+na

ta+d9u+iy+na	Glide Elision
ta+d9u+y+na	Truncation
ta+d9i+y+na	Vocalic Assimilation
ta+d9i+i+na	Syllabicity Assimilation
ta+d9ī+na	Lengthening

There is independent evidence for i-Assimilation and a-Assimilation, however, as shown by derivations such as 6) and 13) of Chapter III. We shall continue to assume, as in 1), that Truncation follows the various assimilation processes. More on u-Assimilation will be forthcoming in this chapter.

From derivations such as 42) and 44) of Chapter IV, we know that I.D. Metathesis precedes Truncation. In those derivations it was also assumed that I.D. Metathesis precedes a-Assimilation, although the correct results could be obtained by assuming that the assimilation process precedes I.D. Metathesis. Again, without reason, we shall assume that the ordering given in 1) is correct. Of course once again it is possible to allow Truncation to precede a-Assimilation in the case of derivations 42) and 44) of the last chapter.

We have given no arguments for placing I.D. Metathesis before Glide Elision. This problem will

not be discussed in this chapter. However, in Chapters IX and X, a number of points relating to I.D. Metathesis are brought up and studied in some detail. I.D. Metathesis aside, it is clear from the preceding discussion that it is the rule of Glide Elision which initiates the whole range of phonological processes listed in 1). In this chapter, a new rule, Ablaut, will be motivated, and shown to interact with additional new rules of some interest. Some paradoxes arising from this discussion will follow in the next chapter. Before turning to the Ablaut process itself, we shall first generalize the canonical shapes of perfective and imperfective stems in 5.1.

5.1 Towards Generalizing Verb Stems

Throughout the exposition to this point, numerous examples of verbs conjugated both in the perfective and imperfective aspects have come to light. Invariably it was the perfective stems which were of the pattern CVCVC and the imperfective stems which were of the pattern CCVC. It would be desirable if conditions could be discovered accounting for when one or the other of the two possibilities obtained. Actually the conditions are quite obvious. Recall that every instance of an imperfective stem CCVC was preceded

by a prefix of the shape CV, while perfective stems of the shape CVCVC was seen to bear person suffixes, and never prefixes of person. Thus, one finds ta+nzil+u, 'she descends', ya+nzil+ū+na, 'they m.p. descend', and ta+nzil+ī+na, 'you f.s. descend', all imperfectives and prefixing. Forms such as nazal+a, 'he descended', nazal+at, 'she descended', and nazal+tu, 'I descended', however, are all perfectives and suffixing. It is obvious that the two stem shapes, CVCVC and CCVC, may be generalized by simply postulating CVCVC as the basic stem and by furthermore permitting CV prefixes to initiate elision of the first V of the CVCVC stem. The rule bringing about this change may be stated as follows:

5) Vowel Elision: V --> Ø / V+C__CV

By this reasoning a form such as ta+nzil+u will be represented as ta+nVzil+u from which the V will be elided by Rule 5). Because of numerous derived forms which actually display two stem vowels, we may identify the first stem vowel of ta+nVzil+u as a. Compare the following proportion:

6) nAzal+at she descended : nAzzal+at she sent down
ta+nVzil+u she descends : tu+nAzzil+u she sends down

The first vowel of each stem is capitalized for clarity. In the imperfective geminate derived class, we find the first stem vowel to be a. In addition both non-derived and derived classes of stems typically display a as the first stem vowel when one is present. Such alternations indicate that V of ta+nVzil+u is a, even though it is subsequently elided by Rule 5), the rule of Vowel Elision. Notice that the first a of the stem nazzil in tu+nazzil+u is not elidable by 5) since instead of being followed by CV, it is followed by CCV. The derivation, then, consists of the change of ta+nazil+u to ta+nzil+u. By such a process, we succeed in generalizing all stems to the single pattern CVCVC. Besides alternations such as tu+nazzil+u which indicate that this step is the correct one, we know that some process such as 5) is operable in Arabic, for otherwise, it would be a mere conincidence that CCVC always occurs after CV when the corresponding perfective is CVCVC. In other words, rule 5) explains why we find no CV+CVCVC+X sequences in Arabic.

We shall see later that Vowel Elision has a wider range of application than just to imperfective verb forms. Now we wish to point out that rule 5) must be stated with a morpheme boundary. If the

boundary were not included in the rule, forms such as katab+at would be converted to katb+at incorrectly, as well as other cases. For example underlying ta+nazil+u would be converted to ta+nzl+u, again incorrectly, if the morpheme boundary, +, were not included in rule 5).[2]

5.2.0 Ablaut

By claiming that ta+nzil+u derives from underlying ta+nazil+u, we have succeeded in generalizing imperfective stems to the CVCVC shape of perfectives, e.g. nazal+at. In addition we claimed that the first stem vowel is invariably a. The second stem vowel, the i of ta+nzil+u and the a of nazal+at following the second radical, is what has been referred to in preceding chapters as the stem vowel. It is variable as is obvious from the preceding examples. This variation in the stem vowel of the imperfective versus that of the perfective will be termed Ablaut. It turns out that there is a good deal of systematicity to the ablaut alternations. In the following sections we shall discuss many of facts relevant to this area of the morphophonemics of Arabic.

5.2.1 The Ablaut Alternation as an Ordered Rule

In section 4.1 it was noted that perfective stems possess one of three potential stem-vowels, a, i, and u. Capitalizing the stem-vowels for clarity, we repeat examples such as katAb+at, 'she wrote', nazAl+at, 'she descended', rakIb+at, 'she rode', and kabUr+at, 'she became big'. In section 3.1 it was noted that imperfective stems possess stem-vowels drawn from the same class, a, i, and u. Examples include ta+šrAb+u, 'she drinks', ta+rkAb+u, 'she rides', ta+nzIl+u, 'she descends', ta+ktUb+u, 'she writes', and ta+kbUr+u, 'she becomes big'. The alternation between the a stem-vowel of nazal+at and the i stem-vowel of ta+nzil+u, or the i stem-vowel of rakib+at and the a of ta+rkab+u, etc. is conceivably a lexical fact of little interest in the phonological component of Arabic. That is, it is perfectly conceivable that the stem underlying nazal+at is nazal and that underlying ta+nzil+u is nazil from which the first vowel is elided by Vowel Elision. On the other hand it would be interesting if we could discover evidence proving one or the other of the alternating vowels (or perhaps a third) to be the basic one, from which the other(s) could be derived. The fact that

the choice of stem-vowels is not pair-wise random. indicates that the latter possibility is the correct approach. Consider the following paradigm, which illustrates this fact.

7)	perfective	imperfective
A:	katab+at	ta+ktub+u
	qatal+at	ta+qtul+u
	xaraj+at	ta+xruj+u
	daxal+at	ta+dxul+u
	nazal+at	ta+nzil+u
	jalas+at	ta+jlis+u
	darab+at	ta+drib+u
	9araf+at	ta+9rif+u
B:	rakib+at	ta+rkab+u
	sarib+at	ta+srab+u
	9alim+at	ta+9lam+u
	labis+at	ta+lbas+u
C:	kabur+at	ta+kbur+u
	sayur+at	ta+syur+u
	ba9ud+at	ta+b9ud+u
	qarub+at	ta+qrub+u

This paradigm displays the normal ablaut alternations of the non-derived verb classes of Arabic. Notice that stem-vowel a in the perfective column implies u or i in the imperfective column (class A). Perfective i implies imperfective a (class B), but whenever we find u in the perfective, we also find u in the imperfective, (class C). This may be schematized as follows:

8)

	A	B	C
perf:	a	i	u
imperf:	u i	a	u

Excluding case C, it is obvious that there is a generalization underlying 8): Whenever we find a low vowel in the perfective, we find a high vowel in the perfective. Whenever we find a high vowel in the perfective, we find a low vowel in the imperfective. Clearly this is a generalization to be captured in the phonological component of Arabic. Such alternations as these may be captured by the following rule.

9) $\begin{matrix} V \\ [\alpha hi] \\ [-C\ ] \end{matrix}$ --> [-αhi] / relevant aspect

We assume that class C verbs are assigned the feature [+C] in lexical representations. Rule 9) is stated so as to exclude this class since classes A and B will be marked [-C]. The feature [+C] may in fact be a feature of stativity or inchoation; however, we shall in this discussion assume [+C] and [-C], this choice having no significant consequences for the results to follow.[3]

Rule 9) accounts for the alternations listed in 8) and evinced in 7)A and B. If the variable α is specified as +, for a specific aspect, then this plus will be converted to minus in the opposite aspect. Thus, if i is chosen as the underlying vowel in the case of perfective rakib, in the imperfect, rakib will be converted to rakab. Of course this form will be prefixed, triggering Vowel Elision, and giving, in the case of the third person feminine singular, ta+rkab+u. On the other hand, if the variable α is minus, then in the opposite aspect, this minus will be converted to plus. The rule thus accounts for why there are no cases of pairs such as CaCiC--CCuC, CaCaC--CaCaC, etc, where we find i as the stem vowel in the perfective and u in the imperfective, and so forth.

We must now confront the problem of which of

two possibilities listed in 8) is in fact the underlying vowel, the vowel which normally appears in the perfective or the vowel which normally appears in the imperfective aspect. That is, does a become u and i; and i, a, or does u and i become a; and a, i? The most obvious choice of underlying vowels is the imperfective ones of 8) for in the A case here, we have a many-to-one mapping. If the perfective vowel were the underlying one, we would need an ad hoc diacritic feature to distinguish those a's which become u in the imperfect from those which become i. Assuming that the imperfective vowels are the basic vowels, nazal would derive from underlying nazil, katab, from katub, rakib from rakab, and so on. Imperfective ta+nzil would derive from ta+nazil via Vowel Elision, ta+ktub+u from ta+katub+u, ta+rkab+u, from ta+rakab+u without a change in the stem vowel. The ablaut process would, under this analysis, be stated as 10), in place of 9).

10)
$$\begin{matrix} V \\ [\alpha hi] \\ [-C\ ] \end{matrix} \quad \text{--->} \quad [-\alpha hi] \ /\ \text{perfective}$$

That is, only when the stem bears the feature [+perf] will 10) be applicable.

There is a strong argument proving that 10) is incorrect, i.e. that the imperfective vowels are not the underlying vowels. This argument, moreover,

indicates that the vowels which typically show up as the imperfective stem-vowels derive from what is normally the surface representation for the perfective stem-vowel. In other words, the mapping of 8) is from perfective to imperfective as indicated below.

11)	A	B	C
perfective:	a	i	u
imperfective:	u i	ä	u

The argument goes as follows. As class B of 7) demonstrates, there are perfectives with stem-vowel i, e.g. rakib+at, labis+at, etc. We should also expect to find lame stems of the shape CāCiG. We have in fact already pointed out such an example in 4.1, viz. laqiy+at, 'she met' and laqī+tu, 'I met', which derives from laqiy+tu by Syllabicity Assimilation and Lengthening as pointed out in that section. We know that y is the underlying third radical because of nouns such as luqy+ān+u+n, a verbal noun corresponding to laqiy+at, where the y shows up distinctly as y. We did not cite any examples of CaCiG stems, where the second possibility for G was realized as w, either at the most abstract level or phonetically. We may now adduce such an example, viz. radiy+at, 'she became

content'. Clearly the third radical G of this stem is underlying w and not y, for the verbal noun corresponding to radiy+at is not ridy+ān+u+n, but rather, ridw+ān+u+n. The phonetic y which actually shows up in radiy+at may be accounted for by a rule already discussed in 3.5.1 of Chapter III (cf. 38)), which may be repeated as 11).

12) w-to-y: w --> y / i__

By means of Rule 12), which will be called w-to-y, underlying radiw+at will be converted to phonetic radiy+at.[4] On the other hand, ridw+ān+u+n remains unaffected by 11). Rule 11) was motivated in Chapter III on the basis of examples such as du9iy+a, 'he was called', the passive of da9ā (<--da9aw+a), 'he called', where again it is clear that the third radical glide is w because of da9aw+tu, 'I called', etc.

The next step in the argument relates to the imperfective stems corresponding to perfectives of the shape CaCiG. From class B of 7) we know that the stem vowel of the corresponding imperfective is a. If our claim about ablaut is at all correct we should expect this alternation to exist for lame verbs just as it does for strong verbs as listed in 7). The

ablaut process does obtain in the case of weak verbs as shown by the imperfect stem corresponding to laqiy+at. This form, as noted earlier, is ta+lqā, which has already been shown to derive from ta+lqay+u in the indicative. Thus, the i of laqIy+at does correspond to a in ta+lqAy+u, but at the deep level of analysis. Further, this is clearly evident from the examples involving the dual morpheme ā, cf. laqiy+ā, 'they m.d. met', and ta+lqay+ā+ni, 'you d. met', where in the latter example, y cannot elide because of the length condition placed on Glide Elision [cf. 3.4]. Let us now examine underlying radiw+at, radiw+a, etc., which by w-to-y become radiy+at, radiy+a, etc. The imperfective forms corresponding to these should be, in underlying representations (excluding the vowel elided by Vowel Elision), ta+rdaw+u, for 'she becomes content', and ya+rdaw+u for 'he becomes content', etc. By Glide Elision, a-Assimilation, and Lengthening, phonetic ta+rdā and ya+rdā are derived. But what about the dual forms? In the perfective we find forms such as radiy+ā, 'they m.d. became content', and radiy+at+ā, 'they f.d. became content', which derive from underlying radiw+ā and radiw+at+ā in accordance with our earlier observations about this root. But in the imperfect, we find not ta+rdaw+ā+ni and ya+rdaw+ā+ni as one might expect; rather, we find ta+rday+ā+ni, 'they f.d. become content', and ya+rday+ā+ni, 'they m.d.

become content', with y, and not w, appearing as the third radical. How can we account for the y of the latter two forms, since the underlying representations (minus Vowel Elision) are ta+rdaw+ā+ni and ya+rdaw+ā+ni? That is, if the stem-vowel is a, we are posed with the difficult problem of how to predict y for such underlying representations. It will not do to posit a rule turning w to y in the environment a__ā, simply because we do find cases of awā, e.g. perfective da9aw+ā, 'they m.d. called'. But the y of phonetic ta+rday+ā+ni and ya+rday+ā+ni can be predicted. This can be brought about if we assume that the perfective stem-vowel i is the basic stem-vowel, and that furthermore, w-to-y applies before the Ablaut rule. The derivations which would then persist would be the following:

13)	ta+radiw+ā+ni	ya+radiw+ā+ni	
	ta+rdiw+ā+ni	ya+rdiw+ā+ni	Vowel Elision
	ta+rdiy+ā+ni	ya+rdiy+ā+ni	w-to-y
	ta+rday+ā+ni	ya+rday+ā+ni	Ablaut

This stem is a class-B stem with i showing up in the perfective conjugation. Imperfectives are present in 13) and consequently undergo Ablaut, which may now be restated as 14), accounting by the ordering explicit in 13), for phonetic y.

14) Ablaut: $\begin{bmatrix} V \\ [\alpha hi] \\ [-C\ ] \end{bmatrix}$ --> [-αhi] / imperfective

The preceding discussion indicates that the perfective vowel is in fact the basic vowel and that the mapping represented in 10) and carried out by 13) is correct, for only with this analysis can we explain why y and not w shows up in cases such as ta+rday+ā+ni and ya+rday+ā+ni. There is at our disposal a means of testing the validity of the analysis just set forth. Earlier we noted that perfective passives are of the shape CuCiC, with stem-vowel i, and that imperfective passives are of the shape CCaC, with stem-vowel a, and prefixes of the shape Cu. Here we find the alternation between high i and low a, which, incidentally, further supports the ablaut alternations predicted by rules such as 14), 10), etc. The empirical test is this. Since the i is present in the perfective and the a in the imperfective, we should be able to take a root such as da9aw (cf. da9aw+tu, etc.), convert it to the passive, and conjugate it in the imperfective dual. If 14) is correct and if w-to-y truly precedes the Ablaut rule, then the following derivation should obtain.

15) tu+d9iw+ā+ni yu+d9iw+ā+ni

tu+d9iy+ā+ni yu+d9iy+ā+ni w-to-y

tu+d9ay+ā+ni yu+d9ay+ā+ni Ablaut

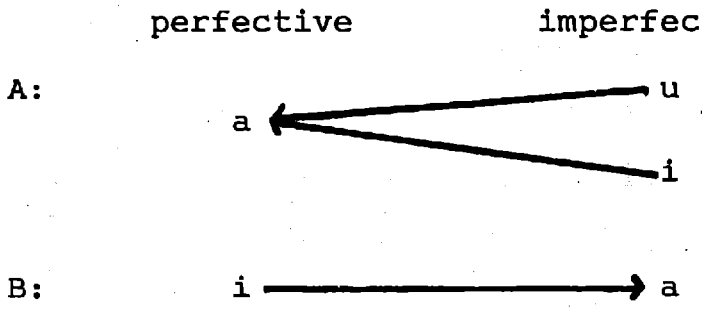
Our analysis is borne out by the fact that we do find tu+d9ay+ā+ni, 'they f.d. are called', and yu+d9ay+ā+ni, 'they m.d. are called'. We conclude that the perfective stem-vowel is the basic one and that w-to-y precedes Ablaut as stated in 15).

5.2.2 Class-A Stems

The argument presented in 5.2.1 proves that the perfective vowel is the underlying vowel in the case of class-B stems of 7), as well as in the case of all imperfective passives. But since all passives possess stem-vowel i in the perfective and a in the imperfective, one might lump passives in the same class with B stems. Are we justified in arguing that the perfective vowel a of the A-class stems of 7) is the basic vowel? That is, is the argument presented above sufficient to prove that the mapping in the case of class-A stems is of the same direction as that for class-B stems? Observing the fact that some perfective a's of 7) become u in the imperfect and others i suggests that for class-A stems the mapping is from imperfective stem-vowel to perfec-

tive. Otherwise, how could we predict which a's become u and which a's become i? If the perfective vowel is the underlying vowel in the case of class-B stems, and the imperfective vowel in the case of class-A stems, however, Rule 14) will not do. Let us review the processes needed under the new assumption stated directly above.

16)



In order to effect these changes 14) could be replaced by 17) along with a new rule 18).

17)
$$\begin{matrix} V \\ [+hi] \\ [-C] \end{matrix} \quad \text{--> [-hi] / imperfective}$$

18)
$$\begin{matrix} V \\ [+hi] \\ [-C] \end{matrix} \quad \text{--> [-hi] / perfective}$$

Rule 17) accounts for class-B alternations. Rule 18) accounts for class-A alternations (cf. 7)). Not only are 17) and 18) similar in every way but one, these rules miss the generalization inherent in paradigm 7) alluded to earlier. That is,

given any vowel of .16), it is always the case that the vowel in the opposite aspect will have the opposite feature specification for height. Rule .14) attempts to capture this fact. Rules 17) and 18) cannot. It is possible to collapse .17) and .18) as 19).

.19) $$\begin{matrix} V \\ [+hi] \\ [-C] \\ [\alpha aspect] \end{matrix} \quad \text{--> [-hi] / [-}\alpha\text{aspect]}$$

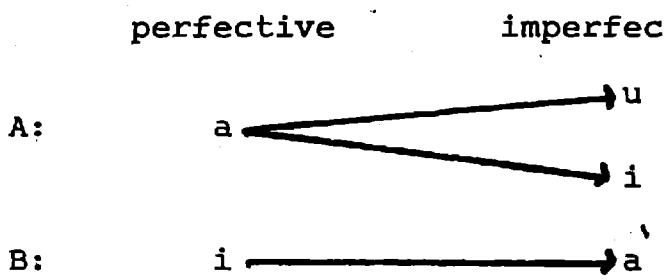
By this rule i of class-B of .16) is converted to a in the imperfect, and u and i of class-A of 16) is converted to a. However 19) is beside the point and is devoid of content, for 19) claims that a particular aspect is basic, perfective in the case of class-B and imperfective in the case of class-A. This feature of aspect would have to be assigned to stem-vowels, but stems would take on perhaps a different feature of aspect. The approach is clearly misleading and hardly tenable because it is not a particular aspect which is basic, rather, it is a particular vowel, which is typically asssociated with a particular aspect. Thus, the argument given in the preceding section shows not that the perfective is the basic aspect for class-B, but rather that i is the basic vowel, although this vowel is typically associated with the perfective aspect. But i is abstracted away from

aspect. By Rule 14) this i is converted to a when the feature [+imperf] is present, and not changed at all when the feature [-imperf] is present. Thus, in conclusion, 19) does not suffice to capture the generalization exhibited by 7).

We have more or less eliminated all possibilities but that realized by 14). However, there is a more direct argument demonstrating that the directionality of 16)A is incorrect. Once this is shown, then it follows that the vowel associated with the perfective aspect of class-A stems is in fact the underlying vowel and that 14) is correct in principle if not in detail. Recall that the rule of w-to-y was made crucial use of in showing that i is the basic vowel of class B. We showed that only under the assumption that i was underlying could we explain why we find y and not w in such imperfectives as ya+rday+ā+ni and yu+d9ay+ā+ni. The reader should refer back to 13). and 15). Now if imperfective i is the basic vowel for some class-A stems (cf. 16)), then a similar argument should exist for these forms. The argument would go as follows: there should be some forms with imperfective i and third radical y, as e.g. ya+rmiy+a, 'that he throw'. Likewise there

should be analogous forms, but with underlying w in place of y, i.e. underlying ya+CCiw+a. Clearly, the w could be identified as underlying from other alternations, e.g. nouns, analogous to lugyān+u+n versus ridwān+u+n used in the preceding section. By w-to-y, ya+CCiw+a would become ya+CCiy+a and in the perfective, we should find CaCay+tu, i.e. with y since w-to-y precedes the ablaut process. But no such cases exist where we have underlying w which shows up as y in imperfectives in i and perfectives in a. Thus, i cannot be the basic vowel of class A. This means that 16) is incorrect. The only possibility is that the perfective vowels are basic not only for class-B stems, but also for class-A stems. In place of 16), then, is the following:

20)



Returning to the problem of predicting which a's become u and which, i, there are two approaches to this question. First, one might conjecture that there is a second low vowel in the repertory of under-

lying vowels of Arabic, a front æ and a back a. It might further be claimed that perfective æ becomes i in the imperfect, and perfective a, u. We have in fact been utilizing the symbol a to designate phonetic æ throughout our discussion up to now (cf. Chapter I).[5] The underlying vowel system i, u, and æ is usually considered to be a highly marked system, certainly, more so than i, u, æ, and a. This may be taken as evidence in favor of this abstract solution to the problem of predicting imperfective u and i of 20). This possibility, although plausible, is untenable because of the restricted character of the second low vowel. In other words, unless the abstract low vowel postulated to account for this problem can be utilized elsewhere in the grammar to solve other outstanding problems, little weight can be given to this approach. This leaves us with no other alternative than to assign some a's of class A stems an ad hoc diacritic feature, call it [+F], to distinguish those a's which become i from those which become u. This feature is not altogether arbitrary since such a feature, [+C], has already been assumed for class-C stems. We shall assume that those stems of class-A which become u in the imperfect are assigned the

feature [+F]. Rule 14) will be restated as 21).

21) Ablaut:
$$\begin{matrix} V \\ [\alpha hi] \\ [-C] \\ \langle [+F] \rangle \end{matrix} \quad \text{--->} \quad [-\alpha hi] \quad \Big\langle \begin{matrix} [+bk] \\ [+rd] \end{matrix} \Big\rangle \quad / \text{ imperfective}$$

Since a represents phonetic æ, those a's becoming u must receive the feature specification [+bk] and [+rd] in addition to [+hi]. Thus, the angled brackets indicate that such is the case with those stem vowels bearing the feature [+F].

Rule 21) gives rise to the following derivations, along with the earlier 13) and 15). The stage involving Vowel Elision is omitted and will be unless crucial in following derivations.

22)

katab	ya+ktab+u	nazal	ya+nzal+u	labis	ya+lbis+u
[-impf]	[+impf]	[-impf]	[+impf]	[-impf]	[+impf]
[+F]	[+F]	[-F]	[-F]	[-F]	[-F]
katab	ya+ktub+u	nazal	ya+nzil+u	labis	ya+lbas+u

21)

In conclusion, such derivations allow us to set up the perfective vowels as the basic ones.[6] This furthermore seems to be mandatory in view of the arguments against the imperfective vowels presented in this section, and for the perfective vowels presented in the preceding section.

5.2.3 A Class of Apparent Counter-Examples to Ablaut

It has been pointed out in previous sections that perfective stem-vowel a corresponds to imperfective u or i. This is illustrated by the strong forms of class A of 7). Rule 21), Ablaut, thus accounts for why we do not normally encounter imperfective a corresponding to perfective a (or imperfective u corresponding to perfective i of class B, etc.). However there is a rather substantial class of imperfectives in a corresponding to perfective stem-vowel a. Some of these forms are listed below.

23)

qata9+at	ta+qta9+u	she cuts, cut
ba9aθ+at	ta+b9aθ+u	she sends, sent
fatah+at	ta+ftah+u	she opens, opened
šahar+at	ta+šhar+u	she divulges, divulged
qara'+at	ta+qra'+u	she reads, read
sa'al+at	ta+s'al+u	she asks, asked
ðahab+at	ta+ðhab+u	she goes, went

If one compares these forms with those listed as class-A in 7), one discovers the conditions which may account for the unexpected a in the imperfective column of 23). All stems listed as 23) possess

either a second or third radical laryngeal, where laryngeal includes those sounds produced in the area extending from the larynx to the upper regions of the pharynx.[7] We may therefore eliminate this apparent class of exceptions to the rule of Ablaut and in addition account for why it is just the laryngeals which permit a in the perfective and a in the imperfective if we postulate the following rule.

$$24)\ \begin{matrix} V \\ [+hi] \\ [-C] \end{matrix} \text{ --> } [-hi] \ / \left\{ \begin{matrix} L\_\_ \\ \_\_L \end{matrix} \right\} / \text{ imperfective}$$

In addition, we require forms such as those listed as 2b) to be specified with the basic perfective a and to undergo Ablaut as any other verb does. After the ablaut process has taken place, however, 24) will apply accounting for the peculiar distribution of imperfective a adjacent to laryngeals, which we informally represent by L. Notice that this last rule, 24), applies only to imperfectives, since there are abundant examples like sa9id+at, 'she ascended', sami9+at, 'she heard', su'il+at, 'it f. was asked', etc., where although the second or third radical is a member of the class L, the stem-vowel i is not altered to a. In addition, rule 24), like Ablaut, excludes all cases of class-C stems, i.e. stems with stem-vowel u in the perfective (and imperfective, cf. 7)). We find

many cases such as ba9ud+a, 'it was distant', ra9un+a, 'he became light-headed', etc. The rule of Ablaut, together with the new rule stated as 24), will give rise to the following derivations of 25):

25)	ta+ẟhab+u	ta+qra'+u	ta+smi9+u	
	ta+ẟhib+u	ta+qri'+u	ta+sma9+u	Ablaut, 20)
	ta+ẟhab+u	ta+qra'+u	ta+sma9+u	Rule 24)

This approach predicts that there will be no cases of perfective CaLaC or CaCaL corresponding to imperfective CLiC or CCiL, and indeed this is generally the case. There are a few exceptions, e.g. rada9+at, 'she sucked', can apparently take ta+rdi9+u, 'she sucks'. However, alongside the latter, one finds ta+rda9+u, as predicted by 24). Forms such as ta+rdi9+u are rare and may be accounted for by marking them as exceptions (mostly optional) to 24). But what about the distribution of CaLaC and CaCaL forms with respect to imperfective CLuC and CCuL, which 24) also prohibits? In fact, what is the evidence for sending the stem-vowel a of 25) through the stage i and not u instead? There are few cases of CaLaC--CLuC, CaCaL--CCuL alternations involving strong stems. The only cases which

may not be true exceptions to 24) are those having 9 as second radical: qa9ad+at, 'she sat down', corresponding to ta+q9ud+u, 'she sits down', sa9at+at, 'she coughed', corresponding to ta+s9ul+u, 'she coughs', or za9am+at, 'she claimed', corresponding to ta+z9um+u, 'she claims'. There are no alternative forms in a for the imperfectives listed here as is the case for ta+rdi9+u viz. ta+rda9+u, etc. The significance of these examples is not clear. It may be that rule 24) is to be restated so as to apply only to i, never affecting u.[8]

26) $i \rightarrow a \,/\, \left\{ \begin{matrix} L\_ \\ \_L \end{matrix} \right\}$ / imperfective

The absence of all other examples of alternations CaLaC--CLuC, CaCaL--CCuL would then be captured by a lexical redundancy rule stating that all such sequences as CaLaC and CaCaL, with the exception of Ca9aC are not marked with the feature [+F] which, recall, occasions creation of u in the imperfective by Ablaut. Call this guttural redundancy.

27) Guttural Redundancy: ∉ [+F] in CaLaC, CaCaL except Ca9aC

On the other hand one may wish to account for the lack of CaLaC--CLuC, CaCaL--CCuL alternations by claiming that u is converted to a by 24), i.e. it

is precisely 24) which accounts for the non-existent forms. The actually occurring C9uC stems under this analysis are exceptions to 24). More specifically, stems Ca9aC which are marked [+F] (i.e. which become C9uC by Vowel Elision and Ablaut) are also marked [-Rule 24]. The trouble with this possibility is that it is difficult, if at all possible, to determine which CaLaC and CaCaL stems become CLuC and CCuL and which CLiC and CCiL only then to be converted to CLaC and CCaL by 24). Let us call this latter possibility, i.e. the one utilizing 24) and marking C9uC as exceptions to 24), Solution II. Call the solution utilizing 26) and 27) Solution I. Consider now the following forms:

28)

perfective		imperfective	
da9aw+tu	I called	'a+d9uw+a	that I call
ra9aw+tu	I repented	'a+r9uw+a	that I repent
ša'aw+tu	I overtook	'a+š'uw+a	that I overtake
zahaw+tu	I was conceited	'a+zhuw+a	that I be conceited
lahaw+tu	I insulted	'a+lhuw+a	that I insult

All these stems contain second radicals belonging to the class L of laryngeals. Forms are given in the imperfect subjunctive simply to facilitate recognition of the stem and for no other reason. Indicative 'a+d9ū, 'I call', 'a+r9ū, 'I repent', etc. could have been given since such as these derive from 'a+d9uw+u,

'a+r9uw+u, etc. by Glide Elision and Lengthening. The point to 28) is that if 24) were correct, we would expect the u to become a in the imperfect forms. That is, we would expect 'a+d9uw+a to become 'a+d9aw+a (with concomitant Glide Elision perhaps) and so forth. But no such change takes place, indicating that only i becomes a adjacent to laryngeals in the imperfect, which is what is claimed by 26), or what we have termed Solution II. It might be claimed that high vowels do not become a when adjacent to glides in general. However, compare 28) with the following.

29)

perfective		imperfective	
sa9ay+tu	I ran	ya+s9ay+ā+ni	they d. run
ra9ay+tu	I tended	ya+r9ay+ā+ni	they d. tend
sa'ay+tu	I chirped	ya+s'ay+ā+ni	they chirp
ra'ay+tu	I saw	ya+ray+ā+ni	they see[9]
laḥay+tu	I insulted	yə+lḥayy̆ā+ni	they insult

It is irrelevant that third person dual forms are cited in the imperfective column. We could just as well have cited 'a+s9ā, 'I run', 'a+r9ā, 'I tend', etc., which derive from an intermediate stage 'a+s9ay+u, 'a+r9ay+u, etc. by Glide Elision and à-Assimilation. The dual forms are listed simply to facilitate recognition of the stems. Compare forms such as

ra9ay+tu--ya+r9ay+ā+ni of 29) with ra9aw+tu--'a+r9uw+a of 28), or laḥay+tu--ya+lḥay+ā+ni of 29) with laḥaw+tu--'a+lḥuw+a of 28). In the former set of cases we have a nice minimal pair, in the latter, a case where the occurrence of w or y is optional. However, important is the fact that if laḥay is the perfective, then lḥay must be the imperfective, and if laḥaw is taken as the perfective, then lḥuw must be taken as the imperfective. There are several things to explain about these paradigms. First, 29) is a counter-example to the normal class-A ablaut alternations, cf. 7) and 20), while 28) apparently is not. Second, it is always the case that we find u in the imperfect of these CLuG imperfective stems just in case the weak radical, i.e. the third radical G, is w, which shows up as such not only in the imperfect stems, but also in the perfective, proving that it is w that is underlying. And finally it is only with third radical y stems of the shape CLaG that we find stem-vowel a. The first point is easily explainable. Since we find the CaCaC--CCaC alternation, contrary to 7), just in those cases involving second or third radical laryngeals, examples listed in 29) fall together quite naturally with those listed in 23). Thus, we may assume derivations similar to 25) for these forms.

30)	ya+s9ay+ā+ni	ya+r9ay+ā+ni	
	ya+s9iy+ā+ni	ya+r9iy+ā+ni	Ablaut
	ya+s9ay+ā+ni	ya+r9ay+ā+ni	Rule 26)

Now the fact that the imperfectives of 28), e.g. 'a+d9uw+a, 'a+r9uw+a, etc. do not become 'ā+d9aw+a, 'a+r9aw+a (whence 'a+d9ā, 'a+r9ā perhaps) etc. is explained if we invoke Rule 26) and not rule 24), i.e. Solution II over Solution I. If Rule 24) is adopted, then all imperfectives such as those of 28) must be marked as exceptions to that rule. This is theoretically possible given the extreme power of present phonological devices, however probably undesirable since in general languages tend to generalize.[10]

Sending underlying ya+s9ay+ā+ni, etc. through a stage consisting of stem-vowel i to be followed by a switch back to a by Rule 26) [or 24)] explains an otherwise anomalous distribution of data. But the fact that it should be i (and not u) which constitutes the intermediate stage is borne out by the fact that when we have weak stems with third radical y, but without second radical L, we always find i (never u).

31)

ramay+tu	I threw	'a+rmiy+a	that I throw
q̣aday+tu	I judged	'a+q̣diy+a	that I judge
ḥakay+tu	I related	'a+ḥkiy+a	that I relate
ḥamay+tu	I defended	'a+ḥmiy+a	that I defend

And this coincides with the fact that all perfectives with third radical w possess stem-vowel u in the imperfective (regardless of whether or not a second radical L is present, cf. 28).

32)	talaw+tu	I followed	'a+tluw+a	that I follow
	ɣazaw+tu	I attacked	'a+ɣzuw+a	that I attack
	fasaw+tu	I farted (noiselessly)	'a+fsuw+a	that I fart
	9adaw+tu	I ran	'a+9duw+a	that I run

Quite clearly it is the third radical which determines the quality of the imperfective stem vowel corresponding to perfective a. Thus, the fact that u co-occurs with w in imperfectives such as those listed in 32) and 28) may be independent of the feature [+F] accounting for the u of ya+ktub+u etc. Note further in this connection that we have a motivated rule of Vocalic Assimilation restated in 1) of this chapter. We might account for the uw and iy sequences of such cases as those just listed by assuming that i is the unmarked imperfective vowel of the class-A stems, i.e. that [+F], which yields u, is the marked case. Then underlying 'a+tlaw+a will not be marked [+F], will undergo Ablaut to give 'a+tliw+a, whereupon Vocalic Assimilation will predict 'a+tluw+a. Thus, the rule of Vocalic Assimilation can be utilized

here to account for point number two mentioned above. Alternatively, all stems of the shape CaCaw may be marked redundantly [+F] to insure u in the imperfect and 27) changed accordingly to account for the fact that CaLaw can be marked [+F] (cf. 28). The former will be assumed in what follows since the rule of Vocalic Assimilation does perform a similar function elsewhere in the phonology (cf. the discussion in 4.3, especially 32) of that section). We shall discuss this possibility again in the following chapter.[11] The derivation of forms such as those listed in 28), 29), 31), and 32), runs along the lines sketched out in this discussion. This is recapitulated in 33) of the following page.

33)	'a+da9aw+a	ya+sa9ay+ā+ni	'a+ramay+a	'a+talaw+a	
	'a+d9aw+a	ya+s9ay+ā+ni	'a+rmay+a	'a+tlaw+a	Vowel Elision
	'a+d9iw+a	ya+s9iy+ā+ni	'a+rmiy+a	'a+tliw+a	Ablaut
	'a+d9uw+a	ya+s9iy+ā+ni	'a+rmiy+a	'a+tluw+a	Voc. Assim./ï --> ü/__w
	'a+d9uw+a	ya+s9ay+ā+ni	'a+rmiy+a	'a+tluw+a	Rule 26)

The discussion of this section centers on the two classes of counterexamples to the rule of Ablaut, those listed in 23) and those 29). However, the factor which shows that these are only apparent counterexamples is the fact that all and only such cases involving this CaCaC--CCaC alternation possess a second or third radical laryngeal. Thus, the limited distribution of such alternations can be explained by first invoking Ablaut, then a rule changing the resulting vowel of class-A stems to a by Rule 24) or 26). The question of whether both u and i are converted to a when adjacent to L, or whether just i is relevant, constituted the secondary theme of this section. We have favored the second alternative, hence Rule 26), because of examples such as those of 28), although as pointed out in footnote 10, this is not totally clear. Finally, it was suggested that the rule of Vocalic Assimilation accounts for the fact that u invariably appears with w in forms such as those listed in 28) and 32) in the imperfective conjugation. In section 5.2.1 we argued that w-to-y precedes Ablaut. This accounts for the appearance of y for w in forms such as radiy+a, 'he became content', and du9iy+a, 'he was called', from underlying radiw+a and du9iw+a, as well as for imperfective ya+rday+ā+ni and yu+d9ay+ā+ni(cf. 12 and

15) from underlying ya+rdiw+ā+ni and yu+d9iw+ā+ni (omitting Vowel Elision). If this is correct, then iw becomes iy by w-to-y [12)] before Ablaut applies, but iw becomes uw after Ablaut applies by Vocalic Assimilation. Notice that it will always be the class-B stems (i.e. those with underlying i) which undergo w-to-y, and class-A stems which undergo Vocalic Assimilation. More on this follows in the following chapter. We conclude this section, having dispelled examples such as those listed in 23) and 29) as counterexamples to Ablaut. Indeed, such examples offer a rather strong argument that Ablaut must have applied and thus support the conclusions arrived at in preceding sections. In the final section, we adduce one additional case of class-A stems (i.e. stem-vowel a in the perfective) with a in the imperfective. This class will offer the strongest evidence possible for a process similar to 24) or 26), and with it, evidence for Ablaut.

5.2.4 Blind Verbs

Blind verbs are those weak verbs possessing G as the first radical segment. Here we are concerned with stems bearing w as this radical. As is the case with strong stems, we would expect to find class-A

blind stems, i.e. those with stem-vowel a, class-B blind stems, i.e. those with stem-vowel i, and finally class-C blind stems, i.e. those with stem-vowel u. Such forms are found. Several are listed in 34) below.

34)	Class A:	waṣal+at	she arrived
		waṣaf+at	she described
		walad+at	she bore
	Class B:	wajil+at	she feared
		waji9+at	she pained
		wabiq+at	it f. perished
	Class C:	wafur+at	it f. became abundant
		wasu9+at	it f. was wide
		waru9+at	she was pious

The rule of Ablaut as stated in 14) or 21) predicts that the imperfectives of class-C corresponding to those in 34) will be the following:

35)	Class C:	ṭa+wfur+u	it f. becomes abundant
		ta+wsu9+u	it f. is wide
		ta+wru9+u	she is pious

Such forms as these are predicted by virtue of the fact that class-C stems are excluded from the ablaut

process (cf. 7)). In fact, the forms listed in 35) are the correct phonetic representations. Notice that the u of these imperfects is not changed to a in the case of ta+wsu9+u and ta+wru9+u which contain third radical laryngeals, as predicted by 24) and 26). Turning to class-B, the ablaut process stated as 21) predicts the following imperfects:

36) Class B: ṭa+wjal+u she fears
ta+wja9+u she pains
ta+wbaq+u it f. perishes

Once again these predictions are borne out by the phonetic representations which are identical to the forms listed in 36). The next set of forms is the interesting class. Ablaut predicts that some class A forms will take i in the imperfect and some u. Let us assume that all those forms listed under Class A of 34) take i stem-vowels, i.e. are not marked [+F]. Then we would predict the following corresponding set:

37) Class A: *ta+wṣil+u
*ta+wṣif+u
*ta+wlid+u

However, those forms listed in 37), as the asterisks indicate, are not the correct phonetic representations. Instead we find the following:

38) Class A: ta+ṣil+u she arrives
ta+ṣif+u she describes
ta+lid+u she bears

These forms indicate that our assumption that the class-A forms of 34) are not marked [+F] was correct. In addition 38) indicates that an additional process is at work taking 37), the expected result, into 38) the actual result. This process may be stated as 39). It will be henceforth termed w-Occultation.

39) w-Occultation: w --> Ø / __Ci

Apparently the stem-vowel i is incompatible with w in the environment of 39) and hence causes the w to elide. The derivation of a verb such as ta+ṣif+u, then, runs as follows:

40) ta+waṣaf+u
ta+wṣaf+u Vowel Elision
ta+wṣif+u Ablaut
ta+ṣif+u w-Occultation

We may now utilize Rule 39) in an interesting way to prove that alternations similar to those listed in 23) and 29) of the preceding section must pass through a stage with i as predicted by Ablaut, and hence do not constitute counterexamples to Ablaut, but rather constitute strong confirmatory evidence for that rule. The argument is this: take perfective blind verbs of class-A, i.e. those of the shape waCaC where the second or third radical is a member of the class L, i.e. of the class of laryngeals including 9, ḥ, h, and '. Some cases are listed below.

41) Class A: wada9+at she laid
waqa9+at she fell
waθa'+at she bruised
wada9+at she put down

Now compare 41) with the corresponding imperfects listed in 42).

42) Class A: ta+da9+u she lays
ta+qa9+u she falls
ta+θa'+u she bruises
ta+da9+u she puts down

once again we encounter a in the imperfect of such class-A forms only when there is an adjacent largyngeal. This fact can once again be accounted for by allowing the forms of 42) to pass through the normal stage given by Ablaut, i.e. with stem-vowel i, and then by allowing rule 26) to apply changing i to a. But notice that the case is even stronger here, for if we are to account for the loss of first radical w in 42), i must be present in the course of the derivation, for as noted above, only i rejects w, cf. 39). The derivations explaining 42) are identical to that listed below.

43)

ta+wada9+u	
ta+wda9+u	Vowel Elision
ta+wdi9+u	Ablaut
ta+di9+u	w-Occultation (39)
ta+da9+u	Rule 26)

The upshot of the discussion of this and the preceding sections is that CaCaC--CCaC alternations do not refute the rule of Ablaut. Instead, such alternations offer rather strong evidence that there is a process of Ablaut, for otherwise forms such as those listed in 42) are unexplainable.

There is a good deal more to say about blind verbs. First, one should note that only i is derived from a for class-A. This is proven by the fact that

there are no cases of imperfective ya+wCuC+u corresponding to perfective waCaC. We might wish to account for this fact by the following redundancy rule.

44) Class-A Redundancy for Blind Verbs:

$\emptyset$ [+F] / waCaC

That is to say, no blind verbs are marked with the feature [+F]. The fact is interesting, for it supports our claim that i is the unmarked vowel arising from perfective a of Class-A stems. This indicates that cases such as ta+ftah+u, ta+qta9+u, etc. (cf. 23) involving second or third radical L do go through a stage ta+ftiḥ+u, ta+qti9+u, etc., i.e. with i and not u (cf. 25)), as suspected. This indicates that Rule 26) is to be favored over 24).

Another fact about blind verbs to be noted is the fact that only third radical L is relevant for initiating rule 26), and here only a subclass of L including 9 and '. Compare the following forms:

45) I: wa9ad+at she promised
wa'ad+at she buried alive (newborn girl)
waham+at she imagined
II: waḍaḥ+at it f. became clear
walaḥ+at she became mad

with their imperfects in 46):

46) I: ṯa+9id+u she promises
ta+'id+u she buries alive (newborn girl)
ta+him+u she imagines
II: ta+diḥ+u it f. becomes clear
ta+lih+u she becomes mad

The class I forms of 46) show that all imperfects containing second radical laryngeals are exceptions to Rule 26). Class II forms show that third radical ḥ and h (as opposed to third radical 9 and ', cf. 42)) likewise do not initiate 26). We may mark all cases listed in 46) by two redundancy rules, thus extracting the generalization concerning exceptions to Rule 26).[12]

47) Laryngeal Redundancy I: waLaC --> [-Rule 26)]
Laryngeal Redundancy II: waCa$\begin{Bmatrix} h \\ ḥ \end{Bmatrix}$ --> [-Rule 26)]

There is only one exception to 47) that I am aware of and that involves Laryngeal Redundancy I. The pair wahab+at, 'she gave', ta+hab+u, 'she gives', where we know ta+hab+u goes through a stage ta+whib+u because of loss of w, and yet the second radical h

causes i to become a in the manner of 43). This verb then is marked as exceptional with respect to Redundancy I of 47).

It is to be noted that some stems are both blind and lame, i.e. possess stems of the shape GVCVG in underlying representations, where both the first and third radicals are glides.[13] Such cases as these follow the rules presented above in every way.

48)	Perf.	wahay+tu	I became weak
		wahat	she became weak
	Imperf.	'a+hī	I become weak
		ta+hī	she becomes weak
		'a+hiy+a	that I become weak
		ta+hiy+a	that she become weak

The perfective wahat will derive from wahay+at by Glide Elision and Truncation. The imperfective forms of 48) corresponding to the perfectives are more interesting. The indicative 'a+hī and ta+hī undergo the following derivations:[14]

49)	'a+wahay+u	ta+wahay+u	
	'a+whay+u	ta+whay+u	Vowel Elision
	'a+whiy+u	ta+whiy+u	Ablaut
	'a+hiy+u	ta+hiy+u	w-Occultation
	'a+hi+u	ta+hi+u	Glide Elision
	'a+hi+i	ta+hi+i	i-Assimilation

Notice that stem-vowel i (from a by Ablaut) is not converted to a even though adjacent to h, for this h is the second radical L, which by 47) is marked so as not to undergo Rule 26). Derivations such as 49) bear out a number of our predictions. As predicted, stem-intial and stem-final G are syncopated, stem-vowel i does not become a, and indicative u is assimilated to i. Derivations such as 49) therefore serve to confirm the rules proposed up to this point.

The subjunctive forms listed in 48), i.e. those with subjunctive a--'a+hiy+a and ta+hiy+a, undergo derivations similar to 49), only Glide Elision is not applicable since the vowels surrounding third radical y violate the if-then condition placed on that rule. The examples presented in 48) do not constitute an isolated case. Analogous to the examples of 48) are wā9ay+tu, 'I preceived', wa9at, 'she perceived', 'a+9ī, 'I perceive', ta+9ī, 'she perceives', 'a+9iy+a, 'that I perceive', and ta+9iy+a, 'that she perceive', all analyzed in a manner analogous to 48).

Before leaving the topic of blind verbs it will not be out of order to point out that there

is a small class of exceptions to Ablaut. These exceptions all belong to class-B (i.e. take i in the perfective). Several of the more commonly occurring exceptions are listed below.

50)

perfective		imperfective	
wariθ+at	she inherited	ta+riθ+u	she inherits
waθiq+at	she trusted	ta+θiq+u	she trusts
wafiq+at	it f. was fit	ta+fiq+u	it f. is fit

Examples such as these, which are relatively rare,[15] may be accounted for by marking the stem [-Ablaut]. Notice that since i is not changed to a by Ablaut, the w of the imperfectives of all such forms, cf. 50), is elided by w-Occultation as expected. This leads to an even smaller class of apparently exceptional items:

51)

wat̤i'+at	she stepped	ta+t̤a'+u	she steps
wasi9+at	it f. was wide[16]	ta+sa9+u	it f. is wide

The examples listed in 51) are interesting for the following reasons. It appears as though such forms undergo the normal process of Ablaut, i.e. i becomes a, and yet the w is elided in the imperfective forms. However, we know that w-Occultation is dependent on there being an i in the imperfect. We know from cases such as those listed in 38), cf. 40), that

w-Occultation follows Ablaut. How then can one account for the loss of w in cases such as 51)? There are three approaches: (i) give up the claim that w-Occulta- is dependent on i. This must be wrong since there are only a couple of apparent counterexamples (51) to the otherwise productive process of eliding w when i is present. Those earlier counterexamples listed in 42) turned out upon deeper analysis not to be counter-examples at all, cf. 43. Such is probably the case with 51) as well, since, NB, those examples listed in 51) contain third radical L. This observation leads to solution (ii). Suppose we assume that the examples of 51) are exceptions to Ablaut in the same way as are the examples of 50). This would give imperfect ta+wti'+u and ta+wsi9+u. At this point in the derivation, w may elide quite regularly by w-Occultation. Then i would be changed to a quite independently by Rule 26). This solution is probably correct, for recall, from earlier discussion that only 9 and ' intiate Rule 26) in the case of blind verbs. This was captured by the redundancy rules listed as 47), cf. also 45) and 46). The fact that no exceptional items waCah or waCah corresponding to ta+Cah and ta+Cah exist is explained by this approach, for if these forms are marked as exceptions to Ablaut, Rule 26) will not apply turning i to a since Redundancy

II of 47) blocks Rule 26) from applying. Thus, the fact that no exceptions such as these exist, i.e. that only exceptions involving 9 and ' exist [51)], where we find both w-Occultation and a in the imperfect corresponding to i in the perfect, is explained by marking such forms as exceptions to Ablaut. It follows that w is elided by w-Occultation and that i becomes a by Rule 26).

52)	ta+wati'+u	ta+wasi9+u	
	ta+wti'+u	ta+wsi9+u	Vowel Elision
	---	---	Ablaut [does not apply]
	ta+ti'+u	ta+si9+u	w-Occultation
	ta+ta'+u	ta+sa9+u	Rule 26)

One would expect some forms such as CaCih or CaCih to be marked as exceptions to Ablaut, and indeed one does find walih+at, 'she was melancholy', and ta+lih+u, 'she is melancholy', but as predicted by Laryngeal Redundancy II, Rule 26) does not apply turning i to a. These facts constitute strong evidence that the examples of 51) are exceptions to Ablaut, from which it naturally follows that w elides and i becomes a by Rule 26).

A third possibility (iii) could be invoked to account for 51). One may mark such examples with a

rule ordering differing from the normal ordering Ablaut-w-Occultation. That is, such forms could be marked w-Occultation-Ablaut. This would account for loss of w, but as shown above, this is really unnecessary since the imperfective a of such examples is already accounted for by Rule 26). In fact this solution involving a new ordering should be rejected since we expect to find cases exceptional with respect to Ablaut like 51) and the marking solution rules out this expected case.[17] In conclusion, then, 51) offers no counterevidence to our analysis. Indeed, it is just what is expected.

Footnotes to Chapter V

1. In other words, ordering Truncation before the assimilation rules saves one step in the derivation, but certainly this cannot be used as an argument for such an ordering.

2. Rule 5) is still incorrect. It predicts that samak+at+u+hum+ā, 'fish-fem.-nom.-their-d. = their d. fish', becomes samak+at+u+hm+ā, which it does not. What may be needed is the following:

   (i) $V \rightarrow \emptyset \;/\; V\ [C\_\_CV$

   The left-bracket stands for the stem boundary, thus excluding Vowel Elision from applying in the above example while still allowing for its application in the desired cases of the text. Another possibility is (ii).

   (ii) $V \rightarrow \emptyset \;/\; \underset{[+pr]}{V}\ C\_\_CV$

   Here the feature [+pr] refers to the class of prefixes, so that the claim is that only prefixes trigger Vowel Elision. This possibility is excluded in footnote 7 of Chapter VII.

3. The Arab grammarians recognized class C as involving verbs of permanent state and class B as those of temporary state. While there may be something to this claim, there are a great number of examples where this distinction does not hold.

4.

5. Phonetic a, or more precisely, a (i.e. emphatic), does put in an appearance in Arabic, but only as the result of a low-level rule which changes a to the more marked a when adjacent to C. Cf. Abdo (1969) for an attempt at specifying this rule in detail. Also cf. Chapter I above.

6. The analysis adopted here is that suggested by Chomsky and Halle (1968) for Hebrew, who also note the more obvious data of Arabic (cf. pp. 356-57 of that work).

7. The two uvulars x and γ behave as members of this class only sporatically. For example, we find δaxar+at--ta+δxar+u, 'she stored, stores', alongside daxal+at--ta+dxul+u, 'she entered, enters', and bayat+at--ta+byat+u, 'she descended, descends upon', alongside balaγ+at--ta+bluγ+u, 'she reached, reaches'. There may be some redundancies here, but the data are not pursued further in this work.

8. It is of course possible to collapse the two environments of 26) as one by means of the Bach notation or some equivalent proposal. For clarity this step is not taken here. Cf. Bach (1968) and Anderson (1969) for some discussion of this issue.

9. The form ya+ray+ā+ni occurs in place of the expected ya+r'ay+ā+ni. Historically this is no doubt related, to, and quite clearly supports, the analysis presented in Chapter X. The change at the synchronic level, however, is probably to be effected by a minor rule, if the alternation is to be accounted for at all, i.e. if this is not to be considered as a case of suppletion, analogous to English be, am, is, were, etc. The alternation in no way affects the point of the text.

10. Although here the class of exceptions would be a general one, i.e. stems of the shape CCuw, and clearly definable as such by a redundancy rule similar in principle to 27). The issue of whether 24) or 26) is correct is by no means solved by these remarks. They can only be suggestive. However one additional important consideration favoring 26) over 24) follows.

11. It seems plausible that the quality of the second and third radicals determined the quality of the imperfective stem-vowel at an earlier stage of Arabic. Once this broke down, however, the feature [+F] along with the angled brackets were incorporated into the Ablaut rule. This is a plausible and by no means atypical kind of historical reanalysis.

12. In footnote 7 we noted that x and γ sometimes function as members of the class L which trigger Rule 26). With respect to blind verbs, it is important to note that it is γ which sometimes triggers 26) as do ʕ and ʔ, but not x, as do not ħ and h, cf. 47). Thus, we find walaγ+at--ta+lāγ+u, 'she lapped, laps', where w has elided in the imperfect, proving that there was a stage with stem-vowel i, which in turn became a because of the presence of γ. We must also recognize waðar+at--ta+ðar+u, 'she left, leaves', where we find the extremely rare phenomenon of r acting as a member of the class L, since we get elision of w with the change of i to a subsequently. Thus, the segments ħ, h, ʕ, and ʔ normally constitute the class L, along with x, γ, and r rarely, and the voiceless segments ħ and h do not take on their normal function for blind stems of the shape waCaH, whereas ʕ, ʔ, and sometimes γ and r do, all the latter of which are voiced with the exception of ʔ. This may indicate that ʔ was at a much earlier stage, a voiced segment, but this is no more than a speculation, for there may be some feature which cross classifies ʕ and ʔ (and perhaps γ and r) as a natural class as opposed to ħ and h (and perhaps x). Cf. Brame (1969) for a language in which ʕ, r, l, m, and n function together as a natural class, excluding h.

13. However the first and third radicals may never be identical, i.e. there are no stems such as waCaw, etc. If there were, we would have an interesting test case for our claim that tlaw of 33) becomes first tliw before becoming tluw by Vocalic Assim. For if a stem such as waʕaw existed, we might expect to find the following derivation:

(i) ta+wa9aw+a

ta+w9aw+a Vowel Elision

ta+w9iw+a Ablaut

ta+9iw+a w-Occultation

ta+9uw+a Vocalic Assimilation

The phonetic representation ta+9uw+a would indicate that the stage ta+w9iw+a persisted, for then loss of w would be explained. But no such forms exist. There is a redundancy condition ruling out all roots C_iCC_i.

14. As yet, we have no argument that w-Occultation precedes Glide Elision. The opposite order gives the same results.

15. Wright (revised 1964) notes a few such examples along with several optional cases, who in section 144 of that work tacitly admits to the ordering w-Occultation, Rule 26). ''The reason why w is elided in these verbs probably is, that the fetha [=a] of the Imperf. and Imperat. owes its existence only to the fact of the second or third radical being in each case a guttural or semiguttural (r).'' Wright was referring not only to examples such as 42), but also to those of 51) below, which, if Wright's comment is to be consistent, must be treated in the manner sketched out below.

16. Cf. this form with wasu9+at with the same meaning. However, wasi9 with negation can mean be able, whereas wasu9 may not.

17. Moreover, it is not at all obvious that orderings should under any circumstances differ with respect to particular lexical entries. Few convincing examples have been forthcoming; however compare Anderson (1969) who argues for such a device and also Bordelois and Brame (1970) for another candidate.

Chapter VI

THREE CASES OF ORDERING PARADOXES

6.0 In the preceding chapter the following rules were discussed:

1) Vowel Elision: $V \rightarrow \emptyset \; / \; V+C\_\_CV$

w-to-y: $w \rightarrow y \; / \; i\_\_$

Ablaut: $\begin{matrix} V \\ [\alpha hi] \\ [-C] \\ <[+F]> \end{matrix} \rightarrow \left\langle \begin{matrix} [-\alpha hi] \\ [+bk] \\ [+rd] \end{matrix} \right\rangle$ / imperf.

Voc. Assim: $i \rightarrow u \; / \; \_\_w$

w-Occultation: $w \rightarrow \emptyset \; / \; \_\_Ci$

L-Assim: $i \rightarrow a \; / \left\{ \begin{matrix} \_\_L \\ L\_\_ \end{matrix} \right\}$ / imperf.

Once again the lines indicate orderings established between the various rules connected. Note that Rule 26) of last chapter has been termed L-Assimilation.[1]

A rather striking fact about the rules of 1) for which there has been an order established is that each one of these rules crucially involves the stem-vowel, i.e. V_x of $CVCV_xC$ or CCV_xC stems. Thus, the left-most environment of w-to-y is the stem-vowel in examples such as <u>ṭa+rdIw+ā+ni</u> --> <u>ṭa+rdIy+ā+ni</u>, cf. 13) of 5.2.1; the vowel which undergoes Ablaut

is the stem-vowel, ta+rdIy+ā+ni --> ta+rdAy+ā+ni, cf. 5.2.1; the examples of 5.2.3 include those for which it was claimed stem-vowel i becomes u by Vocalic Assim., viz. 'a+tlIw+a --> 'a+tlUw+a, cf. 33); the i which causes w to elide by w-Occultation is the stem-vowel, cf. ta+wsIf+u --> ta+sIf+u, 5.2.4, 40); and the vowel affected by L-Assimilation is the stem-vowel, cf. ta+dI9+u --> ta+dA9+u, 5.2.4, 43). In each case presented directly above, the stem-vowel has been capitalized for clarity. Thus it is that all these rules repeat a particular segment in one way or another, namely the stem-vowel. That these rules should be ordered together as a block comes therefore as no surprise, for it is no coincidence that the stem-vowel should play such a crucial role in initiating these rules. These two facts converge in such a way so as to lend a certain degree of plausibility to the approach thus far. There is still the question of whether a generalization is not being lost by permitting the repetition of the stem-vowel in these rules. However, there seems to be no justifiable way of factoring out the repeated segment in any insightful way. Moreover, it appears that the situation persisting in 1) [excluding Vowel Elision] is quite natural and is, it is claimed, to be expected in language. Unfortunately so few

ceding chapter where it was noted that imperfective ya+sa9ay+ā+ni passes through various stages as the result of applying rules such as Vowel Elision, Ablaut, and L-Assimilation (Rule 26) to yield ya+s9ay+ā+ni, 'they d. run', cf. 33) of 5.2.3. Now suppose instead of the suffix ā followed by ni, we choose the simple indicative u, giving underlying ya+sa9ay+u. After Vowel Elision we are left with ya+s9ay+u, which by Ablaut becomes ya+s9iy+u. Now whether Glide Elision applies now or after L-Assimilation makes little difference, because regardless of the ordering, the y will be elidable, i.e. whether ya+s9iy+u becomes ya+s9i+u by Vowel Elision and then ya+s9a+u by L-Assimilation, to be followed by a-Assimilation and Lengthening giving the correct surface form ya+s9ā, 'he runs', or whether ya+s9iy+u first becomes ya+s9ay+u by L-Assimilation and then ya+s9a+u by Glide Elision, to be followed by a-Assimilation and Lengthening, is irrelevant, since in both analyses, the correct ya+s9ā is obtained. However, what if instead of indicative u, we append subjunctive a. Interestingly, the phonetic ya+s9ā stands for both 'he runs' and 'that he run', i.e. for both indicative and subjunctive. Thus, underlying ya+sa9ay+a with subjunctive a, like ya+sa9ay+u described above, must be converted to ya+s9ā. Vowel Elision will

of course give ya+sʕay+a and Ablaut then applies to derive ya+sʕiy+a. But here it is a different story, for clearly if Glide Elision were to apply before L-Assimilation, the incorrect ya+sʕay+a would result. This follows from the fact that the condition on Glide Elision prevents y from eliding from ya+sʕiy+a. Once L-Assimilation has applied to the latter giving ya+sʕay+a, however, Vowel Elision is applicable and the correct ya+sʕā is derivable. The complete derivation is repeated below.

2)

ya+saʕay+a	
ya+sʕay+a	Vowel Elision
ya+sʕiy+a	Ablaut
ya+sʕay+a	L-Assimilation
ya+sʕa+a	Glide Elision
ya+sʕā	Lengthening

Thus, L-Assimilation must apply before Glide Elision or else the glide will never elide. Notice that it will not do to allow Glide Elision to apply before Ablaut, for then imperfective ya+lqiy+a will not become ya+lqā as desired by Ablaut and Glide Elision.[2] The two examples, ya+lqā and ya+sʕā together prove that the only ordering feasible is that requiring Glide Elision to follow L-Assimilation. This is to say that all the rules listed as 1) above pre-

cede all the rules listed as 1) in 5.0. (with the exception of I.D. Metathesis perhaps). The complete list of rules is given below.

3) Vowel Elision: $V \rightarrow \emptyset$ / V+C__CV

w-to-y: $w \rightarrow y$ / i__

Ablaut: $\begin{matrix} V \\ [\alpha hi] \\ [-C] \\ <[+F]> \end{matrix} \rightarrow \begin{matrix} [-\alpha hi] \\ [+bk] \\ [+rd] \end{matrix}$ / imperf.

Voc. Assim: $i \rightarrow u$ / __w

w-Occultation: $w \rightarrow \emptyset$ / __Ci

L-Assimilation: $i \rightarrow a / \left\{ \begin{matrix} \_\_L \\ L\_\_ \end{matrix} \right\}$ / imperf.

I.D. Metathesis: $C_kVC_kV \rightarrow VC_kC_kV$

Glide Elision: $G \rightarrow \emptyset$ / V_i__V_j, if j=[+lo], then i=[+lo]

i-Assimilation: $u \rightarrow i$ / i__

(u-Assimilation: $i \rightarrow u$ / u__)

a-Assimilation: $\left\{ \begin{matrix} u \\ i \end{matrix} \right\} \rightarrow a$ / a__

Truncation: $V \rightarrow \emptyset$ / V__C $\left\{ \begin{matrix} C \\ \# \end{matrix} \right\}$

Voc. Assim: $\left\{ \begin{matrix} u \\ i \end{matrix} \right\} \rightarrow \left\{ \begin{matrix} i \\ u \end{matrix} \right\}$ / __ $\left\{ \begin{matrix} y \\ w \end{matrix} \right\}$

Syllabicity Assim: $\left\{ \begin{matrix} w \\ y \end{matrix} \right\} \rightarrow \left\{ \begin{matrix} u \\ i \end{matrix} / \begin{matrix} u \\ i \end{matrix} \right\}$ __ $\left\{ \begin{matrix} C \\ \# \end{matrix} \right\}$

Lengthening: $VV \rightarrow \bar{V}$

6.1.0 Ordering Paradoxes

Below we present three ordering paradoxes and in following sections analyze the means of overcoming the loss of generalization implied by these examples.

6.1.1 The First Case

The first case is rather obvious from the list of rules given above. Therein Vocalic Assimilation is encountered twice, once preceding w-Occultation and following Ablaut, and once preceding Syllabicity Assimilation and following Truncation. Let us call the first instance of Vocalic Assimilation, Voc. Assim-1 and the second, Voc. Assim-2. Voc. Assim-1 was utilized to explain the fact that imperfective u is always encountered with third radical w of class-A stems. In 33) of 5.2.3 we assumed that ya+tlaw+a becomes ya+tliw+a by Ablaut and ya+tluw+a by Voc. Assim-1. Voc. Assim-2 on the other hand was utilized in derivations such as 26) and 27) of 4.3 to turn ya+rmi+w+na to ya+rmu+w+na and ta+d9u+y+na to ta+d9i+y+na.[3] Clearly the repetition of the same rule constitutes a loss of generalization. We would like to be able to state Voc. Assim. as a single rule. Before investigating the possibilities of overcoming this paradox, let us turn to another, similar case.

6.1.2 The Second Case

The second case, though less obvious than the first, is nontheless not difficult to discover given the rules listed in 3). This case concerns the rule w-to-y, which has the effect of turning w to y after i, and i-Assimilation, which turns u to i after i. The similarity between these two rules is not coincidental. In fact both rules accomplish the same task in terms of distinctive features and would be stated identically in this more formal notation.

4) $[-\text{cns}] \rightarrow \begin{matrix}[\alpha\text{bk}] \\ [\beta\text{rd}]\end{matrix} / \begin{matrix}\text{V} \\ [\alpha\text{bk}] \\ [\beta\text{rd}]\end{matrix}\text{—}$

Rule 4) will have the effect of bringing about the following changes.

5) a. iw --> iy
   b. uy --> uw
   c. iu --> ii
   d. ui --> uu

One might object to the claim that w-to-y and i-Assim. are the same process on the following grounds. It might be claimed that i-Assim. and u-Assim. are to be collapsed as a single rule. Such cases where these rules are apparently needed have already been presented.

But whereas there have been cases presented for which the change iw --> iy was motivated, no such examples exhibiting the change uy --> uw were encountered. This, the argument might run, serves to distinguish the two rules, w-to-y and i-u-Assimilation. Rule 4), the most natural statement of the two rules,[4] however, undermines this reasoning, for the most general statement of both w-to-y and the assimilation processes is identical as stated above. Moreover, whereas there is no productive class of examples for which third radical y becomes w after u, analogous to, say, the passive examples involving the change of w to y after i or the active examples involving the same change, (cf. radiw+a --> radiy+a, du9iw+a --> du9iy+a, etc.) there is one example of the former change cited by the Arab grammarians. For example Ibn 9aqiil in his commentary on Ibn Maalik's work, 'Alfiyya, claims that underlying nahuy+a becomes nahuw+a.[5] If this is correct, then, obviously the predictions 4) makes are borne out by the data. The rules discussed in this section, to conclude, constitute a second case of ordering difficulties.

6.1.3 The Third Case

The next case is similar to that of the

immediately preceding. It involves the w-to-y (y-to-w) rule and a similar or identical rule which will be motivated by some new data. To pave the way for an adequate understanding of these examples, it is necessary to first discuss the means of forming imperatives in Arabic. Consider the following paradigms:

6)

	perfective		imperfective		imperative	
A:	katab+ta	you wrote	ta+ktub	you write	'u+ktub	write
	qatal+ta	you killed	ta+qtul	you kill	'u+qtul	kill
	xaraj+ta	you exited	ta+xruj	you exit	'u+xruj	exit
	daxal+ta	you entered	ta+dxul	you enter	'u+dxul	enter
	nazal+ta	you descended	ta+nzil	you descend	'i+nzil	descend
	jalas+ta	you sat	ta+jlis	you sit	'i+jlis	sit
	9araf+ta	you knew	ta+9rif	you know	'i+9rif	know
B:	rakib+ta	you rode	ta+rkab	you ride	'i+rkab	ride
	ʂarib+ta	you drank	ta+ʂrab	you drink	'i+ʂrab	drink
	labis+ta	you dressed	ta+lbas	you dress	'i+lbas	dress
	9alim+ta	you knew	ta+9lam	you know	'i+9lam	know

Here those verbs presented in 7) of Chapter V are repeated along with the imperative forms, all in the second person singular masculine conjugation.[6] It is clear from these paradigms that the imperative forms are identical to the imperfective forms with respect to the stem. Both imperfectives and imperatives take CCVC as the stem shape, whereas perfectives take CVCVC. Both imperfectives and imperatives take the same stem-vowel, i.e. both undergo Ablaut. One can account for this similarity in the following manner. Since imperatives refer to second person, simply drop the second person prefix ta and apply the following rule of Prosthesis.

7) Prosthesis: $\emptyset \rightarrow \begin{matrix} V \\ [+hi] \\ [\alpha rd] \end{matrix} / \Psi\_\_CC\begin{matrix} \\ \\ [\alpha rd] \end{matrix}$

This rule inserts u at the beginning of a word commencing with two consonants and bearing the stem-vowel u, i.e. ΨCCu --> ΨuCCu. It also inserts i in an analogous situation but where the stem-vowel is i or a instead of u. We may assume a later rule which inserts ' at the beginning of a word beginning with a vowel.[7] Thus, ta+ktub will drop ta, 'you', leaving ktub, whereupon Prosthesis inserts u and a later rule glottal stop, giving 'uktub, the command.

Similarly ta+nzil becomes nzil, then 'inzil and ta+rkab becomes rkab, then 'irkab, etc. By means of derivations such as these, we explain why it is that the imperfective and imperative forms are alike is having identical stem vowels and identical stem shapes (CCVC). The imperative is, simply enough, derived from the imperfective. Thus, there is no need to complicate the Ablaut and Vowel Dropping processes. Commands such as 'uktub, 'inzil, and 'irkab derive, in terms of a more complete derivation, as follows:

8)	ta+katab [+F]	ta+nazal	ta+rakib	
	ta+ktab	ta+nzal	ta+rkib	Vowel Elision
	'ktab	nzal	rkib	ta-Elision
	ktub	nzil	rkab	Ablaut
	'u+ktub	'i+nzil	'i+rkab	Prosthesis

Of course there is no argument that ta-Elision precedes Ablaut. Ablaut could equally well have preceded ta-Elision. The important thing is simply that these stems are all marked [+imperf], as well as, of course, [+imper] or whatever feature distinguishes imperatives from other verb forms. However, it is clear that ta-Elision does follow Vowel Elision. Otherwise, there would be no preceding vowel to trigger the

vowel dropping process stated in 3) as Vowel Elision.

Besides the parallelism between imperfectives and imperatives, there is additional evidence indicating that the underlying representations cited in 8) are correct in principle. Requiring the second person prefix ta to appear in these underlying representations of commands has a good deal of semantic plausibility since as noted above, commands are associated with the second person. But more important is the fact that in prohibitions, i.e. negative commands, the ta shows up. Compare the following with 6).

9) A: lā ta+ktub don't write
lā ta+qtul don't kill
lā ta+xruj don't exit
lā ta+dxul don't enter

lā ta+nzil don't descend
lā ta+jlis don't sit
lā ta+drib don't strike
lā ta+9rif don't know[8]

B: lā ta+rkab don't ride
lā ta+šrab don't drink
lā ta+9lam don't know[8]
lā ta+lbas don't dress

The fact that second person ta actually shows up as such in negative commands, together with the other arguments for underlying ta with positive commands, constitutes evidence for the derivations listed in 8) with ta-Elision. The rule which elides ta, 'you', may now be stated as 10).

10) ta-Elision: $ta \rightarrow \emptyset \; / \; \begin{matrix}[+imper] \\ [-neg]\end{matrix}$

It is not clear how the feature [-neg] is specified with respect to Rule 10). We shall simply assume that the negative particle lā marks stems [+neg]. In this way, those not so marked will undergo Rule 10), for they will possess the feature [-neg] as desired. Clearly the adequate method of assigning the feature [+neg] depends to some extent on the syntactic analysis one wishes to assign imperatives and negation. Such a study is independent of the questions now being pursued.

It should be pointed out that the imperfectives of 6), as well as those of 9), do not possess mood endings. This is the so-called jussive mood, and it may be concluded that commands derive, not from indicative, not from subjunctive imperfectives, but from the jussive imperfectives without mood endings. The actual underlying representations of jussives are far more complicated, but this topic will not be treated

here.

In our discussion of blind verbs in 5.2.4, we noted that there is a rule of w-Occultation which has the effect of deleting w before a single consonant followed by i, cf. 40) of 5.2.4. This rule was shown to follow Ablaut, for it is Ablaut which typically brings about the environment triggering w-Occultation. Recall that ta+wsal+u becomes ta+wsil+u by Ablaut, only then to be converted to ta+sil+u, the correct phonetic representation, by w-Occultation. It is plausible that the rule of Prosthesis motivated above follows Ablaut, for once again Ablaut determines the quality which the prosthetic vowel is to take on. That is, we must know that imperfective ta+ktub has stem-vowel u in order to know which vowel to insert after ta has elided by ta-Elision, and this u, the stem-vowel, derives from a by means of Ablaut, cf. 8). What we now wish to determine is the relative ordering of the two rules, w-Occultation and Prosthesis. We now have empirical evidence at hand to decide which of these rules is first in the ordered set of rules. The crucial example is imperfective ta+sil, which

derives from the more abstract (but not most abstract) ta+wsiI. If Prosthesis preceded w-Occultation, then after ta is elided from ta+wsiI giving wsil, we expect the command, arrive, to possess a prosthetic element since wsiI does begin with two consonants, the prerequisite for Prosthesis. Thus, wsil would become 'i+wsil, whereupon w-Occultation could follow yielding 'i+sil. The command, however, is sil, 'arrive', proving that w-Occultation precedes Prosthesis. This is quite general as evidenced by numerous examples of this type.

11)	perf.	imperf.	imper.	
	wasal+ta	ta+sil+u	sil	arrive
	wasaf+ta	ta+sif+u	sif	describe
	walad+ta	ta+lid+u	lid	bear

These class-A stems should be compared with those listed as 34) in 5.2.4. The logical question to pose at this point is what happens to the class-B stems, i.e. those with imperfective stem-vowel a which do not elide by w-Occultation. Recall imperfective ta+wjal+u, ta+wja9+u, etc. Here we expect the ta to elide to form commands (assuming that no mood marker is present), giving wjal and wja9. Now there is nothing to prevent Prosthesis from applying, since

as noted above, w cannot be elided by w-Occultation. Thus, Prosthesis applies giving 'i+wjal and 'i+wja9. This discussion is confirmed by the phonetic representations for these commands, which though not 'i+wjal and 'i+wja9 precisely, nevertheless do evince the prosthetic vowel, viz. 'Ijal, 'fear', and 'Ija9,'pain'.[8] Note that these phonetic representations are easily accountable for, given the rules of w-to-y, Syllabicity Assimilation, and Lengthening.

12)	ta+wajil	ta+waji9	
	ta+wjil	ta+wji9	Vowel Elision
	wjil	wji9	ta-Elision
	wjal	wja9	Ablaut
	--	--	w-Occultation (inapplicable)
	'i+wjal	'i+wja9	Prosthesis
	'i+yjal	'i+yja9	w-to-y
	'i+ijal	'i+ija9	Syllabicity Assim.
	'Ijal	'Ija9	Lengthening

From such cases one begins to appreciate the beauty of Arabic phonology; however, the consistency of the system is far from obvious, for as noted earlier, w-to-y precedes Ablaut, but here clearly w-to-y follows Ablaut since it follows Prosthesis which follows w-Occultation which follows Ablaut. The situation is completely analogous to that presented in 6.1.2 above, where it was pointed out that the

relative ordering of w-to-y and i-Assimilation were inconsistent. Only here, apparently identical segments are involved, i.e. it is w which changes to y in both cases. Note that similar arguments can be given for y-to-w. Although examples are not easy to come by, we do find verbs like yatum, 'to become an orphan', with initial y and stem vowel u. Such forms belong to class-C and thus do not undergo Ablaut. The second person imperfective is ta+ytum+u, 'you become an orphan'. The command is formed by dropping ta and prosthetizing 'u to agree with stem-vowel u. This would give 'u+ytum. However, correct is 'ūtum, 'become an orphan'.[8] Clearly, we may allow y to become w by the same rule which turns w to y. The complete derivation is given below.

13)

ta+yatum	
ta+ytum	Vowel Elision
ytum	ta-Elision
'u+ytum	Prosthesis
'u+wtum	y-to-w
'u+utum	Syllabicity Assimilation
'ūtum	Lengthening

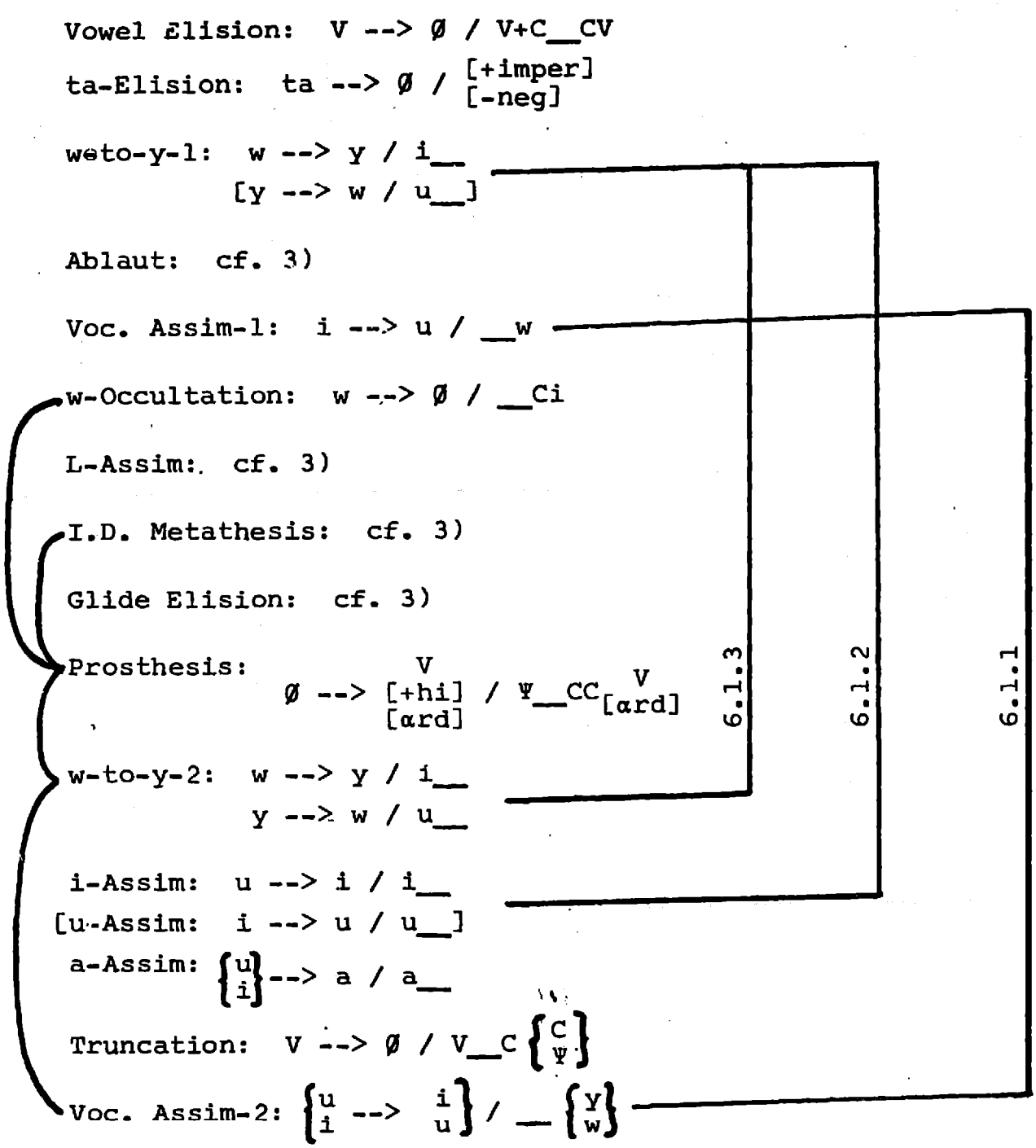
Let us call the second application of the rule w-to-y and y-to-w, w-to-y-2 for short, and the first application, w-to-y-1. It seems that a generalization is

lost by repeating these rules. We shall turn to possibilities for a resolution of this and the other difficulties noted above in the following sections. First, however, let us discuss the ordering of w-to-y-2 further. It is clear that this rule follows Prosthesis, for Prosthesis creates the environment for the rule to apply. Further, it is clear that w-to-y-2 must precede Vocalic Assimilation, or 'i+wjal, 'u+ytum, etc. would become 'ūjal, 'ītum, etc., rather than the desired 'ījal, 'ūtum, and so forth. It can be shown that Prosthesis follows I.D. Metathesis[9] [cf. 3) above], which indicates that it also follows Glide Elision. Thus, w-to-y-2 will quite naturally be ordered adjacent to the assimilation processes, which we have been referring to as i-Assim., u-Assim., etc. For the moment, then, let us assume that Prosthesis and w-to-y-2 are so ordered.

6.2.0 Implications

In this section, some implications will be drawn from the discussion set forth in 6.1. The new rules motivated in that section are incorporated into the earlier list of rules as 14). This is done to clarify the discussion to follow.

14)


Vowel Elision: V --> Ø / V+C__CV
ta-Elision: ta --> Ø / [+imper] [-neg]
weto-y-1: w --> y / i__
[y --> w / u__]
Ablaut: cf. 3)
Voc. Assim-1: i --> u / __w
w-Occultation: w --> Ø / __Ci
L-Assim: cf. 3)
I.D. Metathesis: cf. 3)
Glide Elision: cf. 3)
Prosthesis: Ø --> V [+hi] [αrd] / Ψ__CC V [αrd]
w-to-y-2: w --> y / i__
y --> w / u__
i-Assim: u --> i / i__
[u-Assim: i --> u / u__]
a-Assim: {u i} --> a / a__
Truncation: V --> Ø / V__C {C Ψ}
Voc. Assim-2: {u i --> i u} / __ {y w}
Syl. Assim: cf. 3)
Lengthening: VV --> V̄
6.1.3
6.1.2
6.1.1

The ordering arguments presented in this section are reflected in 14) as usual by connecting lines. Those rules in brackets represent examples of dubious status due to alternative possibilities. Nonetheless, as pointed out in 6.1.1 and 6.1.2 the collapsed rules vitiate this distinction. The labelled lines appearing to the right of 14) connect those rules which are identical in feature representation, i.e. those ordering paradoxes discussed above.[10]

6.2.1 Stem Phonology vs. Word Phonology

Let us recapitulate the important examples to which the various repetitive rules of 14) apply.

15) a. iw --> iy	radiw+a --> radiy+a 5.2.1	
	du9iw+a --> du9iy+a 5.2.1	
	raḍiw+tu --> raḍiy+tu	
[uy] --> uw	[hahuy+a --> nahuw+a] 6.1.2	
b. i+w --> i+y	'i+wjal --> 'i+yjal 6.1.3 [12)]	
u+y --> u+w	'u+ytum --> 'u+wtum 6.1.3 [13)]	
c. i+u --> i+i	ta+rmi+u --> ta+rmi+i 3.1 [6)]	
	rāmi+u+n --> rāmi+i+n 3.1 [4)]	
	ya+rmi+uw+ṇa --> ya+rmi+iw+na 4.3 [26)]	
	laqi+uw --> laqi+iw 4.6 [49)]	
	rumi+uw --> rumi+iw 4.6 [50)]	
u+i --> u+u	ta+d9u+iy+na --> ta+d9u+uy+na 4.3 [27)]	
d. iw --> uw	ta+tliw+a --> ta+tluw+a 5.2.3 [33)]	
e. i+w --> u+w	ya+rmi+w+na --> ya+rmu+w+na 4.3 [26)]	
	laqi+w --> laqu+w 4.6 [49)]	
	rumi+w --> rumu+w 4.6 [50)]	
u+y --> i+y	ta+d9u+y+na --> ta+d9i+y+na 4.3 [27)]	

It is to be noted that 15)a. corresponds to w-to-y-1, b. to w-to-y-2, and c. to i-Assimilation and u-Assimilation. Notice that w-to-y-1 applies to sequences internal to the stem, and never across morpheme boundaries. The adjacent, and highly similar, rules w-to-y-2 and i-u-Assimilation, however, typically apply across morpheme boundaries, and but for the examples involving identical consonants (cf. below), never apply to sequences internal to the stem.[12] A completely analogous situation arises with 15d. and e. which represent Voc. Assim-1 and Voc. Assim-2 respectively. Note that the d. example involves the stem, the e. examples, morpheme boundaries. Moreover, the ordering coincides, w-to-y-1 followed by Voc. Assim-1, and w-to-y-2 followed by Voc. Assim-2, and i-u-Assimilation followed by Voc. Assim-2. This fact about ordering along with the distribution of data clarified by 15) may be no coincidence. It may be that we have two rules, w-to-y (incorporating the assimilation processes) followed by Voc. Assim. The rules may be stated once and by convention applied first to stems and then to words. A nice example illustrating this application would be underlying radiw+uw for 'they became content'. Suppose there is a stem cycle. Then the following derivation obtains.

16) [[radiw]uw]

y	w-to-y
Ø	Glide Elision
i	w-to-y (=i-Assim.)
Ø	Truncation
u	Voc. Assim.
u	Syl. Assim.
radū	Lengthening

The rules w-to-y-1, w-to-y-2, i-Assim. and u-Assim. may thus be collapsed as 4). In section 3.3 the similarity between the a-Assimilation and i-Assimilation was noted and hypothetically collapsed as 16).
It is now rather obvious that the a-Assimilation rule can be incorporated into the rule collapsing w-to-y and i-u-Assimilation, 4). The new rule is stated as 17).

17) $$\begin{bmatrix}-\text{cns}\\+\text{hi}\end{bmatrix} \rightarrow \begin{bmatrix}\alpha\text{bk}\\ \beta\text{hi}\\ \gamma\text{lo}\\ \delta\text{rd}\end{bmatrix} / \begin{bmatrix}\text{V}\\ \alpha\text{bk}\\ \beta\text{hi}\\ \gamma\text{lo}\\ \delta\text{rd}\end{bmatrix}\_\_$$

Rule 17) will, in addition to realizing the changes listed in 5) above, take au and ai into aa. Notice that the examples involving the latter change for the most part involve examples containing morpheme boundaries.

18) a+u --> a+a

ya+lqa+u --> ya+lqa+a 3.3 [13)]
ma+qha+u+n --> ma+qha+a+n 3.3 [19)]
ya+lqa+uw+na --> ya+lqa+aw+na 4.2 [16)]

a+i --> a+a

ma+qha+i+n --> ma+qha+a+n 3.3 [20)]
ta+lqa+iy+na --> ta+lqa+ay+na 4.2 [21)]

Thus, a-Assimilation,besides being ordered adjacent to the other assimilation processes including w-to-y-2, fits quite naturally into the system evinced through the examples presented in 15).

There is one set of exceptions to the generalization captured in 15) and 18). That is, there is one set of examples requiring i-Assim., u-Assim., or a-Assim. to apply internal to the stem. As mentioned above,this class of examples is that involving identical second and third radical segments, the so-called doubled stems. In 4.4 examples such as underlying mādid+u+n were shown to undergo derivations involving I.D. Metathesis, a-Assimilation, and Truncation, cf. 44) of that section. The derivation is repeated here as 19).

19)

mādid+u+n	
māidd+u+n	I.D. Metathesis
māadd+u+n	a-Assimilation
mādd+u+n	Truncation

Clearly a-Assimilation in this case applies internal to the stem. If this derivation is correct, then the generalization is this: w-to-y-1 applies only internally to the stem, never across morpheme boundaries. The rule w-to-y-2, and the assimilation processes, however, typically apply across morpheme boundaries, but not always, for there will be cases created by I.D. Metathesis internal to the stem. Clearly, such

examples do not refute the cyclical hypothesis advanced above. In fact, such examples might well be expected. Before leaving this immediate topic, let us once again note, as we did earlier, that it is conceivable that Truncation precedes i-u-a-Assimilation. By this hypothesis, 19) is replaced by 20).

20) mādid+u+n
māidd+u+n I.D. Metathesis
mādd+u+n Truncation

In every case presented in Chapters II-IV, this ordering gives the correct results. Thus, a derivation such as 26) in 4.3 is replaced by the following:

21) ya+rmiy+uw+na
ya+rmi+uw+na Glide Elision
ya+rmi+w+na Truncation
--- i-u-a-Assimilation (inapplicable)
ya+rmu+w+na Voc. Assim.
ya+rmu+u+na Syl. Assim.
ya+rmū+na Lengthening

Here when Truncation precedes the Assimilation rules, the correct ya+rmū+na is derived from ya+rmiy+uw+na

as desired. But the important point to be made is this: If i-u-a-Assimilation are to be collapsed with w-to-y as a single rule, 17), then derivation 21) no longer obtains. Instead, we get 22).

22) ya+rmiy+uw+na

ya+rmi+uw+na	Glide Elision
ya+rmi+w+na	Truncation
ya+rmi+y+na	Rule 17)
ya+rmi+i+na	Syl. Assim.
ya+rmī+na	Lengthening

Here the wrong results are obtained. Instead of the desired ya+rmū+na, we obtain ya+rmī+na, for w is affected by 17), although w was not affected by i-Assimilation in 21) in terms of the earlier analysis. The conclusion is this: If the assimilation rules are collapsed with w-to-y as a single rule, then Truncation most definitely cannot precede this rule. On the other hand if the rules are not so collapsed, then it is still possible that Truncation may precede the assimilation processes, in which case 20) rather than 19), and 21) and similar derivations, result. Of course if 20) is favored over 19), then the generalization that the assimilation processes apply only to forms of the shape V+V still holds, however, this is of little interest in this case, for the assimilation rules are

no longer collapsible with w-to-y, and hence the cyclical argument is invalid.

Let us for the sake of clarity continue to assume a set of rules identical to 14), keeping in mind, however, that in order to obtain maximal generalization out of this set of rules, w-to-y-1 must be collapsed with w-to-y-2, and with the assimilation rules as well. Also the two Voc. Assimilation rules must be collapsed. This of course implies a phonological cycle defined in terms of the stem and the word. If the latter possibility is correct, it is of some import for linguistic theory, as few convincing examples of the phonological cycle treating segmental phonology have been forthcoming to date, although a good deal of evidence has been found proving that the phonological cycle is needed for suprasegmental phenomena.[12] This result is therefore to be scrutinized and in what follows, a somewhat different approach is suggested. This approach will be developed further in succeeding chapters.

6.2.2 Vocalic Assimilation

As noted in 6.1.1, cf. 14), there are two rules of Vocalic Assimilation which could be collapsed as a single rule and be made to apply cyclically in terms of a stem cycle and word cycle. We are now interested

in eliminating the first occurrence of Voc. Assim., i.e. Voc. Assim-1. To this end note that typically third radical y stems take i in the imperfect if they are members of class-A, i.e. have a in the perfect. In 5.2.3 this fact was noted and assumed to follow from the fact that a-i is the unmarked alternation in the case of class-A stems. Thus, the a-u alternation could be brought about only by resort to marking the stem with the ad hoc feature [+F]. In order to focus on the fact that it is no coincidence that [+F] is never assigned to a stem with third radical y, we might propose the following redundancy rule.

23) Class-A Redundancy for Lame Verbs:

I: Ø [+F] / CaCay

In 5.2.3 it was also assumed that lame verbs in w undergo Ablaut and subsequently undergo Voc. Assim.-1. However, another means of accounting for the same facts is by means of a redundancy rule in the spirit of 23).

24) Class-A Redundancy for Lame Verbs:

II: E [+F] / CaCaw

This redundancy rule insures that all verbs of

the type designated by 24) will have u in the imperfect. It is important to recall that Voc. Assim.-1 was motivated by only this class of examples, so that once 24) is adopted, Voc. Assim-1 is no longer required.

The solution discussed above is certainly a plausible one. It is not at all strange that such redundancy rules as 23) and 24) should exist given the necessity for other rules of this type, namely rules such as 44) of 5.2.4. However, still it is not clear that the latter type rule and 23) above are really needed, for both are negative conditions. It may equally well follow that [+F] is excluded from CaCay and waCaC stems [24) above and 44) of 5.2.4 respectively] from a very general assumption about markedness, viz. that i is the unmarked class-A imperfective vowel. In fact, it is the case that no a-u alternations exist for derived verbs. Only a-i alternations are found, although there are a couple of apparent exceptions, which dissolve upon scrutiny. Thus, it may be that these two redundancy rules are not needed at all, and in fact negative conditions in general may be questioned. At any rate, the possibility disclosed in this section must be considered as a serious candidate for the treatment of the relevant examples, and additional empirical considerations must resolve the issue of

which analysis is to be favored. In succeeding chapters, we shall keep in mind both possibilities, the cyclic solution, and the redundancy solution, without really committing ourselves to any one analysis. This will be appropriately represented in future rule lists.

6.2.3 w-to-y

There is one method of jettisoning w-to-y-1, which if correct, would eliminate the paradoxes uncovered in 6.1.2 and 6.1.3 above, cf. 14). In fact this method has already been suggested in an earlier discussion of Glide Elision, in 3.5.2. There it was noted that the if-then condition on Glide Elision, i.e. that preventing Glide Elision in the case of iGa and uGa, could be eliminated altogether if a rule of Diphthongization were added to the grammar.

25) Diphthongization: $\emptyset \text{ --> } \left\{ \begin{matrix} y \\ w \end{matrix} / \begin{matrix} i \\ u \end{matrix} \right\} \_\_ a$

If this were done, then the crucial examples involving the earlier w-to-y-1 such as radiw+a, du9iw+a, and others could be treated as follows:

26)

radiw+a	du9iw+a	
radi+a	du9i+a	Glide Elision
radiy+a	du9iy+a	Diphthongization

Also to derive ta+rday+ā+ni and tu+d9ay+ā+ni [cf. 5.2.1], we need derivations like 27).

27)	ta+rdiw+ā+ni	tu+d9iw+ā+ni	
	ta+rdi+ā+ni	tu+d9i+ā+ni	Glide Elision
	ta+rdiy+ā+ni	tu+d9iy+ā+ni	Diphthongization
	ta+rday+ā+ni	tu+d9ay+ā+ni	Ablaut

In order to account for the surface y in such forms as these under this analysis, Diphthongization must precede Ablaut, which of course means that Glide Elision also precedes Ablaut. Earlier we argued that Glide Elision follows L-Assimilation because of derivations such as 2) above, but now if the condition on Glide Elision is relaxed, the argument ordering L-Assimilation after Glide Elision disappears, and Glide Elision may, after all, precede Ablaut, viz. 27). Let us therefore explore the implications of the ordering entailed by 27) more deeply. If Glide Elision and Diphthongization precede Ablaut, then a form such as ta+rmī, from underlying ta+rmay+u, cf. ramay+tu, will be derived as 28).

28)	ta+rmay+u	
	ta+rma+u	Glide Elision
	---	Diphthongization (inapplicable)
	ta+rmi+u	Ablaut
	ta+rmi+i	i-Assimilation
	ta+rmī	Lengthening

But what about its subjunctive counterpart, ta+rmiy+a?

29) ta+rmay+a
ta+rma+a Glide Elision
--- Diphthongization (inapplicable)
ta+rmi+a Ablaut

Here there is no way to derive ta+rmiy+a, 'that she throw', for Diphthongization applies before Ablaut, and it is Ablaut which brings about the environment satisfying Diphthongization in this example. Thus, the ordering Ablaut-Diphthongization is needed for 29), while the opposite is true of 27). So the solution utilizing Diphthongization, while eliminating one paradox, i.e. the w-to-y paradox, nevertheless creates a new ordering difficulty. But this new problem has no natural cyclic interpretation, for whether Diphthongization applies before or after Ablaut, its environment remains the same domain with respect to the word, never correlating with the stem in one case and the word in the other, as with w-to-y.

EXCURSUS ON ORDERING

In an important recent study, Anderson has questioned one of the basic tenets of generative phonology,

that of linear ordering. Therein he questions the correctness of all three conditions defining linear ordering, that of irreflexiveness, assymetricness, and transitivity. He claims that a rule may precede itself, that a single rule may both precede and follow the same rule, and that if R_1 precedes R_2 and R_2 precedes R_3, then it is not necessarily the case that R_1 precedes R_3. In place of the principle of linearizability, he proposes a theory he terms local ordering, whereby marked orders[13] are specified in the lexicon with respect to the form which undergoes the rules in the specified marked order.[14] Unmarked ordering relations are given by linguistic theory, and thus, are not part of language specific grammar and consequently are not given lexically.[15] Thus, it is necessary for the child to recognize the rules of his language and to learn the marked orders. The ordering relations which are unmarked are not learned per se. Now it is interesting to note that in order to derive ta+rmiy+a from ta+rmay+a, viz. 29), the ordering Ablaut-Diphthongization is needed and this is the unmarked order with respect to this example, whereas in 27), the ordering Diphthongization-Ablaut is required, and this too is the unmarked order with respect to this example. Hence Anderson's theory predicts the two different orders for the appropriate examples and accounts for the derivations with no additional statements in the grammar, for linguistic theory gives the desired result.[16]

There is an interesting piece of evidence indicating that these two possible unmarked orders, Ablaut-Diphthongization and Diphthongization-Ablaut could not in principle be given lexically. Consider the phonetic representation ta+d9uw+a, 'that she call', which derives from underlying ta+d9aw+a by the following steps.

30) ta+d9aw+a

ta+d9a+a	Glide Elision[17]
ta+d9u+a	Ablaut[18]
ta+d9uw+a	Diphthongization

In 30) the ordering Ablaut-Diphthongization is required. But now recall that in 27) the opposite ordering was required and, moreover, the same stem d9Vw was involved. The stem d9iw is in fact the passive stem related to active d9aw by some productive rule of passive formation. Clearly, the active and passive stems are not listed in the lexicon, and thus, the differing orders could not be stated there. Under Anderson's theory, however, this presents no problem. In fact, given that the Diphthongization rule is to be favored over w-to-y, then the fact that unmarked orders cannot be listed lexically, what he in fact claims, is borne out.

End of Excursus

Returning to the main theme, we may conclude that if Diphthongization can be given independent justification, then it is possible to eliminate w-to-y-1 and with it, the paradox discovered in 6.1.2 and 6.1.3. This can be done, however, only by adopting a theory similar to that proposed by Anderson. This leads to the rather obvious point that even should Diphthongization not be maintained, w-to-y-1, w-to-y-2 and the assimilation processes can still be collapsed as a single process which will apply to a specific form in the unmarked order with respect to any rule with which it (the collapsed rule) is contingent. This of course, once again assumes a theory similar to Anderson's. Thus, if we assume the collapsed version 17), then this rule will be contingent with Glide Elision in the following derivation, cf. 6) in 3.1.

31)

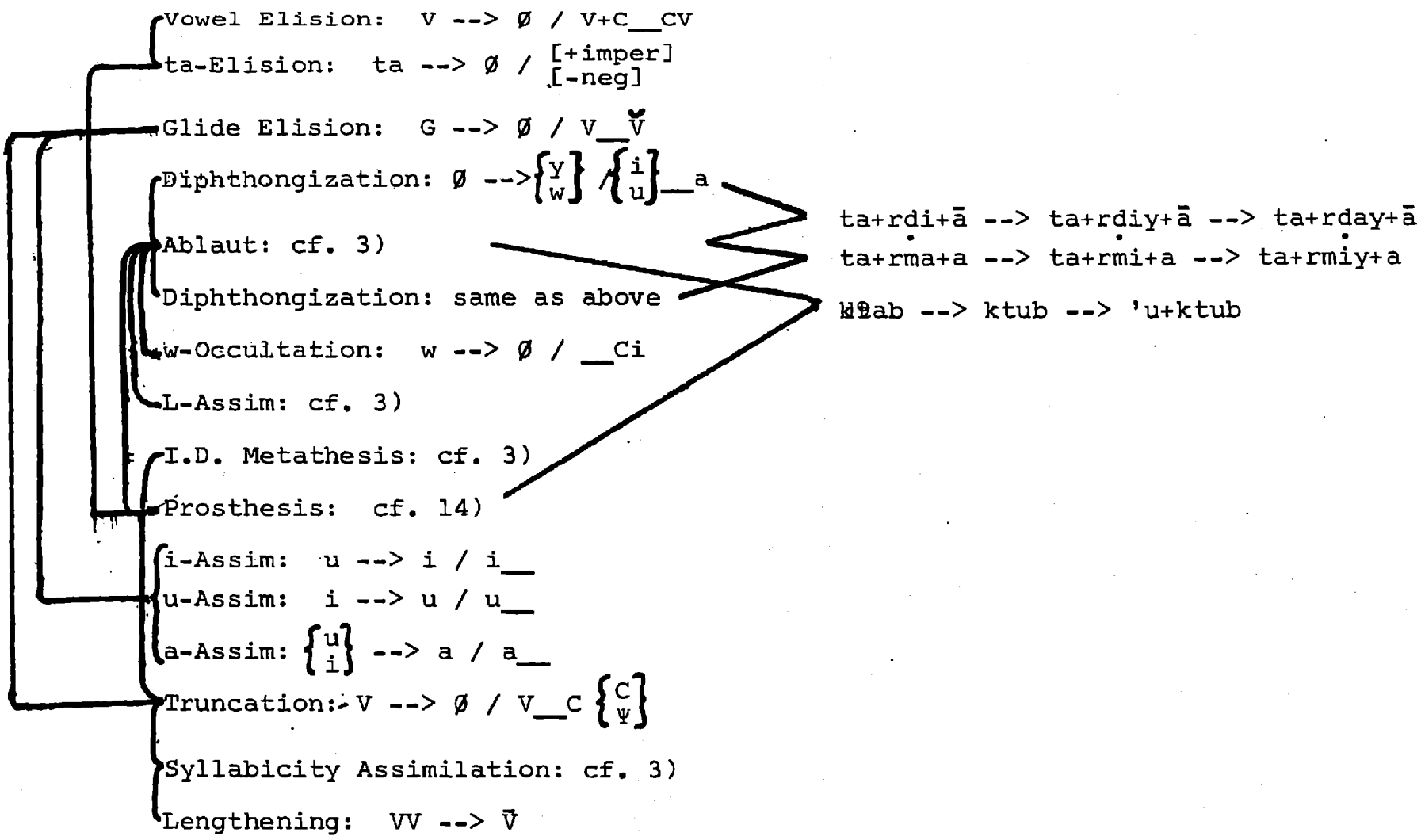
ta+rmiy+u	
ta+rmi+u	Glide Elision
ta+rmi+i	17)
ta+rmī	Lengthening

But contingent with Ablaut in derivations such as the following, cf. 15) in 5.2.1.[19]

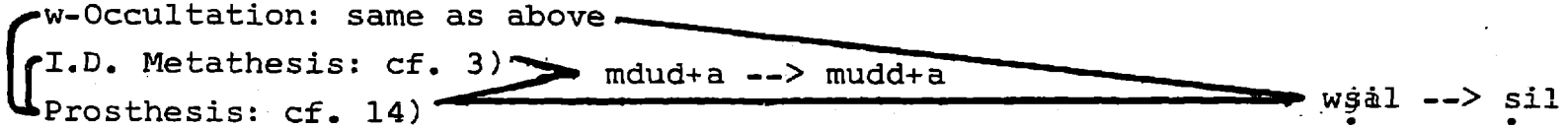
32) tu+d9iw+ā+ni
tu+d9iy+ā+ni 17)
tu+d9ay+ā+ni Ablaut

And contingent to Prosthesis in examples such as those listed in 12) above. This theory, however, is quite similar to the cyclic one proposed above, for, because of examples such as 16), this theory requires re-application of Rule 17) on the word cycle. In this non-cyclical theory, it is completely accidental that the rule should reapply on the word cycle and not the stem cycle. For this reason, we shall entertain only the two possibilities discussed earlier--namely, the cyclic theory and the theory incorporating Diphthongization. There are a couple of points which seem to constitute evidence against the Diphthongization solution already touched on above. First, there is the fact about the stem versus word, which the cyclic theory captures, and second, even given the rule of Diphthongization, 17) appears to be needed still to account for w-to-y in the examples with prosthetic vowels, cf. 12), and to account for i-Assimilation in the earlier examples, cf. 31).[20] But there is one argument which can readily be given in favor of Diphthongization. This concerns the example buyd+u,

adduced in 4.3, cf. 32), which must become biyd+u by Vocalic Assimilation (and later bid+u, 'white'). If the cyclic solution is adopted, we would expect buyd+u to become buwd+u, since w-to-y applies before Vocalic Assimilation, cf. 14). If w-to-y is done away with altogether, however, this form will not have to be marked as an exception to w-to-y, and it will follow naturally that the rule of Vocalic Assimilation originally motivated in Chapter IV (which applies after Truncation in 14)) turns buyd+u to the desired biyd+u. This argument must await further discussion of the examples of 12), however, as noted in footnote 20. The two theories are summarized below.

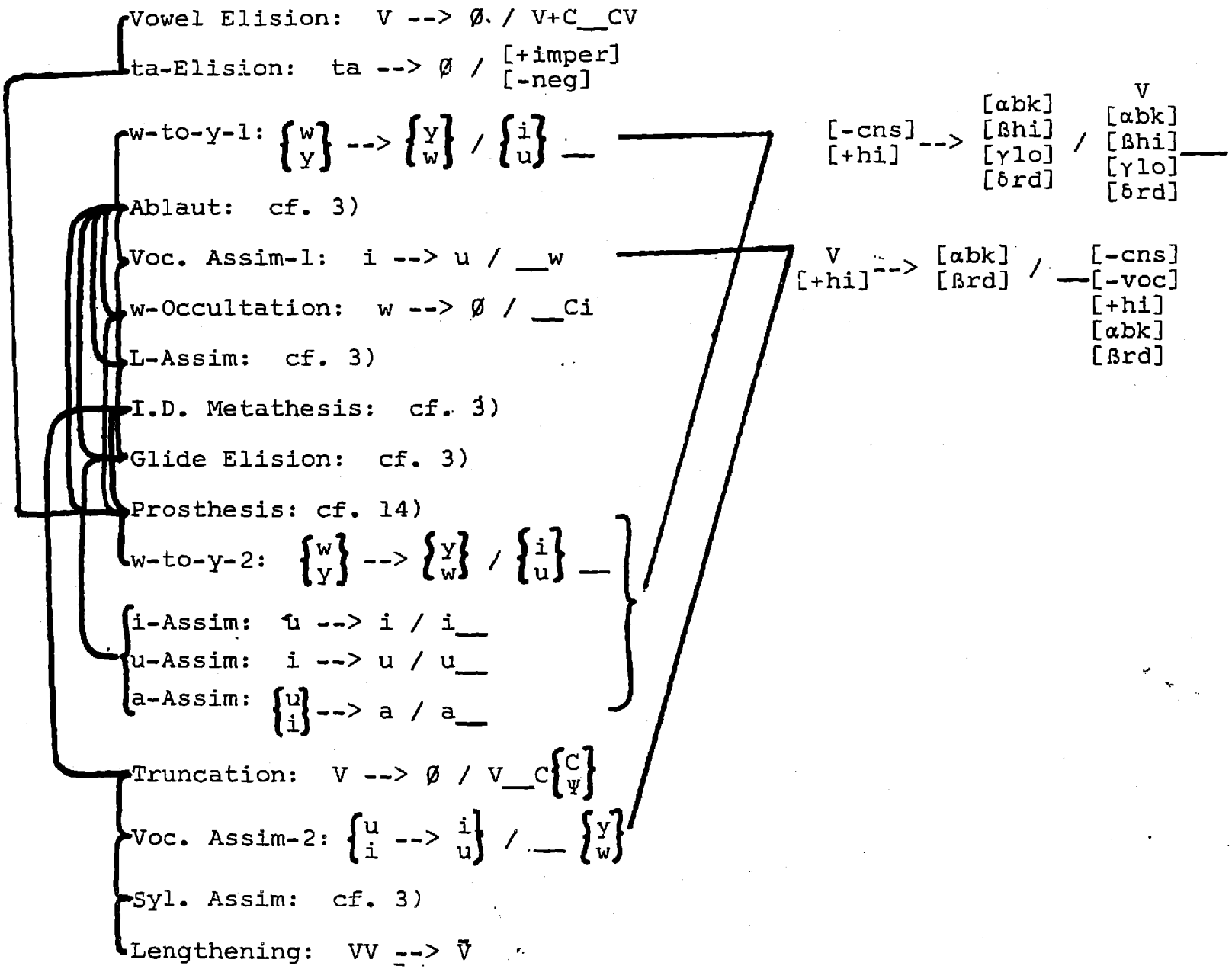


34) Local Ordering Solution: Marked Orders



The Local Ordering solution, included in 33) and 34), is that dictated by adopting the analysis suggested in 6.2.3, where Diphthongization replaces w-to-y. In 33) all the unmarked orders are indicated by lines connecting the rules bearing an unmarked order. These ordering relations are, according to Anderson, given by universal theory. In every case, we have a feeding order, i.e. the first rule connected feeds or creates the environment for the second rule connected by that line to the first. Some examples of these unmarked cases appear to the right, e.g. ktab (from ta+katab) becomes ktub by Ablaut, which in turn feeds Prosthesis to yield 'u+ktub. If Prosthesis applied before Ablaut, then we should find 'i+ktub, since i' is prosthetized to a stem with stem-vowel a.[21] The other unmarked cases can easily be gleaned from the text. Notice that this analysis does not yet account for the change of w to y in examples such as those listed in 12). In 35) we encounter the only examples of marked orders discovered. Examples are given to the right. Note that w-Occultation bleeds Prosthesis, as does I.D. Metathesis as noted in footnote 9. These forms would be assigned these marked orders lexically or by lexical redundancy rules, since the orders apply to specific classes of examples, i.e. doubled verbs and class-A blind verbs. It is interesting that Prosthesis figures in both cases

35) The Cyclic Solution



of marked orderings. This may be more than mere coincidence, but whatever significance there may be to this fact is beyond our present understanding. Also to be noted is the disparity between marked and unmarked orders in terms of number. The overwhelming majority of ordering relations that can be established are unmarked orders of the feeding variety. Marked orders seem to be rarer.

What has been termed the cyclic solution is summarized in 35). Most of the ordering arguments established earlier (cf. 14), 3), and 1) above) are indicated in 35) in the usual fashion. The repetitive rules, w-to-y and Vocalic Assimilation may be collapsed as indicated by the lines. If so, then the rules are to apply cyclically, first to the stem, then to the word. We might assume that the rules commencing with w-to-y and ending with L-Assimilation are stem rules. If this is done, however, we still do not obtain the correct results. For consider the following putative derivation:

36) [ta+[rmay]+u]

1st cycle	[rmay]	w-to-y (inapplicable)
	[rmiy]	Ablaut
2nd cycle	[ta+rmiy+u]	w-to-y (inapplicable)
	[ta+rmi+u]	Glide Elision

In other words, w-to-y must apply in the same relative position in the ordering on each cycle.[22] But if w-to-y precedes Ablaut and Ablaut precedes Glide Elision, then obviously w-to-y will not have the chance to reapply after Glide Elision to effect the important switch of u to i, and we are left with ta+rmi+u instead of the desired ta+rmi+i (--> ta+rmī).[23] This can be easily remedied, however, by allowing Glide Elision to be a cyclic rule, i.e. to apply both to the stem and the word, and to be ordered before w-to-y. If this is done, then 36) is replaced by 37).

37) [ta+[rmay]+u]

1st cycle	[rmay]	Glide Elision (inapplicable)
	[rmay]	w-to-y (inapplicable)
	[rmiy]	Ablaut
2nd cycle	[ta+rmi+u]	Glide Elision
	[ta+rmi+i]	w-to-y
	ta+rmī	Lengthening