

ARABIC PHONOLOGY:
Implications for Phonological Theory
and Historical Semitic

by

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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

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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.

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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,

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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

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.

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 'aṣl, 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.

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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 made 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 nonetheless 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 \bar{i} , which must follow the stem of the f.s. second person, \bar{u} , which must follow the m. p. of the second and third persons, \bar{na} , which must follow the f.p. of the second and third persons, \bar{a} , which must follow the m.d. of the second and third persons, and \bar{a} , 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 \bar{u} you m.	ta X \bar{a} you m.
ta X \bar{i} you f.	ta X na you f.	ta X \bar{a} you f.
ya X he	ya X \bar{u} they m.	ya X \bar{a} they m.
ta X she	ya X na they f.	ta X \bar{a} they f.

It seems clear that these suffixes mark gender and number, whereas the prefixes mark 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 ĩ 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 \emptyset represent the indicative in 6) or 5), the subjunctive has \emptyset . 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.	$\text{CaC} \begin{Bmatrix} \text{a} \\ \text{u} \\ \text{i} \end{Bmatrix} \text{C}$	$\text{CC} \begin{Bmatrix} \text{i} \\ \text{a} \\ \text{u} \end{Bmatrix} \text{C}$
II.	$\text{CaC}_i \text{C}_i \text{aC}$	$\text{CaC}_i \text{C}_i \text{iC}$
III.	$\text{C}\bar{\text{a}}\text{CaC}$	$\text{C}\bar{\text{a}}\text{CiC}$
IV.	'a+CCaC	CCiC
V.	$\text{ta}+\text{CaC}_i \text{C}_i \text{aC}$	$\text{ta}+\text{CaC}_i \text{C}_i \text{iC}$
VI.	$\text{ta}+\text{C}\bar{\text{a}}\text{CaC}$	$\text{ta}+\text{C}\bar{\text{a}}\text{CiC}$
VII.	'i+n+CaCaC	n+CaCiC
VIII.	'i+CtaCaC	C'taCiC
IX.	'i+CCaC _i aC _i	CCaC _i iC _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 the stem vowel.

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 ktb takes a in the perfective, viz. katab, the root rkb takes i in the perfective, viz. rakib, the root kbr takes u, kabur, 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 initial '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 C , which the exception of h , 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 pharyngealization 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 h 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 pharyngealized 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

non-continuant fricative in 12) is j. That is, j is the only affricate found in the Arabic under investigation, having no voiceless counterpart ç. 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 q.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 q.

This evidence concerns the definite article 'al and the well-known rule of Arabic which assimilates the l of this morpheme⁸ 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 --> 'at+ṭifl+u
	'al+qur'ān+u	'al+dūd+u --> 'ad+dūd+u
	'al+faras+u	'al+dil9+u --> 'ad+dil9+u
	'al+xāl+u	'al+ṭawb+u --> 'aṭ+ṭawb+u
	'al+hāl+u	'al+samak+u --> 'as+samak+u
	'al+ḡār+u	'al+sīn+u --> 'aṣ+sīn+u
	'al+ḡayn+u	'al+ḡanab+u --> 'aḡ+ḡanab+u
	'al+walad+u	'al+ḡuhr+u --> 'aḡ+ḡuhr+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 q, then we may allow the assimilation rule to apply, followed by the rule taking q to j.

15) l-Assimilation: $l [+def] \rightarrow C_i / \begin{array}{c} C_i \\ \text{---} \\ [+cns] \\ [+cor] \end{array}$

g-to-j: $g \rightarrow j$

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

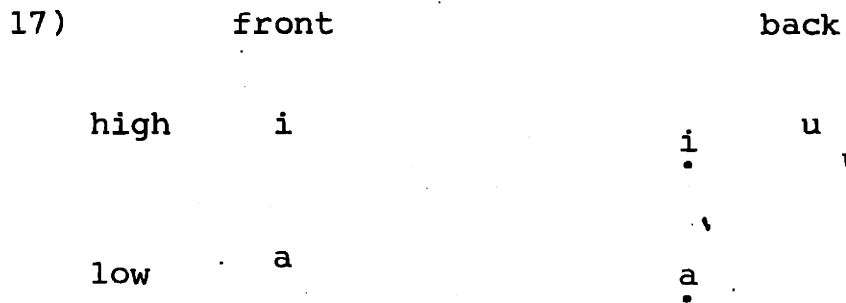
16)

SONORANTS

	m	n	l	r	w	y	h	'	i	i̇	ĩ	ĩ̇	u	u̇	ũ	ũ̇	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 V 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 ti becomes ti, 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.



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 t̤ --> t̤, 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 ɣi and hi do not become ɣi and hi, 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.C.aC and ta+CāCaC are derived from the more abstract ta+CaC.C.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 ʒ. 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 ʒ 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: $w \rightarrow \emptyset / a_a$

Rule II: $aa \rightarrow \bar{a}$

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: $\bar{a} \rightarrow a / _C\psi$

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
 da9 \bar{a} 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 da9 \bar{a} 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': $G \rightarrow \emptyset / a_a$

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 batalan, 'hero',

maṭaran, 'rain', and baytan, 'house', which are segmented as baṭal+a+n, maṭar+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 riḍan, '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 embarrassed', hamaytu, 'I protected', and riḍwānan, '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 riḍaw+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	riḍaw+a+n	
	huda+a+n	xaza+a+n	hima+a+n	riḍa+a+n	Rule I'
	hudā+n	xazā+n	himā+n	riḍā+n	Rule II
	huda+n	xaza+n	hima+n	riḍa+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 u 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 mean '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 Ψ 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 $iwu \rightarrow iu$ and $iyu \rightarrow iu$ 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: $G \rightarrow \emptyset / \begin{matrix} \underline{V} & & \underline{V} \\ [\alpha hi] & \text{---} & [\alpha hi] \end{matrix}$

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 \underline{V} is [+hi], then the right-most \underline{V} must also be [+hi] for the rule to apply. Alternatively if the left-most \underline{V} is [-hi], then the right-most \underline{V} must be [-hi]. Similarly, if the right-most \underline{V} is [+hi], then the left-most \underline{V} must be [+hi], and if the right-most \underline{V} is [-hi], then the left-most \underline{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+rmi, '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 tarmi 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+rmi 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 tarmi. 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 tarmi, 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 tarmiī. This prediction follows from the underlying stems postulated for phonetic tad9ū and tarmiī 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+rmi	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 lugy+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 lqVy 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+iqay+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. laqiya 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 tentatively 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: $\begin{matrix} V \\ [+hi] \end{matrix}$ --> $\begin{matrix} [\alpha bk] \\ [-rd] \end{matrix}$ / $\begin{matrix} V \\ [\alpha bk] \end{matrix}$ —

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

C:: Collapsed Version:

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

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 i 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 $u \rightarrow i$ and $u \rightarrow a$ 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

$$16) \quad \begin{array}{c} V \\ [+hi] \end{array} \rightarrow \begin{array}{c} [\alpha bk] \\ [\beta hi] \\ [\gamma rd] \end{array} / \begin{array}{c} V \\ [\alpha bk] \\ [\beta hi] \\ [\gamma rd] \end{array} \text{---}$$

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: $G \rightarrow \emptyset / V_i \text{---} V_j$, if $j=[+10]$, then $i=[+10]$.

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+ʿamal+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 ghw to undergo the substitution. We know that the third radical of this root is w because it 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 maghan 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 maghan for all three cases. The genitive realization of this word is, not surprisingly, maghan, 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: $\left\{ \begin{array}{c} u \\ i \end{array} \right\} \rightarrow a / a_$

Surface maghan 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+qñā+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+hliq+u I shave	'u+hlaq+u I am shaved
	ta+hliq+u you shave	tu+hlaq+u you are shaved
	ya+hliq+u he shaves	yu+hlaq+u he is shaved
	ta+hliq+u she shaves	tu+hlaq+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., 'armi, 'I throw', tarmi, '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+r mā	tu+r mā	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 VGṼ 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 VG \bar{V} sequences. The new statement of Glide Elision required is stated below.

28) Glide Elision: $G \rightarrow \emptyset / V_i _ \check{V}_j$, if $j=[+lo]$, then $i=[+lo]$

The symbol \check{V} signifies that the right-most vowel of any VG \bar{V} 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 \rightarrow ma+xzāt+a+n.

There are a number of examples involving similar derivations. Thus, it can be demonstrated that ṣalāt+a+n <-- ṣalaw+at+a+n, 'prayer', fatāt+a+n <-- fatay+at+a+n, 'girl', etc. The plurals of such forms, however, turn out to be ṣalaw+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, tentatively 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 diphthonzation. 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+rmⁱ 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: $u \rightarrow i / iG_$

a-Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow a / aG_$

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) $G \rightarrow \emptyset / V_i _ V_i$

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: $G \rightarrow \emptyset / \begin{matrix} V & V \\ [\alpha hi] & \underline{[\alpha hi]} \\ [\beta bk] & [\beta bk] \end{matrix}$

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: $u \rightarrow i / iG_$

a-Assimilation: $\begin{matrix} u \\ i \end{matrix} \rightarrow a / aG_$

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

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 initial 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 i 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 karihu, '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-Assimilation 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-Assimilation 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: $G \rightarrow \emptyset / V_i _ V_j$, if-then (cf. 18)

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

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

B:: i-Assimilation: $u \rightarrow i / iG _$

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

Glide Elision: $G \rightarrow \emptyset / V_i _ V_j$, 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: $w \rightarrow y / i \underline{\quad}$

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 y 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: $V_iGV_j \rightarrow V_iV_j$, if-then (i)
 $iu \rightarrow ii$ (ii)
 $a\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow aa$ (iii)
- B: $iGu \rightarrow iGi$ (i)
 $aG\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow aGa$ (ii)
 $V_iGV_j \rightarrow V_iV_j$, 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 repetition 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).

$$40) \quad iGu \rightarrow iGi$$

$$aG \begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow aGa$$

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 9awir+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 repetition 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 Diphthonzation 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 Diphthonzation, 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 Diphthonzation 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) $\bar{V} \rightarrow V / _ CV$

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.

$$4) \bar{V} \rightarrow V / _C \left\{ \begin{array}{c} \Psi \\ C \end{array} \right\}$$

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 $j=[+10]$, then $i=[+10]$
 i-Assimilation: $u \rightarrow i / i _$
 a-Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow a / a _$
 Lengthening:¹ $V_i V_i \rightarrow \bar{V}_i$
 Shortening: $\bar{V} \rightarrow V / _ C \begin{Bmatrix} \psi \\ C \end{Bmatrix}$

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: $V \rightarrow \emptyset / V_C \left\{ \begin{array}{l} \Psi \\ C \end{array} \right\}$

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: $\left\{ \begin{array}{c} y \\ w \end{array} \right\} \rightarrow \left\{ \begin{array}{c} i \\ u \end{array} \right\} / \left\{ \begin{array}{c} i \\ u \end{array} \right\} _C$

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 rumi+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 lgy 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 point 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 aa sequences do not

become ay 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+ <u>i</u> +na	you f.s. write
	ta+nzil+ <u>i</u> +na	you f.s. descend
	ta+rkab+ <u>i</u> +na	you f.s. ride
		ta+lqayna
		you f.s. meet

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+ī+na ta+nzil+ī+na ta+rkab+ī+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+lqāy+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 ī and ii can be ruled out as possibilities for the same reason as ū 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+rmi+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 creates 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: $V_i V_i \rightarrow \bar{V}_i$

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 tad9īna. 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+d9ī+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: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow \begin{Bmatrix} \dot{i} & / & \dot{y} \\ \dot{u} & / & \dot{w} \end{Bmatrix}$

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 independent 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	xadrā'+u	xuḍr+u	green
	'aṣfar+u	ṣafra'+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
	'abyad+u	bayd+ā'+u	bīd+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 CVC. What we would expect the plural of these forms to have been, given no further operations, is suwd+u and būyd+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 bīd+u, however, from underlying būyd+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).

$$34) \begin{Bmatrix} i^* \\ u^* \end{Bmatrix} \rightarrow \begin{Bmatrix} \dot{u} & / & \text{---} & w \\ \dot{i} & & \text{---} & y \end{Bmatrix}$$

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. Which ever, the solution involving Shortening must restate 28), whereas the solution involving Truncation entails no such re-statement.

Turning to the derivation of ta+d9ina 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+d9i+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 tabīb+u, 'doctor', xalīl+u, 'friend', habīb+u, 'loved one', raqīq+u, 'slave', and so forth. These forms all contain doubled roots--tbb, xll, hbb, and rgq 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 'aṣḍiqā' 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):

$$C_k VC_k V \quad \text{-->} \quad VC_k C_k V$$

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 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)	<u>mādid+u+n</u>	<u>mādid+i+n</u>	<u>mādid+a+n</u>	
	<u>māidd+u+n</u>	<u>māidd+i+n</u>	<u>māidd+a+n</u>	I.D. Metathesis
	<u>māadd+u+n</u>	<u>māadd+i+n</u>	<u>māadd+a+n</u>	a-Assimilation
	<u>mādd+u+n</u>	<u>mādd+i+n</u>	<u>mādd+a+n</u>	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 Vöcalic Assimilation are to retain their initial 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)	<u>yu+lqay+uw+na</u>	<u>tu+lqay+iy+na</u>	
	<u>yu+lqa+uw+na</u>	<u>tu+lqa+iy+na</u>	Glide Elision
	<u>yu+lqa+aw+na</u>	<u>tu+lqa+ay+na</u>	a-Assimilation
	<u>yu+lqa+w+na</u>	<u>tu+lqa+y+na</u>	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
	yu+d9a+aw+na	tu+d9a+ay+na	yu+rma+aw+na	tu+rma+ay+na	Elis.
	yu+d9a+w+na	tu+d9a+y+na	yu+rma+w+na	tu+rma+y+na	a-Ass.
					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: $\left\{ \begin{array}{c} y \\ w \end{array} \right\} \rightarrow \left\{ \begin{array}{c} i \\ u \end{array} \right\} / \left\{ \begin{array}{c} i \\ u \end{array} \right\} - \left\{ \begin{array}{c} C \\ \Psi \end{array} \right\}$

Rule 48) is an informal abbreviation⁷ 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 la9iy, 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:

(i)
$$\begin{array}{l} [-cns] \\ [+hi] \end{array} \rightarrow [+syl] / \begin{array}{l} [+hi] \\ [+syl] \end{array} \text{---}C$$
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+āt+ū+n.

7. Cf. footnote 3. for a more adequate statement in terms of features. The boundary $\underline{\Psi}$ 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: $C_k VC_k V \rightarrow VC_k C_k V$

Glide Elision: $G \rightarrow \emptyset / V_i \check{V}_j$, if $j=[+lo]$,
then $i=[+lo]$

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

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

a-Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow a / a _$

Truncation: $V \rightarrow \emptyset / V _ C \begin{Bmatrix} C \\ \Psi \end{Bmatrix}$

Vocalic Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow \begin{Bmatrix} i \\ u \end{Bmatrix} / _ \begin{Bmatrix} y \\ w \end{Bmatrix}$

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

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

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+d9i+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+d9i+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: $V \rightarrow \emptyset / V+C_CV$

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 coincidence 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+nzil+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+dṛib+u
ḡaraf+at	ta+ḡrif+u
B: rakib+at	ta+ṛkab+u
sarib+at	ta+ṣrab+u
ḡalim+at	ta+ḡlam+u
labis+at	ta+ḷbas+u
C: kabur+at	ta+ḳbur+u
ṣayur+at	ta+ṣyur+u
baḡud+at	ta+ḅḡud+u
qarub+at	ta+q̣rub+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:	$\begin{array}{c} \text{a} \\ \diagup \quad \diagdown \\ \text{u} \quad \text{i} \end{array}$	$\begin{array}{c} \text{i} \\ \\ \text{a} \end{array}$	$\begin{array}{c} \text{u} \\ \\ \text{u} \end{array}$
imperf:			

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)
$$\begin{array}{c} \text{V} \\ [\text{ahi}] \\ [-\text{C}] \end{array} \rightarrow [-\text{ahi}] / \text{relevant aspect}$$

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+rakab+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, sa, 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) V
 [ahi] --> [-ahi] / perfective
 [-C]

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 shows 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	 ā	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 CaCiG. 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+r _· diw+ā+ni	ya+r _· diw+ā+ni	Vowel Elision
	ta+r _· diy+ā+ni	ya+r _· diy+ā+ni	w-to-y
	ta+r _· day+ā+ni	ya+r _· day+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: V
 [ahi] --> [-ahi] / imperfective
 [-C]

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-

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) V
 [+hi] --> [-hi] / [-αaspect]
 [-C]
 [αaspect]

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 associated 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

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:

V		
[+hi]	-->	[-ahi] / imperfective
[-C]		
<[+F]>		<[+bk]>
		<[+rd]>

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
ba9a0+at	ta+b9a0+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
šahab+at	ta+šhab+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.

$$24) \begin{array}{l} V \\ [+hi] \\ [-C] \end{array} \rightarrow [-hi] / \left\{ \begin{array}{l} \underline{L} \\ \underline{\quad} \\ \underline{L} \end{array} \right\} / \text{imperfective}$$

In addition, we require forms such as those listed as 23) 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+δhab+u ta+qra'+u ta+smi9+u
 ta+δhib+u ta+qri'+u ta+sma9+u Ablaut, 20)
 ta+δhab+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+rđi9+u, 'she sucks'. However, alongside the latter, one finds ta+rđa9+u, as predicted by 24). Forms such as ta+rđi9+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) $i \rightarrow a / \left\{ \begin{array}{c} \underline{L} \\ \underline{\quad} \\ \underline{\quad} \\ \underline{L} \end{array} \right\} / \text{imperfective}$

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: \emptyset [+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
	ṣa'ay+tu	I chirped	ya+s'ay+ā+ni they chirp
	ra'ay+tu	I saw	ya+ray+ā+ni they see ⁹
	lahay+tu	I insulted	yə+lhay+ā+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 a-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 iā+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
 qaday+tu I judged 'a+qdiy+a that I judge
 hakay+tu I related 'a+hkiy+a that I relate
 hamay+tu I defended 'a+hmiy+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
	yazaw+tu	I attacked	'a+yzuw+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./i --> u/___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+a+ni and yu+d9ay+a+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: wa[.]sal+at she arrived
 wasaf+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: ta+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: ta+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+wsil+u
*ta+wsif+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+sil+u she arrives
 ta+sif+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+sif+u, then, runs as follows:

- 40) ta+wasaf+u
 ta+wsaf+u Vowel Elision
 ta+wsif+u Ablaut
 ta+sif+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 ʔ, h, 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 laryngeal. 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:

∅ [+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+ftih+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: wadaḥ+at it f. became clear
 walah+at she became mad

with their imperfects in 46):

- 46) I: ta+9id+u she promises
 ta+'id+u she buries alive (newborn girl)
 ta+him+u she imagines
 II: ta+dih+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 h 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 $\left\{\begin{array}{c} h \\ h \\ \cdot \end{array}\right\}$ --> [-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
	'a+hī	ta+hī	Lengthening

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-initial 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 perceived', 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)			
	wati'+at	she stepped	ta+ta'+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-Occultation 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 counterexamples 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 ' initiate 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 waCih or waCih 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) $V \rightarrow \emptyset / \overset{V}{[+pr]} C_CV$

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 Arābic, 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 ɣ behave as members of this class only sporadically. For example, we find ḡaxar+at--ta+ḡaxar+u, 'she stored, stores', alongside daxal+at--ta+dxul+u, 'she entered, enters', and bayat+at--ta+byat+u, 'she descended, descends upon', alongside balay+at--ta+bluy+u, 'she reached, reached'. 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+r'ay+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 CLuw, 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 $\overline{\text{w a r e r p n c o r p d r a t e d}}$ into the Ablaut rule. This is a plausible and by no means atypical kind of historical reanalysis.
12. In footnote 7 we noted that \underline{x} and \underline{y} sometimes function as members of the class \underline{L} which trigger Rule 26). With respect to blind verbs, it is important to note that it is \underline{y} which sometimes triggers 26) as do $\underline{9}$ and $\underline{'}$, but not \underline{x} , as do not \underline{h} and \underline{h} , cf. 47). Thus, we find $\overline{\text{w a l a y + a t -- t a + l \bar{a} y + u}}$, 'she lapped, laps', where \underline{w} has elided in the imperfect, proving that there was a stage with stem-vowel \underline{i} , which in turn became \underline{a} because of the presence of \underline{y} . We must also recognize $\overline{\text{w a \bar{b} a r + a t -- t a + \bar{b} a r + u}}$, 'she left, leaves', where we find the extremely rare phenomenon of \underline{r} acting as a member of the class \underline{L} , since we get elision of \underline{w} with the change of \underline{i} to \underline{a} subsequently. Thus, the segments \underline{h} , \underline{h} , $\underline{9}$, and $\underline{'}$ normally constitute the class \underline{L} , along with \underline{x} , \underline{y} , and \underline{r} rarely, and the voiceless segments \underline{h} and \underline{h} do not take on their normal function for blind stems of the shape $\overline{\text{w a C a H}}$, whereas $\underline{9}$, $\underline{'}$, and sometimes \underline{y} and \underline{r} do, all the latter of which are voiced with the exception of $\underline{'}$. This may indicate that $\underline{'}$ 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 $\underline{9}$ and $\underline{'}$ (and perhaps \underline{y} and \underline{r}) as a natural class as opposed to \underline{h} and \underline{h} (and perhaps \underline{x}). Cf. Brame (1969) for a language in which $\underline{9}$, \underline{r} , \underline{l} , \underline{m} , and \underline{n} function together as a natural class, excluding \underline{h} .
13. However the first and third radicals may never be identical, i.e. there are no stems such as $\overline{\text{w a C a w}}$, etc. If there were, we would have an interesting test case for our claim that $\overline{\text{t l a w}}$ of 33) becomes first $\overline{\text{t l i w}}$ before becoming $\overline{\text{t l u w}}$ by Vocalic Assim. For if a stem such as $\overline{\text{w a 9 a w}}$ 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_1CC_1 .

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 aifaw 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, wasu9 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: $\begin{matrix} V \\ [\alpha hi] \\ [-C] \\ <[+F]> \end{matrix} \rightarrow \begin{matrix} [-ahi] \\ [+bk] \\ [+rd] \end{matrix} / \text{imperf.}$
 Voc. Assim: $i \rightarrow u / _w$
 w-Occultation: $w \rightarrow \emptyset / _Ci$
 L-Assim: $i \rightarrow a / \left\{ \begin{matrix} _L \\ _L \end{matrix} \right\} / \text{imperf.}$

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 ta+rdIw+ā+ni \rightarrow ta+rdIy+ā+ni, 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+tliUw+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+s9ay+a and Ablaut then applies to derive ya+s9iy+a. But here it is a different story, for clearly if Glide Elision were to apply before L-Assimilation, the incorrect ya+s9ay+a would result. This follows from the fact that the condition on Glide Elision prevents y from eliding from ya+s9iy+a. Once L-Assimilation has applied to the latter giving ya+s9ay+a, however, Vowel Elision is applicable and the correct ya+s9ā is derivable. The complete derivation is repeated below.

2)	ya+sa9ay+a	
	ya+s9ay+a	Vowel Elision
	ya+s9iy+a	Ablaut
	ya+s9ay+a	L-Assimilation
	ya+s9a+a	Glide Elision
	ya+s9ā	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+s9ā 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:
$$\begin{array}{l} V \\ [ahi] \\ [-C] \\ <[+F]> \end{array} \rightarrow \begin{array}{l} [-ahi] \\ [+bk] \\ [+rd] \end{array} / \text{imperf.}$$

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

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

L-Assimilation: $i \rightarrow a / \left\{ \begin{array}{l} _L \\ _L \end{array} \right\} / \text{imperf.}$

I.D. Metathesis: $C_k VC_k V \rightarrow VC_k C_k V$

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: $\left\{ \begin{array}{l} u \\ i \end{array} \right\} \rightarrow a / a_$

Truncation: $V \rightarrow \emptyset / V_C \left\{ \begin{array}{l} C \\ \Psi \end{array} \right\}$

Voc. Assim: $\left\{ \begin{array}{l} u \\ i \end{array} \right\} \rightarrow \left\{ \begin{array}{l} i \\ u \end{array} \right\} / _ \left\{ \begin{array}{l} y \\ w \end{array} \right\}$

Syllabicity Assim: $\left\{ \begin{array}{l} w \\ y \end{array} \right\} \rightarrow \left\{ \begin{array}{l} u \\ i \end{array} \right\} / \left\{ \begin{array}{l} u \\ i \end{array} \right\} _ \left\{ \begin{array}{l} C \\ \Psi \end{array} \right\}$

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 y 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 nonetheless 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 y 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.

$$4) [-cns] \rightarrow \begin{array}{l} [abk] \\ [Brd] \end{array} / \begin{array}{l} V \\ [abk] \\ [Brd] \end{array} \text{---}$$

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 $iw \rightarrow iy$ was motivated, no such examples exhibiting the change $uy \rightarrow uw$ 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. $radiw+a \rightarrow radiy+a$, $du9iw+a \rightarrow du9iy+a$, 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:

	perfective		imperfective	
A:	katab+ta	you wrote	ta+ktub	you write 'u+kt
	qatal+ta	you killed	ta+qtul	you kill 'u+qt
	xaraj+ta	you exited	ta+xruj	you exit 'u+xr
	daxal+ta	you entered	ta+dxul	you enter 'u+dx
	nazal+ta	you descended	ta+nzil	you descend 'i+nz
	jalas+ta	you sat	ta+jlis	you sit 'i+jj
	9araf+ta	you knew	ta+9rif	you know 'i+9r
B:	rakib+ta	you rode	ta+rkab	you ride 'i+rk
	9arib+ta	you drank	ta+9rab	you drink 'i+9r
	labas+ta	you dressed	ta+lbas	you dress 'i+lb
	9alim+ta	you knew	ta+9lam	you know 'i+9l

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: $\emptyset \xrightarrow{V} [+hi] / \Psi _ _ CC[\alpha rd] \xrightarrow{V} [\alpha rd]$

This rule inserts u at the beginning of a word commencing with two consonants and bearing the stem-vowel u, i.e. $\Psi CCu \rightarrow \Psi uCCu$. 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 in 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	ta+nazal	ta+rakib	
	[+F]			
	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 know⁸

B: lā ta+rkab don't ride
 lā ta+9rab don't drink
 lā ta+9lam don't know⁸
 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+wsif. If Prosthesis preceded w-Occultation, then after ta is elided from ta+wsif giving wsil, we expect the command, arrive, to possess a prosthetic element since wsif 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.	
	wa _· sal+ta	ta+s _· il+u	s _· il	arrive
	wa _· saf+ta	ta+s _· if+u	s _· if	describe
	wa _· lad+ta	ta+l _· id+u	l _· id	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. 'ījal', 'fear', and 'īja9', '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.
	'ījal	'īja9	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+ytum	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. Metathesis⁹ [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: $V \rightarrow \emptyset / V+C_CV$ ta-Elision: $ta \rightarrow \emptyset / \begin{matrix} [+imper] \\ [-neg] \end{matrix}$ weto-y-1: $w \rightarrow y / i_$
 $[y \rightarrow w / u_]$

Ablaut: cf. 3)

Voc. Assim-1: $i \rightarrow u / _w$ w-Occultation: $w \rightarrow \emptyset / _Ci$

L-Assim: cf. 3)

I.D. Metathesis: cf. 3)

Glide Elision: cf. 3)

Prosthesis: $\emptyset \rightarrow \begin{matrix} V \\ [+hi] \\ [ard] \end{matrix} / \Psi_CC \begin{matrix} V \\ [ard] \end{matrix}$

6.1.3

6.1.2

6.1.1

w-to-y-2: $w \rightarrow y / i_$
 $y \rightarrow w / u_$ i-Assim: $u \rightarrow i / i_$ [u-Assim: $i \rightarrow u / u_]$ a-Assim: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow a / a_$ Truncation: $V \rightarrow \emptyset / V_C \begin{Bmatrix} C \\ \Psi \end{Bmatrix}$ Voc. Assim-2: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow \begin{Bmatrix} i \\ u \end{Bmatrix} / _ \begin{Bmatrix} Y \\ W \end{Bmatrix}$

Syl. Assim: cf. 3)

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

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	[nahuy+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+ṅa --> 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
	∅	Glide Elision
	i	w-to-y (=i-Assim.)
	∅	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)	[-cns]	-->	[αbk]	/	V	
	[+hi]		[βhi]		[αbk]	
			[γlo]		[βhi]	
			[δrd]		[γlo]	
					[δrd]	

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
 māadd+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 Voč. 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+rmi+na Lengthening

Here the wrong results are obtained. Instead of the desired ya+rmū+na, we obtain ya+rmi+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: \emptyset [+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: $\emptyset \rightarrow \left\{ \begin{array}{l} y \\ w \end{array} / \begin{array}{l} i \\ u \end{array} \right\} _a$

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+rđay+ā+ni and tu+d9ay+ā+ni [cf. 5.2.1], we need derivations like 27).

- 27) ta+rđiw+ā+ni tu+d9iw+ā+ni
 ta+rđi+ā+ni tu+d9i+ā+ni Glide Elision
 ta+rđiy+ā+ni tu+d9iy+ā+ni Diphthongization
 ta+rđay+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 orders¹³ 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 Elision¹⁷
 ta+d9u+a Ablaut¹⁸
 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

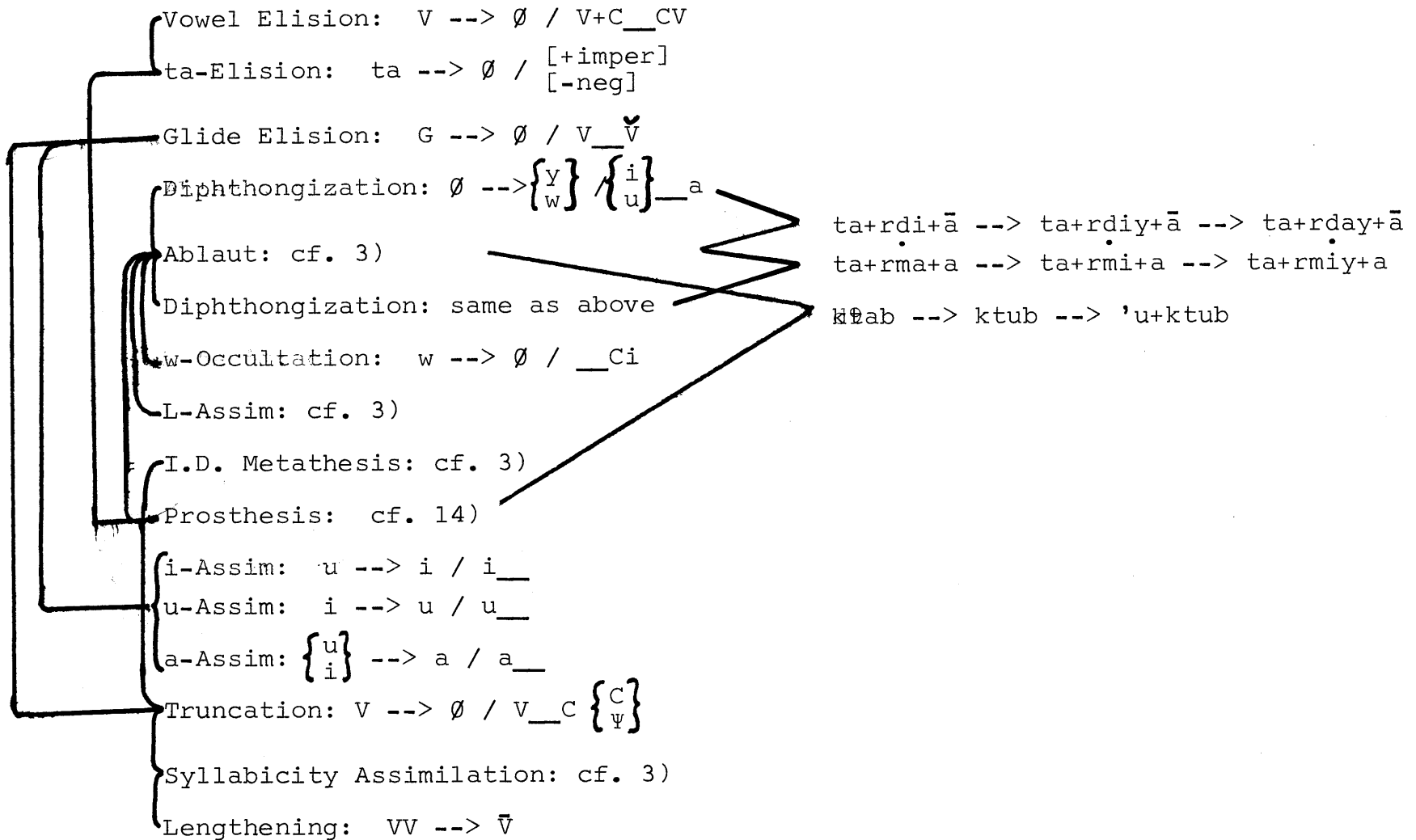
But contingent with Ablaut in derivations such as the following, cf. 15) in 5.2.1.¹⁹

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

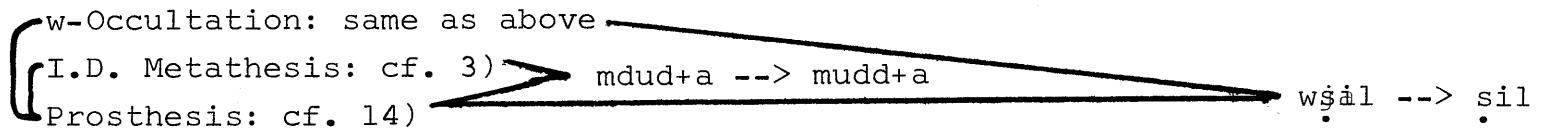
And contingent to Prosthesis in examples such as those listed in 12) above. This theory, however, is quite similar to the cyclic one proposed above, for, because of examples such as 16), this theory requires re-application of Rule 17) on the word cycle. In this non-cyclical theory, it is completely accidental 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 bīd+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.

33) Local Ordering Solution: Unmarked Orders

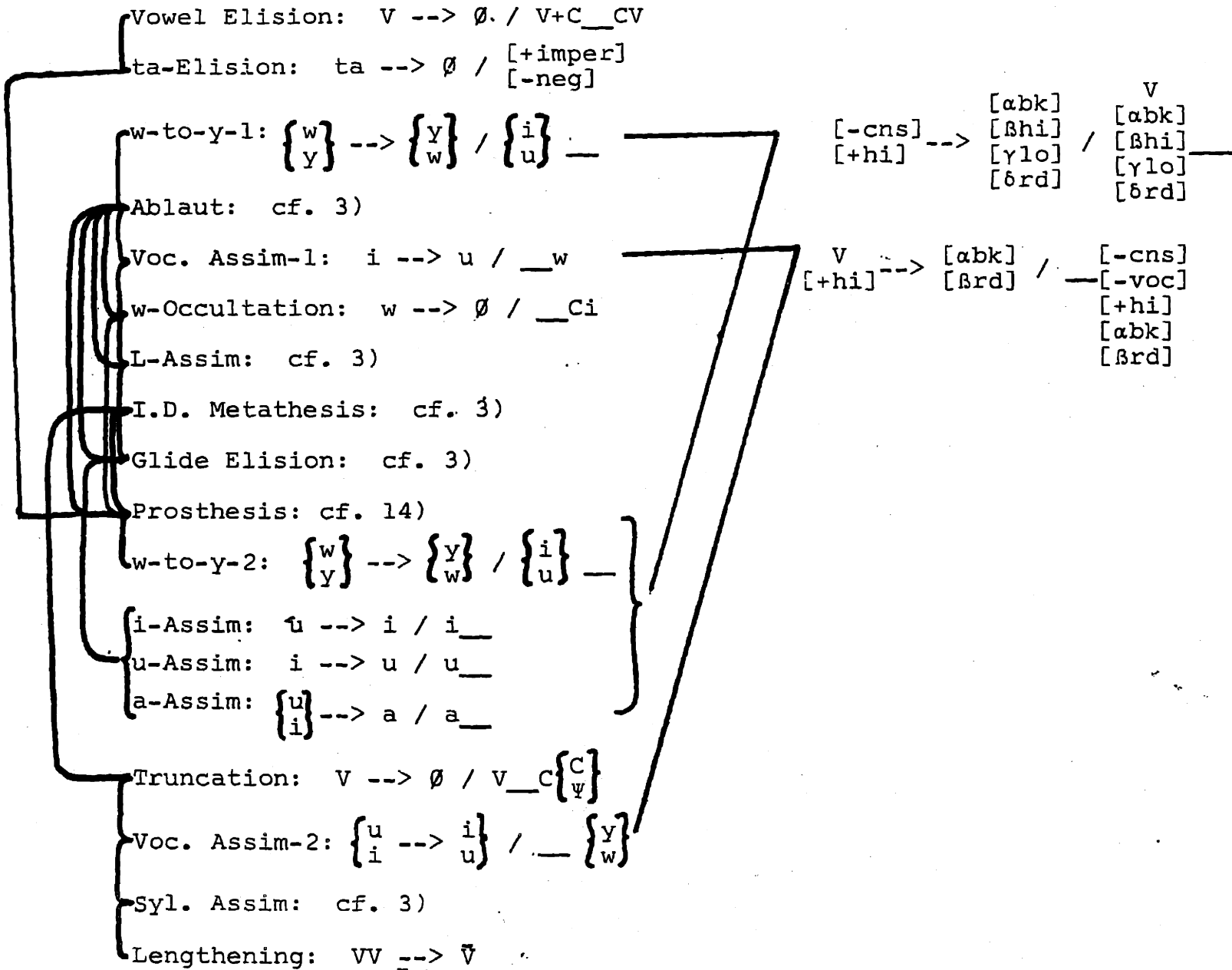


34) Local Ordering Solution: Marked Orders



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 E-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
<hr/>		
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
<hr/>		
2nd cycle	[ta+rmi+u]	Glide Elision
	[ta+rmi+i]	w-to-y
	ta+rmī	Lengthening

The reader may think it no coincidence that Glide Elision, by preceding w-to-y, is just the order assumed earlier for the lower level block of rules. However, to argue convincingly that Glide Elision is cyclic, we must have at our disposal some cases of Glide Elision which actually apply on the stem cycle. There are in fact cases of underlying hollow verbs such as kawan+at which must become kān+at, and this, the reader might suppose, is confirmatory evidence for this theory. The rules needed, then, would be those listed in 38).

38) The Cyclic Solution

- I Vowel Elision
 - ta-Elision

- II Glide Elision
 - w-to-y
 - Ablaut
 - Voc. Assim.
 - w-Occultation
 - L-Assimilation

- III I.D. Metathesis
 - Glide Elision
 - w-to-y (including i-Assim. and a-Assim.)
 - Truncation
 - Voc. Assim.
 - Syl. Assim.
 - Lengthening

It may be no coincidence that Glide Elision must be made to precede w-to-y in order to enable 35) to yield the correct results, for this is just the order assumed earlier in the lower level block of rules. But to argue convincingly that Glide Elision is cyclic, we must have at our disposal some case of Glide Elision applying internal to the stem. Such cases do in fact exist--these are the hollow stems, which are discussed in more detail in Chapter VII to follow. Such an example might be kān+at, 'she was', which derives from underlying kawan+at. The new putative cyclic rule of Glide Elision will elide w on the first cycle of this example, supporting the hypothesis advanced above. Thus, the first application of Glide Elision, like the first application of w-to-y and Vocalic Assimilation, is internal to the stem, and the second application is invariably across morpheme boundaries, i.e. the word. With this in mind, the cyclic solution may be revised as 38).

This theory should be kept in mind, for it is that dictated by the cyclic approach. However, in later chapters, cf. XII and XIII, we demonstrate that Voc. Assimilation and Glide Elision are not cyclic rules.

We shall now turn to a detailed study of the Glide Elision and I.D. Metathesis processes. The correct analysis of these processes will not come to light until Chapter XII.

Footnotes to Chapter VI

1. The careful reader will already have noted the similarity between Ablaut and L-Assimilation--the fact that both apply to the stem-vowel and mention the feature [imperf.]. An attempt to reduce these facts to one might have been to view L-Assimilation not as an independent rule, but rather as a condition on the Ablaut rule. Oversimplifying by omitting angled brackets, this rule might have read as (i).

(i) Ablaut: $V \rightarrow [-ahi] / \left\{ \begin{array}{l} [-L] \\ [-L] \end{array} \right\} / \text{imperf.}$
 $[ahi]$

The feature [-L] signifies whatever feature(s) designates the complement of the class L. In other words, (i) predicts that there is no Ablaut when the second or third radical is L. But this attempt at generalization fails, for from our discussion of blind verbs, we have seen that Ablaut must apply to stems of the shape wCaL, whereupon w elides by w-Occultation, and i gets switched back to a by L-Assimilation. That is, Ablaut and L-Assimilation must be two independent rules, separated in the ordering chain by w-Occultation.

2. Cf. 3.2 where it is shown that indicative ya+lqay+u and subjunctive ya+lqay+a are neutralized as ya+lqā.
3. In 4.3 the change buyd+u --> biyd+u was motivated: All other things being equal, we would expect that it is Voc. Assim-1, and not Voc. Assim-2, which effects this change.
4. Perhaps the theory of markedness is to supply the feature of rounding, but it does no harm to include this assimilation in the rule.
5. Cf. Ibn ʿAqīl (publ. 1965), p. 638 [٦٣٨].

6. Class-C stems do not normally take commands. However one can force the issue and get a perfectly good phonological result.
7. The epenthesis of ' could be incorporated into 7). There is some evidence against this, which will not be given here. In future derivations we may assume, incorrectly, that ' is inserted simultaneously with the epenthetic vowel.
8. Of course stative commands are semantically odd, but the phonological result is undeniable. Cf. fn. 6.
9. Thus, imperfective imperative ta+mdud+a becomes mudd+a, 'stretch', by ta-Elision and I.D. Metathesis.

(i) ta+mdud+a
 mdud+a ta-Elision
 mudd+a I.D. Metathesis
 --- Prosthesis (inapplicable)

If Prosthesis were to apply before I.D. Metathesis, we would obtain the incorrect 'u+mudd+a'. Note that in the doubled radical commands, we find a in the jussive. This ending gives a clue to the true underlying nature of the jussive as hinted at in the main text. However, the analysis of the jussive is far more complicated and will be skipped here.

10. Just the orderings established in 6.1 are indicated in 14). One can easily verify the establishment of the three paradoxes by comparing the connected rules of 14), 3), and 1) of this Chapter and 1) of Chapter V.
11. One could of course argue about the presence of the morpheme boundary in those examples bearing a prosthetic vowel, but such a debate is irrelevant because the real distinction we wish to draw is one between rules applying internal to the stem, and those not. Also cf. fn. 2 of Chapter V.

12. Cf. Chomsky, Halle, and Lukoff (1956), Chomsky and Halle (1968), Halle and Keyser (1970), Bresnan (1970), and Brame (1969) for examples of the phonological cycle. Some cases of the segmental cycle in phonology are justified in Brame (1970). However these cases 'depend' on stress in the ways sketched out in that article, and it is suggested that rules which do not, other than stress or tone assigning rules, can never be cyclic rules.
13. Kiparsky (1968) defines a feeding relationship to hold between two rules when representable by schema (i).

(i) [] > [ρ]

[ρ] > []

And a bleeding relationship to hold between two rules when representable as schema (ii).

(ii) [] > [-ρ]

[ρ] > []

Unmarked is the ordering which maximizes the derivation in the obvious sense, i.e. feeding and the converse of bleeding taken together define the unmarked order. A marked order is one which is bleeding or the converse of feeding. Although Kiparsky adduces examples illustrating what he means by these terms, it is clear from his exposition that marked and unmarked orders are defined in terms of the rule schemata (i) and (ii) alone. But for these terms to be well-defined, the particular forms to which the two rules are relevant must be taken into consideration in defining marked and unmarked, for it is possible one ordering will be feeding with respect to lexical entry A, and bleeding with respect to entry B. Thus, it is not possible to tell whether two rules are of the marked or unmarked order unless the example to which the rules are to apply is taken into consideration.

14. Actually Anderson extends the notion of markedness somewhat so as to allow additional order-types to be given lexically, but this is of little consequence for the present discussion.
15. The unmarked orders are given by linguistic theory in the same sense as transitivity of rule ordering is given by linguistic theory in terms of the theory advocated by Chomsky and Halle (1968).
16. This is the type of example alluded to in fn. 13.

17. Of course there is no reason why Glide Elision may not apply after Ablaut in this theory. In fact Anderson allows either of two orderings when these do not affect the derivation in any crucial way.
18. The feature [+F] is assumed to be present in all such examples. However, this feature is not present in corresponding passives. How the feature is eliminated in the passive stems can only be a matter of conjecture at this point.
19. We mean by contingent that a rule depends on the prior or subsequent application of a rule for its existence, with respect to a particular form. Thus, R_i is contingent on R_j if either R_j creates or destroys an environment relevant to the application of R_i . If R_j creates the environment, then R_i must follow R_j if it is to apply to the form in question as in 31). If R_j destroys the environment, then R_i must precede R_j if it is to apply to the form in question as in 32). In either case we have an unmarked order. Notice that while 17) is contingent to Glide Elision in 31), the converse is not true. And while 17) is contingent to Ablaut in 32), the converse is not true.
20. But the data are far more complicated and there will emerge another possibility for accounting for the change of 'i+wjal to 'ijal, etc., noted in 12). We postpone further discussion until Chapter X, at which point sufficient new data will have been presented so as to permit a more revealing, though by no means decisive, discussion.
21. Note that Prosthesis would apply regardless of its order with respect to Ablaut. However Prosthesis is contingent only on a prior application of Ablaut.

22. This is part of the definition of cyclical application of rules.
23. Note that Ablaut cannot reapply on the word cycle, for if it did, stem-vowel i (from a) would be switched right back to the original a. Ablaut, it is assumed, is a stem rule. This makes sense as there are no environments external to the stem to which Ablaut is ever applicable. By this reasoning, we would also assume w-Occultation and L-Assimilation to be stem rules, for they also apply internal to the stem alone. Also note that Vowel Elision and ta-Elision may be lower level rules since they apply to the word, not the stem. There is, in fact, no reason as yet to suppose that these rules do not apply after L-Assimilation (but necessarily before Prosthesis). If the latter suggestion is adopted, w-Occultation must be restated so as to include the first vowel of the stem.

(i) $w \rightarrow \emptyset / _VCi$

This presents a new problem, however, for w does not normally elide in this phonological environment, cf. walid+u+n, 'boy', etc. One can salvage (i) by resort to morphological features, but we shall continue to assume that Vowel Elision and ta-Elision are pre-cyclic rules. Until stronger evidence turns up, this topic remains of little interest.

Chapter VII

HOLLOW STEMS

7.0 In Chapters II and III great pains were taken to motivate the rule of Glide Elision in terms of lame stems, i.e. stems exhibiting a high glide, G, in the third radical position. Surely if the common non-derived verbal stem is of the shape CVCVC, then stems of the shape CVGVC should be found to which this rule would also be applicable. Such stems, the hollow stems, are in fact numerous, and as expected, there is a good deal of instability associated with the underlying glide, creating, once again, an interesting and complex situation which must be investigated in some detail. Such an investigation is begun in this chapter, however, a detailed treatment of hollow verbs in particular will not emerge until Chapter XI. Here only processes relevant to the treatment of the medial glide itself will be discussed, so that the earlier rule of Glide Elision will be temporarily suppressed--hence one of the new glide processes to be motivated below will carry a new name, GLIDE ECLIPSIS, although this process will take on a striking resemblance to GLIDE-ELISION. The ultimate design in this way of proceeding will become clear in Chapter VIII, wherein some of the most

interesting data in all of Arabic phonology are related.

7.1.0 Glide Eclipsis

The discussion will commence with stems of the shape ...VGV..., where G is the second radical.

7.1.1 Hollow Nouns

Consider the following paradigms:

1)	singular		plural	
	CaCaC+u		'aCCāC+u	
	maṭar+u	rain	'amtār+u	rains
	baṭal+u	hero	'abtāl+u	heroes
	naḥar+u	band	'anfār+u	bands
	baḍan+u	body	'abdān+u	bodies
	qadam+u	foot	'aqdām+u	feet

The paradigms of 1) illustrate a quite productive singular-plural alternation, which can be informally schematized as CaCaC --> 'aCCāC. It is clear that the stem-vowel, the second a of the singular, is lengthened, that the first a is dropped (or perhaps metathesized), and that 'a is appended, in forming the plural from the singular. In addition to 1), one encounters the following alternations:

2)	singular	plural
	bāb+u door	'abwāb+u doors
	zād+u provision	'azwād+u provisions
	nāb+u she-camel	'anyāb+u she+camels

Here one finds the same plural-type as found in 1). Further, the second radical in the latter paradigms possess w or y in the plural. Given the normal process of forming this type of plural and given the actual realizations of the plural in 2), it is of course easy to understand what is going on here. Apparently the singular forms of 2) are to be derived from CaGaC sequences by the following rule:

3) GLIDE ECLIPSIS: G --> Ø / V__V

This rule in conjunction with Lengthening permits the following derivations:

4)	bawab+u	zawad+u	nayab+u	
	baab+u	zaad+u	naab+u	Glide Eclipsis
	bāb+u	zād+u	nāb+u	Lengthening

Note that whatever process turns singular forms to plurals must apply before Glide Eclipsis, for otherwise the glide would be destroyed and in principle unrecoverable. Thus, bawab+u should become 'abwāb+u, zawad+u

becomes ʔazwād+u, etc. by the plural formation process before Rule 3) applies. It is assumed that some feature equivalent to [+pl] triggers the pluralization process. To conclude this brief section, it appears that examples such as those listed in 2) constitute some motivation for a rule of Glide Eclipsis.

7.1.2 Hollow Verbs

As noted earlier, the normal non-derived perfective stem is of the pattern CVCVC. The second V has been designed the stem-vowel throughout the preceding exposition. This procedure will be continued. Of interest to the present discussion is the fact that there is a simple means by which non-derived CVCVC stems are converted to the corresponding causative derived stems. This is done by simply doubling or geminating the second radical. Compare the following forms:

5)	basic		causative
	nazal+at	she descended	nazzal+at she sent down
	xaraj+at	she exited	xarraj+at she took out
	daxal+at	she entered	daxxal+at she brought in

Compare now the forms of 5) with those of 6) below.

6)	basic		causative
	kān+at	she was	kawwan+at she created
	sār+at	she went	sayyar+at she drove

Here the causative forms indicate that a glide has elided from the basic forms in a manner quite analogous to the hollow nouns discussed above. In other words, given the alternations listed in 5) and the causatives of 6), one may conclude that the basic forms of 6) are underlain by kawan+at and sayar+at respectively. Clearly, the latter are convertible to the correct phonetic representations by means of Glide Eclipsis and Lengthening.

7)	kawan+at	sayar+at	
	kaan+at	saar+at	Glide Eclipsis
	kān+at	sār+at	Lengthening

As with the pluralization process discussed above, so here also whatever process effects the causative forms must be invoked before Glide Eclipsis has the opportunity of destroying the relevant glide which is doubled. It is once again assumed that some feature equivalent to [+caus] triggers the causative formation process, whatever the details happen to be.

Both for kān+at and sār+at, a simple CaCaC stem has been assumed. However, strong stems include not only CaCaC, but also CaCiC.¹ There is a verb xāf+at, 'she feared', with the corresponding causative xawwaf+at, 'she frightened', proving that the second radical is underlying w. In the following section, it will become clear that the underlying stem is xawif, thus occupying what would otherwise be a gap in the system if no such CaGiC stem could be motivated in underlying representations. Phonetic xāf+at can be derived from underlying xawif+at via the following steps.

- 8) xawif+at
 xaif+at Glide Eclipsis
 xaaf+at a-Assimilation
 xāf+at Lengthening

Thus, not only does Glide Eclipsis precede Lengthening, it also precedes a-Assimilation, a fact reminiscent of Glide Elision and indeed indicating that Glide Eclipsis and Glide Elision are one and the same rule. However, for the time-being, let us assume the rules to be different.

7.2.0 Glide Metathesis

Stems of the shape CGVC present new complications to the grammar, for it is often the case that when stems of this shape arise in the course of the

phonological derivation, they undergo new processes of great interest. These processes may now be investigated.

7.2.1 Hollow Verbs

The perfective stem is typically CVCVC and the imperfective stem is typically CCVC as a result of Vowel Elision. We now wish to investigate the imperfective stems corresponding to perfective hollow stems such as kān+at and sār+at presented above. The two derive from kawan+at and sayar+at respectively. Converting to the imperfective conjugation by prefixation, we should get ta+kawan+u and ta+sayar+u from which the appropriate vowel deletes leaving ta+kwan+u and ta+syar+u. Such forms should now undergo Ablaut, thus switching the stem-vowel a to i or u. Since the correct surface forms are ta+kūn+u and ta+sīr+u, it is plausible to assume that by Ablaut ta+kwan+u becomes ta+kwun+u and that ta+syar+u becomes ta+syir+u. The problem, then, is to discover the means by which ta+kwun+u and ta+syir+u become ta+kūn+u and ta+sīr+u. One could, of course, propose as rule turning w to u and y to i in the appropriate environment of these forms. Similarly, notice that if we postulate a rule of metathesis to the grammar, converting ta+kwun+u to ta+kuwn+u and ta+syir+u to ta+siyr+u, the independently motivated rules of

results. Thus, there are two possibilities, one utilizing rule 9), the other utilizing rule 10).

$$9) \begin{Bmatrix} w \\ y \end{Bmatrix} \rightarrow \begin{Bmatrix} u \\ i \end{Bmatrix} / C _ \begin{Bmatrix} u \\ i \end{Bmatrix}$$

10) Glide Metathesis: CGV \rightarrow CVG

Both solutions are equally plausible since in either case, one additional new rule is added to the grammar. Additional evidence must be brought to bear in deciding between the two alternatives. In what follows we argue for the second alternative, i.e. the solution employing Glide Metathesis. The argument will be strengthened somewhat in the following chapter where the interesting problem of exceptions is considered. Before turning to the argument for 10), let us first motivate a new rule, the rule of Glottal Formation. As noted at several points in the preceding, active participles are formed according to the pattern CāCiC, cf. kātib+u, 'writing', nāzil+u, 'descending', etc. Given the roots kwn and syr, one would expect active participles of the same pattern to be constructable. That is, we expect to find kāwin+u and sāyir+u. However what we do find is phonetic kā'in+u and sā'ir+u, i.e. with glottal stop in place of the high glides w and y. Apparently, then, there is a rule taking G into ' following ā and preceding a short vowel.

11) Glottal Formation: G --> ' / ā__v

This rule of Glottal Formation will figure in the argument for Glide Metathesis, which centers around the adjectival and nominal-forming infix ī, which shows up in adjectives such as kabīr+u, 'big', ṣayīr+u, 'small', ba9īd+u, 'distant, far', etc., and in nouns such as sadīq+u, 'friend', garīb+u, 'relative', darīb+at+u, 'tax', and ṣahīf+at+u, 'newspaper'. This ī infix may be derived from iy since it would be converted to phonetic ī by Syl. Assim. and Lengthening. The representation iy is given empirical confirmation by two considerations. First we know of cases of affixes deriving from iy and typically appearing as ī, e.g. the feminine singular imperfective morpheme discussed in 4.2. If all long vowels can be eliminated in the lexicon, this would constitute an interesting result. And in fact we shall attempt to establish this in the course of this work. A second reason for deriving ī from iy in cases such as these is the fact that iy shows up phonetically before other high glides. Thus, we find ṣawīyy+u, 'strong', an adjective of the type mentioned above. Here the infix shows up as iy not as ī. This could be explained by allowing ī to derive from iy, but to constrain Syl. Assim. in the appropriate way.² Turning now to nouns of

a type which have not hitherto been discussed, we must note that CaCCVC+at nouns become CaCāCiC in the plural.

12)	singular		plural
	CaCCVC+at		CaCāCiC
	ma+k _̣ tab+at+u	library	ma+kātib+u libraries
	'armal+at+u	widow	'arāmil+u widows
	ta+j _̣ rīb+at+u	experiment	ta+jārib+u experiments

The suffix y is the case ending and of no relevance.

The plural formation process apparently consists in dropping the suffix at (the fem. suffix), infixing ā after the second C of the word, and changing the final y of the stem to i. Consider now the plurals of darīb+at+u and ṣahīf+at+u mentioned above.

13)	ṣahīf+at+u	newspaper	ṣahā'if+u	newspapers
	darīb+at+u	tax	darā'ib+u	taxes

Here we find that the plural is precisely of the type found in 12). We would therefore expect the singular to be of a similar pattern as that of 12). This is not so if ī or iy is taken to be underlying, but it is if yi is taken to be underlying, for then ṣahyif+at and daryib+at are of the pattern CaCCVC+at.

Given such singular patterns the plurals are automatically predicted.

14)	ṣahyif+at+u	daryib+at+u	
	ṣahāyif+u	darāyib+u	Plural Formation Process
	ṣahā'if+u	darā'ib+u	Glottal Formation (11)

The rule of Glottal Formation comes into play here just as expected, explaining why we find ' instead of y. Unless the y is present in underlying representations, this ' is anomalous, a fact which further strengthens our claim that y is involved in underlying representations which typically show up as i.

Paradigm 14) demonstrates that the infix i in the singular forms ṣahif+at+u and darib+at+u derives from yi. Above some evidence was given to support the stage iy. Together these facts motivate the change Cyi --> Ciy --> Cii --> Cī, assuming of course that the infix is followed by a true consonant and not by an additional glide, for in this case iy remains. In conclusion, the following derivations seem motivated:

15)	ṣahyif+at+u	daryib+at+u	
	ṣahiyf+at+u	dariyb+at+u	Glide Metathesis
	ṣahiif+at+u	dariib+at+u	Syl. Assim.
	ṣahif+at+u	darib+at+u	Lengthening

So that finally we see that Glide Metathesis is necessary. Imperfective ta+kūn+u and ta+sīr+u may be derived as follows:

16)	ta+kawan+u	ta+sayar+u	
	ta+kwan+u	ta+syar+u	Vowel Elision
	ta+kwun+u	ta+syir+u	Ablaut ³
	ta+kuwn+u	ta+siyr+u	Glide Metathesis
	ta+kuun+u	ta+siir+u	Syl. Assim.
	ta+kūn+u	ta+sīr+u	Lengthening

It is now appropriate to turn to the imperfective representation corresponding to underlying perfectives such as xawif+at, cf. 8) above. Prefixing ta, the appropriate vowel will elide, leaving ta+xwif+u in the indicative. Here Ablaut turns i to a, giving putative ta+xwaf+u. Now phonetically we find ta+xāf+u, 'you fear', with long ā indicating that the stem vowel is a after Ablaut.⁴ However, the exact means by which ta+xwaf+u becomes ta+xāf+u is yet to be discovered. It is to be expected that ta+xwaf+u undergoes Glide Metathesis, giving ta+xawf+u, which must then be converted to ta+xāf+u. It seems somewhat suspicious to assume that w becomes a in a manner analogous to Syl. Assim., for this change is rarely if ever encountered in languages. The approach that will be adopted here is the following: We assume that a is

epenthesized to yield ta+xaawf+u, whereupon the w is elided by a new rule, giving ta+xaaf+u, which gives ta+xāf+u by Lengthening. The two rules needed to effect this result are

17) V-Epenthesis: $\emptyset \rightarrow V_i / CV_i _ GC$

G-Syncope: $G \rightarrow \emptyset / VV _ C$

It will be seen that G-Syncope is confirmed by examples of another type in the following chapter. As for V-Epenthesis, however, note that given an analysis not utilizing Glide Metathesis, i.e. one favoring Rule 9), a new rule in the spirit of V-Epenthesis is still needed, for the change of ta+xwaf+u to ta+xaaf+u by turning w to a is just as suspicious as turning w to a in ta+xawf+u. Thus, in this regard, both theories are equally plausible. The correct derivation of ta+xāf+u, we assume, is the following:

- 18) ta+xawif+u
 ta+xwif+u Vowel Elision
 ta+xwaf+u Ablaut
 ta+xawf+u Glide Metathesis
 ta+xaawf+u V-Epenthesis
 ta+xaaf+u G-Syncope
 ta+xāf+u Lengthening

It should be noticed that given 17) one can now derive ta+kūn+u and ta+sīr+u, either by 16) or by a derivation analogous to 18), viz. 19).

19)	ta+kawan+u	ta+sayar+u	
	ta+kwan+u	ta+syar+u	Vowel Elision
	ta+kwun+u	ta+syir+u	Ablaut
	ta+kuwn+u	ta+siyr+u	Glide Metathesis
	ta+kuuwn+u	ta+siiyr+u	V-Epenthesis
	ta+kuun+u	ta+siir+u	G-Syncope
	ta+kūn+u	ta+sīr+u	Lengthening

If 19) is adopted then the claim is that all hollow verbs proceed analogously, a result which is probably to be desired. This is further indicated by the fact that typically a+aGC, u+uGC, and i+iGC sequences do not elide the G by G-Syncope, but rather undergo Truncation as argued in Chapter IV. Here, however, no morpheme boundaries are involved. Thus, it is reasonable to assume that stems behave in one way, and words, in another, as summarized below.

20)	aaGC --> aaC	a+aGC --> a+GC
	uuGC --> uuC	u+uGC --> u+GC
	iiGC --> iiC	i+iGC --> i+GC

This suggestion will be adopted in what follows.

7.2.2 An Alternative to Glide Metathesis

There is another tack one could take in accounting for imperfectives such as ta+kūn+u, ta+sīr+u, and ta+xāf+u. This approach would be to allow Glide Eclipsis to apply before Vowel Elision and to permit Ablaut to apply to both the remaining morae. Thus, instead of ta+kawan becoming ta+kwan+u and later ta+kwun+u, etc., we would have ta+kawan+u become ta+kaan+u and then ta+kuun+u, etc. Such a solution would obviate the need for V-Epenthesis and G-Syncope, for underlying ta+xawif+u could become ta+xaif+u, whence ta+xaaf+u by Ablaut, assuming that a is somehow prevented from becoming i or u. While this approach is superficially attractive, there is evidence proving that it is wrong. The argument demonstrating this is constructed as follows: If we can show that underlying ta+kawan+u passes through a stage ta+kwVn+u, and similarly for ta+sayar+u and ta+xawif+u, then the alternative is refuted. This is shown by demonstrating that unless the stage CV+CGVC+u obtains in a similar set of examples, then, an otherwise valid generalization is not captured. It will then follow that ta+kwun+u, ta+syir+u and ta+xwif+u arise, in a manner analogous to the derivation of CV+CGVC+u, i.e. as a result of Vowel Elision.

Consider the two sets of verbs listed below:

21)	I	II
	a. ta+n+katib+u	tu+kattib+u
	b. ta+ktatib+u	tu+kātib+u
	c. ta+sta+ktib+u	
	d. ta+ta+kattab+u	
	e. ta+ta+kātāb+u	

All the verbs listed in column I are characterizable as derived imperfective verbs with person prefix ta, 'she'. In all but the b. form of this column, the inflectional prefix ta is followed by a derivational prefix, n in the case of a., sta in the case of c., and ta in the d. and e. examples. In the b. example, the derivational affix has been infixes (i.e. t). The examples listed under column II are also derived verbs of the imperfective conjugation. Here once again, we find the third person singular prefix, but it shows up as tu instead of ta. The reason for this alternation is readily apparent. In the examples of II, the prefix is followed by a single consonant plus a strong cluster. This is never the case with those examples listed under I. In other words, conditions exist allowing us to predict when tu occurs. This suggests that ta is the underlying prefix⁵ and that ta becomes tu before C followed by a strong cluster.

22) Ca [+person] --> Cu / __CS

S is of course an informal abbreviation for strong cluster, which will be more formally specified at a later point when the underlying nature of the long vowel of tu+kātib+u is investigated.

The next step in the argument involves one additional derived class, not listed in 21) above, but nevertheless crucial, for it bears prefixes of the shape Cu. This is the second causative class already noted briefly in 7.2.1 above.

23) tu+dxil+u
 tu+xrij+u
 tu+nzil+u

Superficially these forms seem to controvert the claim that Cu derives from Ca by 22), since tu is not followed by a single consonant in 23). However, a deeper investigation reveals the opposite, for the imperfectives of 23) correspond to the perfective forms 'a+dxal+at, 'she brought in', 'a+xraj+at, 'she took out', and 'a+nzal+at, 'she sent down'. In each case the causative morpheme 'a' shows up phonetically. Derivational prefixes commonly follow the inflectional prefixes as pointed out above with regard to the

examples of 21)I. It is to be expected that the causative morpheme 'a would show up in the imperfective conjugation, just as derivational n, sta, ta, etc. show up in the imperfective conjugation and the perfective conjugation, for ta+n+katab+u is related to 'i+n+katab+at, ta+sta+ktib+u is related to 'i+sta+ktab+at, etc.⁶ In other words, instead of 23), one expects the following:

- 24) tu+'a+dxil+u
 tu+'a+xrij+u
 tu+'a+nzil+u

There is even stronger evidence that this must be so. Recall in 6.1.3 it was pointed out that imperatives are formed by dropping the second person prefix and applying Prosthesis when applicable. Thus, it was pointed out that ta+ktub --> ktub --> 'u+ktub, ta+nzil --> nzil --> 'i+nzil, etc. The derived forms work in just this way too.

- 25) ta+sta+ktib --> sta+ktib --> 'i+sta+ktib
 tu+kattib --> kattib
 tu+kātib --> kātib

If the causative 'a underlay the imperfectives as indicated in 24), then it should be the case that when tu (the second person tu) is dropped, the 'a

would remain. Thus, the imperatives might be suspected to be the following outputs:

- 26) tu+'a+dxil --> 'a+dxil
 tu+'a+xrij --> 'a+xrij
 tu+'a+nzil --> 'a+nzil

In fact, this is precisely what is found--'a+dxil, 'bring in', 'a+xrij, 'take out', and 'a+nzil, 'send down', proving that 24) is basically correct. But once this is conceded, it becomes clear that the tu of the phonetic representations of 23) is in fact derivable from ta by Rule 22) in a manner analogous to the prefixes of 21)II.

- 27) ta+'a+dxil+u ta+'a+xrij+u ta+'a+nzil+u
 tu+'a+dxil+u tu+'a+xrij+u tu+'a+nzil+u 22)
 tu+dxil+u tu+xrij+u tu+nzil+u new rule

If the CV prefix is not elided, i.e. if the stem is not marked [+imper], then 'a must elide by a new rule which may be stated as 28).

- 28) 'a [+caus] --> \emptyset / CV+__+stem

It is Rule 28) which accounts for the apparent anomaly of imperfectives listed in 23). Clearly, Rule 28) follows Rule 22).

The next step in the argument is obvious. The stems dxil, xrij, and nzil derive from daxal, xaraj, and nazal by invoking Vowel Elision and Ablaut in a manner completely analogous to those cases discussed earlier. Thus, the complete derivations of 23) are

29)	ta+'a+daxal+u	ta+'a+xaraj+u	ta+'a+nazal+u	
	ta+'a+dxal+u	ta+'a+xraj+u	ta+'a+nzal+u	Vowel Elision ⁷
	ta+'a+dxil+u	ta+'a+xrij+u	ta+'a+nzil+u	Ablaut
	tu+'a+dxil+u	tu+'a+xrij+u	tu+'a+nzil+u	22)
	tu+dxil+u	tu+xrij+u	tu+nzil+u	28)

These derivations are given to underscore one important fact--that Vowel Elision must apply before Rule 22), if tu is to be correctly predicted. From here we may now turn to causative forms such as tu+xif+u, 'you frighten', which derives from underlying ta+'a+xawaf+u according to 30).

30)	ta+'a+xawaf+u	
	ta+'a+xwaf+u	Vowel Elision
	ta+'a+xwif+u	Ablaut
	tu+'a+xwif+u	22)
	tu+xwif+u	28)
	tu+xiwf+u	Glide Metathesis
	tu+xiiwf+u	V-Epenthesis
	tu+xiif+u	G-Syncope
	tu+xif+u	Lengthening

The derivation precedes as expected. We know that the underlying representation contains causative 'a since we find tu (and not ta) in the imperfective, viz. tu+xīf+u, and since the imperative is 'a+xif, 'frighten', where, as expected, causative 'a shows up.⁸ This example is very important, however, for it shows that there must have been a stage ta+'a+xwVf+u, so that tu could be predicted. That is, a+xw constitutes the strong cluster of 22) relevant to turning ta to tu. Now the argument is complete, for if derived forms pass through a stage possessing CGVC stems, then it is only rational to assume that non-derived forms such as ta+kūn+u, ta+sīr+u and ta+xāf+u pass through similar stages, i.e. ta+kwun+u, ta+syir+u, and ta+xwaf+u. In conclusion, the alternative possibility brought up in the beginning of this section is refuted. Thus, the rule of Glide Metathesis remains a valid rule of Arabic phonology.

7.2.3 Hollow Nouns

Glide Eclipsis applies to both verbs and nouns. It is to be expected that Glide Metathesis should also apply to verbs and nouns. Several examples of verbs served as motivation for the rule in 7.2.1. It is now appropriate to demonstrate that Glide Metathesis does apply to nouns. Actually it has already been shown that Glide Metathesis applies to underlying

sahyif+at+u and daryib+at+u. Let us therefore turn to a different class of nouns, the nouns of place. As noted earlier, this class of nouns takes on the shape mV+CCVC(+at), e.g. derived from the root ktb, we find ma+ktab+at+u, 'library', and derived from nzl, we find ma+nzil+u, 'stopping place', etc. From the hollow roots kwn and syr, we might expect to derive ma+kwan+u and ma+syar+u, which by Glide Metathesis, V-Epenthesis, and G-Syncope would yield ma+kān+u and ma+sār+u. These nouns do exist, meaning 'place' and 'path', thus confirming the rules postulated above.

7.3 Conclusion

In this chapter the rule of Glide Eclipsis and Glide Metathesis have been discussed, along with others, including V-Epenthesis, G-Syncope, Rule 22), which may be called ta-to-tu, and Rule 28), which may be termed Caus-Del. Glide Eclipsis may be the rule of Glide Elision motivated earlier, and in fact this has been suggested in 6.2.3. However, it will facilitate later discussion to consider the two applications of this process as distinct.

A summary of the rules discussed in this chapter follows in 31).

31)

Vowel Elision

ta-Elision

ta-to-tu 22)

Caus-Del. 28)

Glottal Formation 11)

Glide Eclipsis

Glide Metathesis

V-Epenthesis

G-Syncope

Footnotes to Chapter VII

1. They also include CaCuC, but these are not important for this discussion.
2. That is by requiring the right-most C of Syl. Assim. to be a true consonant as informally abbreviated in (i).
 (i) Syl. Assim: $G \rightarrow V_i / V_i \text{---} \overset{C}{[+cns]}$
3. Class-A stems with medial w always take u in the imperfect and class-A stems with medial y always take u suggesting either an additional rule or a redundancy rule assigning [+F] to all verbs stems of the shape CawaC. Cf. Chapter XI.
4. Which motivates the assumption made in 7.1.2 that i is the underlying stem-vowel of the perfective.
5. The same facts hold for all person prefixes.
6. It is readily apparent that the 'i of 'i+n+katab+at, 'i+sta+ktab+at, etc. is predictable by Prosthesis.
7. Notice that only stem vowels elide by Vowel Elision again bearing out the remarks of footnote 2 of Chapter V.
8. The stem vowel of phonetic 'a+xif is short, as predicted by Truncation.

Chapter VIII

A CLASS OF EXCEPTIONS: Some Implications for Syntax

8.0 This chapter deals with perhaps the most interesting segment of Arabic phonology. A hypothesis is advanced which seeks to explain a rather large class of superficially unrelated exceptions. The explanation has some bearing on syntactic issues such as, for example, the transformational status of causatives. If this analysis is correct, it will support to some extent the lexical hypothesis for Arabic.¹

Four rules will be crucial to the following study. These rules are listed as 1).

- 1) Glide Eclipsis: $G \rightarrow \emptyset / V_V$
- Glide Metathesis: $CGV \rightarrow CVG$
- Glottal Formation: $G \rightarrow ' / \bar{a}_V$
- w-to-y: $w \rightarrow y / i_$

All these rules have been encountered in the preceding chapters. The exact statement of the rule is irrelevant here, e.g. although w-to-y may be collapsed with other processes, such a move has little relevance to the discussion to follow.

8.1 Doubly Weak Verbs

Stems possessing a high glide as one of its

underlying radicals have been termed weak stems in the preceding. Those possessing two high glides are aptly termed doubly weak stems. In this section, we shall be interested in doubly weak verbs exhibiting roots of the shape CGG, i.e. roots the second and third radicals of which are high glides. Such roots are interesting for their exceptional behavior with respect to the rules listed in 1). Consider the following typical examples.

2)	kawā	he ironed	rawā	he related (story)
	kawat	she ironed	rawat	she related (story)
	ṭawā	he folded	'awā	he sought shelter
	ṭawat	she folded	'awat	she sought shelter

These forms derive from underlying kaway+a, kaway+at, ṭaway+a, ṭaway+at, etc. by means of Glide Elision and Lengthening in the case of the masculine forms, and by means of Glide Elision and Truncation in the case of the feminine forms. A sample derivation runs as follows:

3)	kaway+a	kaway+at	
	kawa+a	kawa+at	Glide Elision
	kawa+a	kawa+t	Truncation
	kawā	kawa+t	Lengthening

We know that kaway is the underlying stem from the fact that it shows up as such in the following forms:

4)	kaway+tu	I ironed	raway+tu	I related (story)
	kaway+ta	you ironed	raway+ta	you related (story)
	taway+tu	I folded	'away+tu	I sought shelter
	taway+ta	you folded	'away+ta	you sought shelter

Here the third radical y is not affected by Glide Elision since it is followed by a consonant, t. However notice that neither in the forms of 3) nor in the forms of 4) does the second radical w elide by Glide Eclipsis. Returning to the examples of 3), we might passivize these by substituting u-i for the internal a-a vowels of the perfective active. This, as noted earlier, is the normal means of forming the passive in Arabic, e.g. katab+a, 'he wrote' is kutib+a, 'it m. was written', in the passive. The substitution in terms of 3) gives the following.

5)	kuwiy+a	it m. was ironed	ruwiy+a	it m. was related
	kuwiy+at	it f. was ironed	ruwiy+at	it f. was related
	tuwiy+a	it m. was folded	tuwiy+at	it f. was folded

From these examples the third radical does not elide because the if-then condition on Glide Elision is violated. However, note that the medial glide w also does not elide, although here the adjacent

vowels are identical in height. A similar state of affairs holds for active doubly weak stems of the class-B variety, i.e. with stem-vowel i.

- 6) qawiy+a he became strong
 qawiy+at she became strong
 sawiy+a it was equal
 sawiy+at it f. was equal

Here again the third radical y does not elide by Glide Elision because the if-then condition is violated. The puzzling fact, however, is that medial w does not elide.

Medial glides do not elide from doubly weak roots in the case of nouns and participles. Underlying taway+u+n, e.g., becomes tawa+u+n by Glide Elision, and tawa+n by a-Assimilation and Truncation, but the w does not elide. The active derived participle mu+n+tawin derives from underlying mu+n+tawiy+u+n by elision of y, i-Assimilation, and Truncation, but w does not elide.

It is possible, on the basis of the preceding discussion, to propose the following redundancy:

- 7) EXCEPTION STATEMENT: The medial glide of all roots of the shape CGG is exceptional with regard to Glide Eclipsis.

Consider now the imperfective forms corresponding to those of 2).

8)	ya+kwī	he irons	ya+rwī	he relates (story)
	ta+kwī	she irons	ta+rwī	she relates (story)
	ya+ṭwī	he folds	ya+'wī	he seeks shelter
	ta+ṭwī	she folds	ta+'wī	she seeks shelter

These forms are conjugated in the indicative mood, which means they derive from underlying Ca+Cwiy+u sequences, omitting details of Vowel Elision and Ablaut. From the underlying sequence, y drops, i-Assimilation applies, and Lengthening gives the correct results embodied in 8). However, notice that Glide Metathesis does not apply to the forms of 8). This may be due to the long vowel however. But compare the forms analogous to 8) but declined in the subjunctive mood.

9)	ya+kwiy+a	that he iron	ya+rwiy+a	that he relate
	ta+kwiy+a	that she iron	ta+rwiy+a	that she relate
	ya+ṭwiy+a	that he fold	ya+'wiy+a	that he seek shelter
	ta+ṭwiy+a	that she fold	ta+'wiy+a	that she seek shelter

Here Glide Elision is blocked because of the if-then condition associated with that rule. However, important

is the fact that Glide Metathesis does not apply to the forms of 9), even though the structural description of that rule is met. The imperfectives corresponding to the perfectives of 6) likewise do not undergo Glide Metathesis.

- 10) ya+qwā he becomes strong
 ta+qwā she becomes strong
 ya+swā it is equal
 ta+swā it f. is equal

Again this may be due to the fact that a long vowel is involved in these forms, which derive from underlying ya+qway+u, ta+qway+u, etc. (omitting details of Vowel Elision and Ablaut). But the dual forms are more suggestive.

- 11) ya+qway+ā+ni they m.d. become strong
 ta+qway+ā+ni they f.d. become strong
 ya+sway+ā+ni they m.d. are equal
 ta+sway+ā+ni they f.d. are equal

Here y does not elide because of the length condition placed on Glide Elision. But there is now apparently no reason why Glide Metathesis should not apply, and yet such is the case. Again, it may be concluded

- 12) EXCEPTION STATEMENT: The medial glide of all roots of the shape CGG is exceptional with regard to Glide Metathesis.

As noted earlier, the active participle is formed on the pattern CāCiC, e.g. kātib+u, 'writing'. When w or y constitutes the second radical, it becomes ' by the rule of Glottal Formation, cf. kāwin+u --> kā'in+u, sāyir+u --> sā'ir+u, 'being' and 'going', respectively. It should now be possible to substitute any of the doubly weak roots mentioned above for the three consonants of the active participle pattern. The result would be kāwiy+u, tāwiy+u, rāwiy+u, 'āwiy+u, and so forth. Following the earlier presentation, we expect the third radical y to elide by Glide Elision, to be followed by i-Assimilation and Lengthening. This would yield kāwi, tāwī, rāwī, and 'āwī. In addition one expects the w of these forms to become ' as predicted by Glottal Formation, but the correct phonetic representations are those just listed, and not kā'ī, tā'ī, etc. Once again, this non-application of Glottal Formation might be blamed on the long vowel which follows w. The accusative forms succeed in dismissing this explanation however.

- | | | | | |
|-----|----------------|---------|----------------|-----------------|
| 13) | <u>kāwiy+a</u> | ironing | <u>rāwiy+a</u> | relating |
| | <u>tāwiy+a</u> | folding | <u>'āwiy+a</u> | seeking shelter |

Here the third radical y does not elide because of the if-then condition placed on Glide Elision. But neither does the w become ' as expected. Apparently, then, the following redundancy exists.

- 14) EXCEPTION STATEMENT: The medial glide of all roots of the shape CGG is exceptional with regard to Glottal Formation.

It is not difficult to demonstrate that 14) is true of morphological classes other than active participles. In 7.2.1, cf. 12), it was pointed out that nouns of the shape CVCCVC+at often become CaCāCiC in the plural. The noun mi+kwāt+u+n, 'iron', is related to the verb 'to iron' included in 2) and 4) above. It quite obviously derives from underlying mi+kway+at+u+n (cf. ma+ktab+at+u+n, 'library') by Glide Elision of y and Lengthening. Notice incidentally that this form is an exception to Glide Metathesis as captured by 12). The plural of underlying mi+kway+at should be ma+kāwiy+u+n according to the pattern noted above. From this form the y should elide by Glide Elision, the u should assimilate to i by i-Assimilation, whereupon by Truncation, we are left with ma+kāwi+n, which is the correct representation of 'irons'. What about the w? Surely w should become ' by Glottal Formation, were it not for 14), which correctly forbids the change. Statement 14) is thus borne out by additional classes of words. It is interesting to note that a similar noun

type, underlying ma+nwar+at+u, becomes the expected ma+nā'ir+u, 'lighthouses' in the plural, as well as the expected ma+nār+at+u, 'lighthouse', in the singular. The derivations proceed as follows:

15)	ma+nwar+at+u	ma+nāwir+u	
	---	ma+nā'ir+u	Glottal Formation
	ma+nawr+at+u	---	Glide Metathesis
	ma+naawr+at+u	---	V-Epenthesis
	ma+naar+at+u	---	G-Syncope
	ma+nār+at+u	---	Lengthening

There is no reason, given the abstract representations of 15), for 12) or 14) to be invoked. Thus, Glottal Formation and Glide Metathesis apply as predicted.

It has been noted in several places that w becomes y after i, e.g. radiw+a --> radiy+a, du9iw+a --> du9iy+a, etc. Let us now turn to a new pattern which gives rise to iw combinations. This pattern is the verbal noun class of certain derived verbs.

16)

'i+n+kasar+a	it m. was broken
'i+n+kisār+u	process of being broken
'i+ktašaf+a	he discovered
'i+ktišāf+u	discovery

In the first example, n is a particle signifying the passive. The t of the second set of examples is an infix, cf. kaṣaf+a, 'he uncovered'. We may assume that the 'i of all the examples of 16) is the prosthetic vowel predicted by the rule of Prosthesis. It is the means of forming the verbal noun which is important here. This consists of lengthening the stem vowel to give ā and switching the preceding a to i. It is easy to see that if w is substituted in the verbal noun patterns of 16), that iw sequences will arise. In fact such forms are found, and as predicted w become y.

- 17) 'i+n+qād+a he was led (<-- 'i+n+qawad+a)
 'i+n+qiyād+u compliance (<-- 'i+n+qiwād+u)
 'i+ṛtāl+a he assassinated (<-- 'i+ṛtawal+a)
 'i+ṛtiyāl+u assassination (<-- 'i+ṛtiwāl+u)

The segment w and not y is known to be the underlying second radical because of alternations such as qawd+u, 'leadership', yawl+u, 'seizure', and so forth. The verbal nouns of 17) are interesting for they illustrate the switching of w to y, one of the processes listed as 1) above. The doubly weak roots should be substitutable in similar patterns. In fact, we do find 'i+n+tawā, 'it was folded', which derives from

'i+n+taway+a, cf. 2), 3), and 4); and 'i+ktawā, 'it was ironed', from 'i+ktaway+a, where y elides but because of 7), the w does not. Now the verbal nouns corresponding to these derived verbs should be in the abstract representation, 'i+n+tiwāy+u and 'i+ktiawāy+u, given the normal pattern illustrated in 16) and 17)). The y of these forms should become ' by Glottal Formation, giving 'i+n+tiwā'+u and 'i+ktiawā'+u. Also the w of these forms should become y by w-to-y in a manner analogous to the change evidenced by the verbal nouns of 17)). It is not surprising to find that the phonetic representations are not 'i+n+tiyā'+u and 'i+ktiyā'+u, but rather 'i+n+tiwā'+u and 'i+ktiawā'+u. In other words, these forms are exceptions to w-to-y. The redundancy may be stated as 18).

- 18) EXCEPTION STATEMENT: The medial glide of all roots of the shape CGG is exceptional with regard to w-to-y.

To summarize the results of this section, we may pick the root 'wy already mentioned several times in the preceding. The perfective dual 'away+ā, 'they m.d. sought shelter', is an exception to Glide Eclipsis; the imperfect subjunctive ya+'wiy+a, 'that he seek shelter', is an exception to Glide Métathesis; the active participle 'āwiy+a, declined in the accusative, is an exception to Glottal Formation; and finally the feminine plural

imperative 'iwi+na, 'seek f.p. shelter'. The ultimate form derives from ta+'wiy+na, the normal third person feminine plural imperfective, 'you f.p. seek shelter'. The ta is elided leaving 'wiy+na to which Prosthesis adds 'i, giving 'i+'wiy+na. A rule which has not yet been discussed turns the second ' to i, accounting for the long i. Of course the third radical y becomes i by Syl. Assim. The complete derivation is repeated as 19), omitting details of Vowel Elision and Ablaut.

19).	ta+'wiy+na	
	'wiy+na	ta-Deletion
	'i+'wiy+na	Prosthesis
	'i+iwiy+na	new rule
	'i+iwii+na	Syl. Assim.
	'iwi+na	Lengthening

It is important to understand that neither Glide Metathesis nor w-to-y applies in the course of this derivation. This apparently follows as a consequence of the fact that the stem is doubly weak, i.e. 12) and 18) prevail.

One should attempt to collapse all of 7), 12), 14), and 18). A first attempt would be to claim that the second radical of all CGG roots is simply impervious to any change, i.e. that it is marked as an exception to all rules. That this is not correct becomes clear upon consideration of yet another rule of Arabic.

This rule turns w to y before y. Consider, for example, the verbal noun pattern CaCC, so typical of many non-derived verbs. The verbal noun corresponding to našar+a, 'he spread', is našr+u, 'spreading', of hasab+a, 'he counted', hasb+u, 'counting', and so on. The verbal noun of tawā, noted above, should according to this pattern be tawy+u, but because of the rule under discussion, we find tayy+u, i.e. with y in place of w. The rule may be stated as 20) for future reference.

20) $w \rightarrow y / _y$

This indicates that the claim that the medial radical of CGG roots is exceptional to all rules is wrong.² A more conservative approach would be to claim that the medial radical of all CGG roots is exceptional with respect to all rules having the effect of changing this segment from its status as a high glide. All the rules of 1) do this, but Rule 20) does not, i.e. w retains its character as a high glide viz. y. That this approach is also incorrect will be indicated by some examples to be presented in 8.2 below. Further, the approach adopted later in this chapter, if correct, will reduce the exception classes considerably, as well as the rule to which these classes are exceptions.

One now wishes to press further to discover what

underlies these exceptional classes and why the four rules listed as 1) behave similarly in rejecting the medial glide of CGG roots. This is the target we are aiming at in this chapter. Before turning directly to this task, however, some new classes of exceptions may be introduced.

8.2 Further Exceptions

Another class of exceptions to the rules listed under 1) above is the class of verbs termed the verbs of color and defect. The exceptionhood of these verbs holds both for the non-derived and derived verbs of this class. A representative example of a verb of color is the verb sawid+a, 'he became black', which is an exception to Glide Eclipsis, along with its corresponding imperfective ya+swad+u, 'he becomes black', an exception to Glide Metathesis. The active participle of this verb is not normally encountered, but its formal representation is clearly sāwid+u with w and not sā'id+u, the latter of which is preposterous. In other words, this root is an exception to Glottal Formation. Clearly this root is functioning in a manner reminiscent of the CGG roots of 8.1, so that it may be inferred that this root is also exceptional with respect to w-to-y, although here no examples bearing out this claim exist. Intuitively, the Arabic speaker knows that 'i+stiwād+u and not 'i+stiyād+u is a possible derived form. where the root swd relates

to the color 'black'. That the root swd must relate to the color 'black' for the form to be exceptional is paramount and proven by the fact that sawad+a becomes sād+a by Glide Eclipsis and Lengthening when the root means 'master'. Thus sād+a means 'he became master', and takes imperfective ya+sūd+u, from ya+swud+u via Glide Metathesis. The active participle is, moreover, sā'id+u, 'prevailing', from sāwid+u by Glottal Formation. We also find siyād+at+u, 'mastery', from siwād+at+u via w-to-y. All verbs of color behave as does sawid+a, etc. Thus, bayid+a, 'he became white', ya+byad+u, 'he becomes white', bāyid+u, 'becoming white', etc., where Glide Eclipsis, Glide Metathesis, and Glottal Formation do not apply.

We conclude with the following redundancy:

21) EXCEPTION STATEMENT: Stems of color are exceptional with regard to 1).

It was stated above that verbs of defect are exceptional. Examples include the verbs 9awir+a, 'he became one-eyed', which is an exception to Glide Eclipsis, its imperfect ya+9war+u, 'he becomes one-eyed', an exception to Glide Metathesis; 9awij+a, 'it became crooked', with imperfect ya+9waj+u, 'it becomes crooked', exceptions to Glide Eclipsis and Glide Metathesis; and others. Again if the stem does not bear the correct meaning, i.e. if it is not related to 'defects', then it is not exceptional.

Taking the root 9wr again, we might note that one of the derived forms, the 'a causative is completely regular since it has nothing to do with 'one-eyedness'. We find 'a+9ār+a, 'he loaned', from 'a+9war+a via Glide Metathesis, V-Epenthesis, G-Syncope, and Lengthening.

22) EXCEPTION STATEMENT: Stems of defect are exceptional with regard to 1).

Adjectives of color and defect are also exceptions to 1). Consider the adjectives 'aswad+u, 'black', 'abyad+u, 'white', 'a9war+u, 'one-eyed', 'a9waj+u, 'crooked', etc., all related to the verbs presented above. All these adjectives are exceptional with respect to Glide Metathesis.

Another class of exceptions, which include 'atwal+u, 'taller', and 'aqwam+u, 'straighter', are examples which do not undergo Glide Metathesis.

23) EXCEPTION STATEMENT: Comparatives are exceptional with regard to 1).

Another exceptional class is the so-called class of verbs of surprise. These can be roughly paraphrased as 'how Adj. X is', e.g. ma 'atwal+a l+walad+u, 'how tall the boy is', where 'atwal+a is an exception to Glide Metathesis.

24) EXCEPTION STATEMENT: Verbs of surprise are exceptional with regard to 1).

All these forms should be compared with 'a+tāl+a, 'he lengthened', the 'a causative of twl, which is perfectly regular and derives from 'a+twal+a by the processes delineated in the preceding chapter.

We now wish to turn to a possible explanation for these data. However first note that it will not due to simply mark the exceptional glides as exceptions to any rule having the effect of switching the medial glide to a non-glide segment as suggested in the last section. This becomes clear when we recall the discussion in 4.3 where it was pointed out that suwd+u, the plural of 'aswad+u, 'black', becomes suud+u by Syl. Assim. and finally sūd+u by Lengthening. But this w is the medial w of an adjective of color and thus according to the proposal mentioned above, should be exceptional with regard to Syl. Assim. Since it is not, this proposal must be wrong.³

8.3 Glide Eclipsis, Glottal Formation, and w-to-y, Revisited

The rule of Glide Eclipsis has the following effect:

25) VGV --> VØV

The rule of Glide Metathesis has a similar effect,

26) CGV --> CØVG

which can be more easily seen if the deleted segment or moved segment is replaced by Ø, the null element.

27) V G V --> V Ø V
C G V --> C Ø V G

The similarity is obvious and can be made so if we replace 25) by the following:

28) V G V --> V Ø V G

Comparing 28) with 26), we have 29).

29) V G V --> V Ø V G
C G V --> C Ø V G

This is tantamount to claiming that Glide Eclipsis is in fact a metathesis rule, rather than a deletion rule. In other words, kawan+a becomes kaawn+a by this rule. But notice that if this is done, the means are already available for taking kaawn+a into the desired kaan+a--namely the rule of G-Syncope accomplishes just this result, so that Lengthening gives us the correct kān+a, cf. 7.1.2. Replacing the old rule of Glide Eclipsis with the new metathesis approach is therefore in no sense more costly, for the latter approach does not

Glottal Formation should be part of the exceptional mechanism noted in 8.1 and 8.2, i.e. to why kāwiy+a, sāwid+u, etc. do not undergo Glottal Formation of 1). Suppose we allow G-Metathesis to apply to underlying active participles and similar patterns, i.e. to kāwin+u, sāyir+u, and the other forms mentioned in 7.2.1 including darāyib+u. This gives kāiwn+u, sāiyr+u, and darāiyb+u, which by G-Syncope leaves kāin+u, sāir+u, and darāib+u. We now simply replace Glottal Formation with the following rule of Glottal Epenthesis.

31) Glottal Epenthesis: $\emptyset \rightarrow ' / \bar{a} _ v$

This rule will now take kāin+u, sāir+u and darāib+u into the desired kā'in+u, sā'ir+u, and darā'ib+u.

The approach utilizing 31), the epenthesis rule, it should be noted, is a much more plausible rule phonetically than the Glottal Formation rule listed in 1). In fact, it is debatable that w and y can ever be converted to '. However, epenthesizing glottal stops is not at all an uncommon process. More important than any elusive naturalness arguments, however, is the fact that by replacing Glottal Formation with Glottal Epenthesis, we reduce the list of rules participating in the exception mechanism by one additional rule. Thus, forms such as kaway+ā and ya+kwiya+ā+ni are exceptions to 30), but so is kāwiy+a, the active

participle. That kāwiy+a is an exception to 30) automatically insures that it will not undergo rule 31), Glottal Epenthesis, for only if w disappears from this sequence, will ' be stuck back. The same goes for sāwid+u, etc. This form does not undergo G-Metathesis--thus, it follows that it does not undergo 31). This approach begins to explain an otherwise mysterious set of observations about exceptions noted in the preceding sections. The important derivations are listed below.

32)	kāwin+u	sāyir+u	kāwiy+a	sāwid+u	
	kāiwn+u	sāiyr+u	EX.	EX.	G-Metathesis
	kāin+u	sāir+u	--	--	G-Syncope
	kā'in+u	sā'ir+u	--	--	Glottal Epenthesis

The entries EX. in 32) indicate that the w of these forms is exceptional with respect to G-Metathesis. We see that consequently these forms do not undergo G-Syncope as well as Glottal Epenthesis.

The approach to the exceptionality of certain forms with respect to w-to-y is now apparent. Suppose we allow G-Metathesis to apply to forms such as 'i+n+qiwād+u and 'i+γtiwāl+u listed in 17). This would give 'i+n+qiāwd+u and 'i+γtiāwl+u, which by G-Syncope leaves 'i+n+qiād+u and 'i+γtiāl+u. The rule

w-to-y . . . is now restated as an epenthesis rule, call it Diphthongization.

33) $\emptyset \rightarrow y / i_a$

By this rule 'i+n+qiād+u and 'i+γtiāl+u become 'i+n+qiyād+u and 'i+γtiyāl+u as desired, cf. 17).

But now take 'i+n+ṭiwāy+u and 'i+kṭiwāy+u noted in 8.1. The w of these forms is marked as exceptional with respect to 30), G-Metathesis, therefore it follows that these forms do not undergo 33), Diphthongization. This, then, eliminates the final rule of 1), w-to-y, from the storehouse of rules involved in the exceptions discussed in 8.1 and 8.2. In place of 1), we have three rules, 30)-G-Metathesis, 31)-Glottal Epenthesis, and 33)-Diphthongization. The various classes of exceptions are exceptions to one rule only, the rule of G-Metathesis, which automatically accounts for why these forms do not undergo 31) or 33).

8.4 Implications for Syntax

Several classes of exceptions to G-Metathesis were noted in 8.1 and 8.2. These may be listed along with the associated exception statements which may be interpreted as redundancy rules.

- 34) 1. Roots of the shape CGG: 7), 12) (= [-Rule 30])
 2. Stems of color: 21) (= [-Rule 30])
 3. Stems of defect: 22) (= [-Rule 30])
 4. Comparatives: 23) (= [-Rule 30])
 5. Verbs of Surprise: 24) (= [-Rule 30])
 6. But NB causatives are [+Rule 30])

To this set of exceptions to Rule 30) we may now add adjectives of the shape CaCīC, e.g. tawīl+u, 'long, tall', does not undergo G-Metathesis, nor does its plural tiwāl+u as proved by the fact that w does not become y even though it follows i. Also exceptional is a class of stative or inchoative verbs including tawil+a, 'he became tall, long', ya+twal+u, 'he becomes tall, long'. It should also be noted that whenever there exists a stative adjective of the shape CaCīC, there also exists a corresponding stative or inchoative verb of the shape CaCiC or CaCuC, i.e. a class-B or C verb.

35) <u>tawīl+u</u>	tall, long	<u>tawil+a</u>	he was, became tall
<u>hazīn+u</u>	sad	<u>hazin+a</u>	he was, became sad
<u>ba9īd+u</u>	distant	<u>ba9ud+a</u>	it was distant
<u>sayīr+u</u>	small	<u>sayur+a</u>	he was, became small

Notice that if tawīl+u derives from tawīyl+u by Syl. Assim. and Lengthening, then this class of exceptions falls together quite naturally with class 1. of 34), i.e.

since tawiyl+u possesses two glides, it is expected to be exceptional, just as are words such as taway+ā, kaway+ā, etc. Now the derivational facts listed in 35) are interesting for the meaning of the verb is predictable from the adjective. This might be expressed by the following notation.

36) $X_{adj.} \rightarrow$ to be, become X_{verb} , adj. = CaCiyC
verb = CaCiC/CaCuC

In other words if we know the meaning of the adjective, we also know the meaning of the verb. This is also true of comparatives and verbs of surprise, i.e. of classes 4. and 5. of 34).

37) $X_{adj.} \rightarrow [X_{er}]_{adj_i}$, $adj_i = 'aCCaC$

$X_{adj.} \rightarrow$ how X_{verb} NP is, verb = ma 'aCCaC

This fact about the productivity of the semantics of the corresponding adjective and verb, comparative, or verb of surprise together with the fact about exceptions indicates that the adjective is the underlying category. If CaCiyC is taken as the underlying category, there is no problem predicting the semantics of the derived forms. Moreover, before the adjective is converted to the desired derived category, it will be marked as an exception to Rule 30, G-Metathesis, thus accounting for why the stative-inchoative verbs, comparatives,

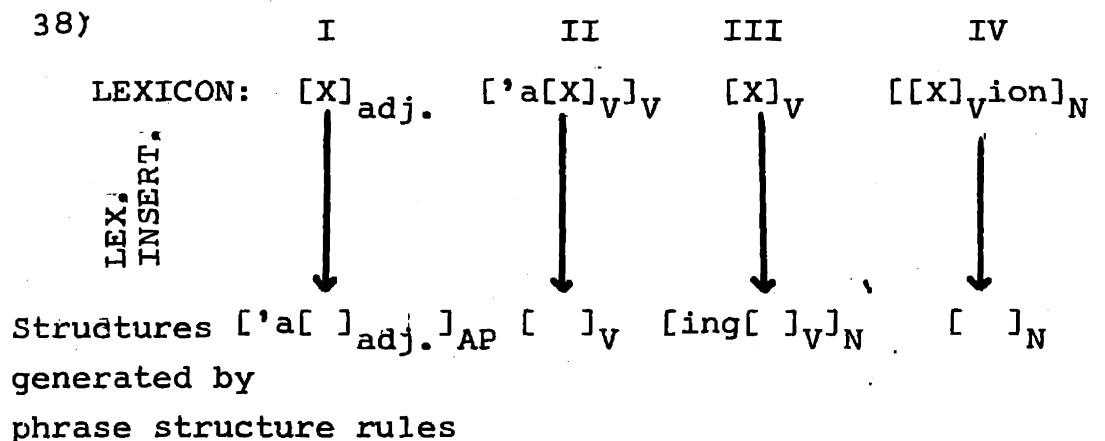
and verbs of surprise do not undergo G-Metathesis. The results of this analysis are not minimal, for a large class of exceptions are thereby reduced to a single class, i.e. 4. and 5. as well as verbs of stativity-inchoation are reduced to class 1. of 34). Obviously, the stems of color and defect may be treated in an analogous fashion. Only here, the form 'aCCaC instead of being interpreted as a comparative will be interpreted as the basic adjective. It is interesting to note that comparatives of color and defect adjectives can not be formed by the regular means, only by periphrastic constructions, which squares with this claim.⁴

We now turn to the crucial example of 34), 6. which is not an exception to G-Metathesis. That is, 'a+twal+a becomes 'a+tāl+a by G-Metathesis, V-Epenthesis, and G-Syncope. But should this form not also be an exception since it is related to the adjective tawīl+u, i.e. this verb means 'he lengthened, made long'? In fact this constitutes a strong argument against deriving the causative from the associated adjective. And supporting this claim is the fact about semantics. No simple rule can be given predicting the semantics of the causative. Thus, to take just a few examples, 'a+nwam+a, which becomes 'a+nām+a by the relevant processes, is related to the verb nām+a (from nawim+a), 'he slept', but does not

simply mean 'to make sleep'. Rather it is used of a child, and means 'to put a baby to sleep'. Numerous examples of this type can be given. In addition many forms taking the causative shape could not naturally derive from a more abstract representation. Thus, 'a+xbar+a, 'he informed' is not obviously related to any more basic structure.

These two facts, then, converge to indicate that the causative forms are basic to the lexicon, i.e. do not derive from more abstract non-causative structures.⁵ On the other hand, the other exceptional classes listed in 34) are not basic but associated with transformational devices, probably lexical insertion transformations. The facts presented above mirror those of English in a way which is perhaps not fortuitous. In English words such as elimination, derivation, etc. undergo the stress rules with the derivational suffix ion participating in crucial ways in these processes. However, suffixes such as the gerundive marker ing, adverbial ly, etc. are not relevant to the stress assigning mechanisms, e.g. they do not serve to make up strong clusters, etc., so that we get décently and not decéntly.⁶ This distinction fits naturally with the so-called 'lexicalist hypothesis' recently espoused by Chomsky, et. al. The Arabic facts are quite similar to those of English.

In place of nominalizations, however, we are considering causatives, and instead of stress rules, we are considering metathesis rules of the type discussed above. The similarity between the two cases is this: those items which appear in toto in the lexicon are not exceptions to the various rules of the phonological component. Those which arise by transformations, either grammatical or lexical insertion transformations, do not undergo certain, perhaps formally designatable, rules. The latter cases are semantically uniform in their interpretation, the former, understandably, idiosyncratic with some subregularities, but by no means a uniform class. This can be clarified further by means of a diagram.



The Arabic lexicon will contain items I and II. The causative morph 'a is part of the lexical entry II, whereas the 'a of the adjectives of color and defect (cf. I), comparatives, and verbs of surprise is not. The English lexicon contains items III and IV. Here the ending ion is part of the lexical entry, analogous to II, although the suffix ing⁷ is not, again analogous to I. Thus, there is a parallelism with English. Because II is a lexical entry, it undergoes the metathesis rule just as does IV, which is a lexical entry. But I and III are both inserted into more complex structures, the former yielding 'a+CCaC, the latter, ing+V. The latter fact may account for the exceptions encountered in both languages. The insertion of the word boundary after V and before ing to block stress assignment in such cases may be a formal representation of this deeper underlying fact. On the other hand it may be that the relevant rules, G-Metathesis and Stress Assignment in English apply in the lexicon itself to items I, II, III, and IV, thus automatically accounting for why ing is not relevant as an environment for stress in English.⁸ To prohibit the G-Metathesis rule from applying to item I, we might make use of the following redundancy

noted earlier:

39) G --> [-G-Metathesis] / __VG

On the other hand, if G-Metathesis applies in the lexicon, as just suggested, then tawiyl+u will derive from tawyil+u, as in fact suggested in Chapter VII, cf. 7.2.1, from which it follows that the w will not elide. Metathesis take tawyil+u into tawiyl+u and nothing more. It is not clear which of the possible alternatives is the correct one, however, the direction in which the solution lies is fairly clear. If this is so, then the lexical hypothesis is further strengthened and the level of deep structure is given empirical justification.⁹

8.5 Implications for Phonology

The data discussed in 8.1 and 8.2 indicate that Diphthongization is to be favored over w-to-y. This of course constitutes evidence in favor of the Local Ordering Theory and against the Cyclic Theory discussed at some length in Chapter VI. Nevertheless, let this not totally dissolve the issue, for there is still some conflicting evidence to come.

Footnotes to Chapter VIII

1. The lexical hypothesis is due to Chomsky (1967). Also cf. Chomsky (1967, 1970).
2. Of course the claim could be maintained if it could be shown that 20) is a universal rule or marking convention and that w-to-y is not. The exception redundancy would apply only to the rules of the grammar of Arabic and have no bearing on universal conventions, etc. However, there seems to be no independent evidence for making this distinction, and until such evidence is forthcoming, we must continue as in the text.
3. Again there is the possibility that Syllabicity Assimilation is universal. Cf. footnote 2.
4. That is, one cannot say 'The book is greener than the pencil' as one says 'The book is longer than the pencil'. Instead one must say 'The book is greater than the pencil in greenness', or some such similar periphrastic locution.
5. It is interesting to note that Fodor (1970) has drawn precisely this conclusion in English on the basis of grammatical evidence.
6. However cf. obligatory versus obligatorily, where ly does function as a lexical affix. One would expect there to be a semantic correlation with these phonological facts. That is, decently should be definable in terms of decent, but obligatorily not necessarily in terms of obligatory. I have not looked into this problem in any depth and am unable to determine whether this is so.
7. It is generally assumed that ing is moved to the post verbal position by a transformation, cf. Chomsky (1957).
8. That word level stress should apply in the lexicon fits nicely with some recent results of Bresnan (1970). Above it was noted that the wa of ma 'a+twal+a l+walad+u does not undergo Glide Metathesis. What about the

wa of l+walad+u? It is possible to include a word boundary, Ψ , between the definite article l ('al after non-vowels) and the stem and thus block Glide Metathesis from applying, much in the way stress is blocked in English when ing is present. But following the suggestion of the text, we also do not expect Glide Metathesis because the stem is inserted into the complex structure including the definite article l, viz. [l+[]_N]_N.

9. If the exception rules listed in 1) were not reduced to a single relevant case, the evidence for the lexical hypothesis would still stand, for it is independent of the former problem. This is mentioned in view of the turn taken in the following chapter, where it is argued that G-Metathesis (actually a more general rule) is the historically antecedent rule of Arabic, and later argued to be the correct rule for the modern literary language.

Chapter IX

METATHESIS

9.0 In this chapter a new look at G-Metathesis and the earlier rule of I.D. Metathesis, cf. 4.4, will reveal some striking similarities. The generalizations which become apparent in the course of this discussion may be captured by collapsing the two rules. The result is questioned in 9.3, where some evidence is given arguing against this solution. However, the evidence is of a tenuous nature, and new evidence uncovered in Chapters X, XI, and XII serves to prove that the conclusions drawn in 9.1 and 9.2 are correct, although not in detail. In Chapter X a historical explanation is attempted for why these two rules should have collapsed as one in the first place. Also some new synchronic evidence is offered.

9.1 Identical Consonant Metathesis

In 4.4 the rule of I.D. Metathesis was motivated by examples such as 'atbibā'+u --> 'atibbā'+u, among others. Let us repeat this rule, replacing the moved segment by \emptyset .

1) I.D. Metathesis: $C_k VC_k V \rightarrow \emptyset VC_k C_k V$

What is to be noted with some interest about this

giṭa9+u, 'pieces'; riṣw+at+u, 'bribe', is riṣā, 'bribes' (from riṣaw+u by Glide Elision, a-Assim., and Lengthening); and so forth. Another singular-plural alternation, which probably reduces to the former type, is the singular CuCC+at with CuCaC plural. For example nuqt+at+u, 'dot', becomes nuqat+u, 'dots'; rukḅ+at+u, 'knee', becomes rukab+u, 'knees'; etc. Finally it is to be noted that CaCC+at sometimes becomes CiCaC or CuCaC in the plural, e.g. qary+at+u, 'village', becomes qurā, 'villages' (from quray+u). We now have a potential set of forms in which the sequences iGa and uGa could occur. And we do find the desired examples.

3)	singular		plural	
	hiyl+at+u	ruse	ḥiyal+u	ruses
	• (becomes ḥīl+at+u)			
	ḍay9+at+u	village	ḍiya9+u	villages
	suwr+at+u	picture	ṣuwar+u	pictures
	• (becomes ṣūr+at+u)			
	dawl+at+u	state	duwal+u	states

Not surprising is the fact that w and y are retained in the plural. The presence of these high glides can be insured through either of two means. First we may place a condition on the Glide Eclipsis case of G-Metathesis, i.e. the a. case, as follows:

4) G-Metathesis:

$$\begin{Bmatrix} V \\ C \end{Bmatrix} i \ G \ V_j \ \rightarrow \begin{Bmatrix} V \\ C \end{Bmatrix} \emptyset \ V_j \ G, \text{ if } j=[+10], \text{ then } i=[+10]$$

This rule, along with the if-then condition, accounts for all the necessary cases which are summarized as 5).

- 5) aGa --> aaG
 aGi --> aiG
 aGu --> auG
 iGa --> iGa
 uGa --> uGa

The other approach, suggested by the results of the last chapter, is to forego the condition placed on 4) and to allow G-Metathesis to apply to iGa and uGa sequences giving iaG and uaG. The glides will later be eliminated by G-Syncope. The actual phonetic glides, however, are now predictable if the rule of Diphthongization (cf. 8.3) is adopted. This rule may be restated as 6).

6) Diphthongization: $\emptyset \rightarrow \begin{Bmatrix} y \\ w \end{Bmatrix} / \begin{Bmatrix} i \\ u \end{Bmatrix} \text{---}a$

The rule is an informal abbreviation for the change of ia to iya and ua to uwa. Under this analysis hiyal+u becomes hiayl+u by G-Metathesis, hial+u by G-Syncope, and hiyal+u by Diphthongization.

Similarly duwal+u becomes duawl+u, dual+u, and duwal+u. Let us refer to the former approach, i.e. that utilizing 4), as the CONDITION approach, and to the latter, i.e. that utilizing 6), as the DIPH. approach. It is obvious that if the CONDITION approach is adopted, the initial V and C of G-Metathesis in 2) cannot be omitted and brought in line with I.D. Metathesis, for the condition requires the presence of V_i, cf. 4). But now let us reexamine I.D. Metathesis to see if perhaps this rule might not give us a hint as to the correct statement of G-Metathesis. The plurals discussed in 4.4 constitute cases of $CC_k VC_k V$ sequences becoming $CVC_k C_k V$ by I.D. Metathesis. The initial C is added to bring out the parallelism between it and case b. of G-Metathesis, the old Glide Metathesis of 7.2. An example of this change is listed as 7).

7) 'at**ib**ā'+u --> 'at**ib**ā'+u

The relevant sequences have been underlined.

In addition to I.D. Metathesis with initial C as in 7), there are cases with with initial V, already noted in 4.4., i.e. $VC_k VC_k V$ --> $VVC_k C_k V$.

8) madad+a --> maadd+a (--> madd+a, cf. 42) of 4.4)

Again the relevant sequences are underscored to bring out the parallelism of this change with that of case a. of G-Metathesis, i.e. the old Glide Eclipsis. Now if I.D. Metathesis is stated with the initial V and C included in 7) and 8), this will bring it closer to the statement of G-Metathesis in 2).

$$\begin{array}{l}
 9) \text{ G-Metathesis: } \left\{ \begin{array}{c} \underline{V} \\ \underline{C} \end{array} \right\} G \quad V \quad \rightarrow \quad \left\{ \begin{array}{c} \underline{V} \\ \underline{C} \end{array} \right\} \emptyset \quad V \quad G \quad \begin{array}{l} \text{a.} \\ \text{b.} \end{array} \\
 \\
 \text{I.D. Metathesis: } \left\{ \begin{array}{c} \underline{V} \\ \underline{C} \end{array} \right\} C_k \quad V \quad C_k \quad V \quad \rightarrow \quad \left\{ \begin{array}{c} \underline{V} \\ \underline{C} \end{array} \right\} \emptyset \quad V \quad C_k \quad C_k \quad V \quad \begin{array}{l} \text{a.} \\ \text{b.} \end{array}
 \end{array}$$

This parallelism is brought out clearly in 9). The restatement of I.D. Metathesis of 9) contains two cases, just like G-Metathesis. Is there any independent evidence for restating I.D. Metathesis as 9)? There is. Suppose we find singular nouns of the shape $C_i C_k C_k +at$ and $C_u C_k C_k +at$. We know from the preceding discussion, cf. 3), that the plurals should be $C_i C_k a C_k$ and $C_u C_k a C_k$ respectively. However, now I.D. Metathesis would be applicable to the plurals of such representations. But we in fact find the following:

10)	singular		plural
	sikk+at+u	road	sikak+u roads
	limm+at+u	lock (hair)	limam+u locks
	qubb+at+u	dome	qubab+u domes

Note well that although the plural forms sikak+u, limam+u, and qubab+u meet the structural description of the rule of I.D. Metathesis, the rule does not apply. That is we do not get siakk+u, liamm+u, or quabb+u. In order to block application of I.D. Metathesis to such forms, and many others like them, an if-then condition must be placed on this rule.

$$11) \text{ I.D. Metathesis: } \begin{Bmatrix} V_i \\ C \end{Bmatrix} C_k V_j C_k V \rightarrow \begin{Bmatrix} V_i \\ C \end{Bmatrix} \emptyset V_j C_k C_k V,$$

if $j=[+10]$,
then $i=[+10]$

In other words, I.D. Metathesis will not apply in the case of $iC_k aC_k V$ and $uC_k aC_k V$ sequences, although it will apply to $aC_k aC_k V$, $aC_k iC_k V$, and $aC_k uC_k V$ sequences. The former case has been illustrated by means of madad+a \rightarrow maadd+a. The latter two cases can also be motivated. Compare the following paradigms:

12)

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

ḡalil+tu I remained

labub+tu I became sensible

ḡalil+ta you m.s. remained

labub+ta you m.s. became sensible

ḡalil+ti you f.s. remained

labub+ti you f.s. became sensible

ḡall+a he remained

labb+a he became sensible.

ḡall+at she remained

labb+at she became sensible

It was shown in 4.4. that madad+a and madad+at are the underlying representations for third person madd+a and madd+at respectively. It is not difficult to see that similarly δalil+a, δalil+at, labub+a, and labub+at underlie the third person δall+a, δall+at, labb+a and labb+at of 12). The surface forms may be derived according to the following derivations:

13)	madad+at	δalil+at	labub+at	
	maadd+at	δaill+at	laubb+at	I.D. Metathesis
	---	δaall+at	laabb+at	a-Assimilation
	madd+at	δall+at	labb+at	Truncation

The relevant cases are, then, covered by I.D.

Metathesis. The following changes can be listed with respect to this rule.

14)	$aC_k aC_k V$	-->	$aaC_k C_k V$
	$aC_k iC_k V$	-->	$aiC_k C_k V$
	$aC_k uC_k V$	-->	$auC_k C_k V$
	$iC_k aC_k V$	-->	$iC_k aC_k V$
	$uC_k aC_k V$	-->	$uC_k aC_k V$

This is exactly the set of changes noted in terms of G-Metathesis (11)) and listed as 5). If the statement of G-Metathesis embodied in 11) is adopted, then the two rules, G-Metathesis and I.D. Metathesis

the second radical, then the relevant identical C followed by a vowel must also be present. We shall see later that the converse implication does not hold, i.e. if V_j is followed by $C_k V$, the second radical may be G and 16) will still apply.

9.2 Further Similarities

In 9.1 it was pointed out that I.D. Metathesis and G-Metathesis are similar in several important respects. There are additional similarities to be noted. The first point concerns the relative ordering of I.D. Metathesis and G-Metathesis. We shall concentrate here on the b. cases of 15) only, i.e. on those cases of metathesis involving the sequences CGV and $CC_k VC_k V$. In chapter VII, section 7.2.2 a rather detailed argument was given proving that ta-to-tu, 22) of 7.2.2, must precede both Causative-'a-Deletion and Glide Metathesis, the latter being case b. of 15)A. By similar reasoning we can now show that ta-to-tu must precede case b. of I.D. Metathesis. This is obvious from the fact that the imperfect causative of the root mdd is yu+midd+u, 'he aids', tu+midd+u, 'she aids', from underlying ya+'a+madad+u and ta+'a+madad+u.¹ The derivations run as follows:

17)	ya+'a+madad+u	ta+'a+madad+u	
	ya+'a+mdad+u	ta+'a+mdad+u	Vowel Elision
	ya+'a+mdid+u	ta+'a+mdid+u	Ablaut
	yu+'a+mdid+u	tu+'a+mdid+u	ta-to-tu
	yu+mdid+u	tu+mdid+u	Caus.-Del.
	yu+midd+u	tu+midd+u	I.D. Metathesis

These derivations should be compared with those of 29) in 7.2.2 and particularly with 30) in that section. If ta-to-tu does precede Caus.-'a-Del., then clearly I.D. Metathesis cannot precede ta-to-tu, for the latter rule changes a to u only when followed by a single consonant plus a strong cluster, and I.D. Metathesis destroys the strong cluster. That is, if ya+'a+mdid+u is first converted to ya+'a+midd+u, then the a of ya is not followed by a single consonant plus a strong cluster, rather it is followed by a single consonant plus a weak cluster. This is precisely what was discovered in the case of 30) of 7.2.2. So that both hollow verbs and doubled verbs function identically with respect to ta-to-tu and I.D. Metathesis or G-Metathesis. There is another possibility, incidentally, which has not been discussed. One could allow Causative-'a-Del. to apply, to be followed by I.D. Metathesis or G-Metathesis, whereupon ta-to-tu would apply correctly yielding the correct results. The

derivations 17) above and 30) of 7.2.2 would then be replaced by 18) (omitting the derivation of yu+midd+u for brevity).

18) ta+'a+madad+u	ta+'a+xawaf+u	
ta+'a+mdad+u	ta+'a+xwaf+u	Vowel Elision
ta+'a+mdid+u	ta+'a+xwif+u	Ablaut
ta+mdid+u	ta+xwif+u	Caus.-Del.
ta+midd+u	ta+xiwf+u	I.D. Metathesis and G-Metathesis (or 16))
tu+midd+u	tu+xiwf+u	ta-to-tu
---	tu+xiiwf+u	V-Epenthesis
---	tu+xiif+u	G-Syncope
---	tu+xif+u	Lengthening

By this route, ta-to-tu is applicable after the metathesis processes have applied, for then the a of ta (and similar prefixes) is followed by a single consonant plus a strong cluster. However, 18) must be abandoned in favor of the earlier treatments 17) and 30) of 7.2.2 for the following reason. The imperfect of the non-derived form ya+madad+u becomes ya+mudd+u and not yu+mudd+u as predicted by 18).² In other words, the derivation must be 19), not 20).

19)	ya+madad+u	
	ya+mdad+u	Vowel Elision
	ya+mdud+u	Ablaut

ya+mudd+u I.D. Metathesis

20) ya+madad+u

ya+mdad+u Vowel Elision

ya+mdud+u Ablaut

ya+mudd+u I.D. Metathesis

yu+mudd+u ta-to-tu

Thus, it is the strong cluster created by Vowel Elision which is relevant to triggering ta-to-tu and not the strong cluster created by the metathesis processes. The same results are obtainable in the case of the non-derived hollow verb, underlying ta+xawif+u. This latter becomes ya+xāf+u as noted in chapter VII, and not yu+xāf+u as predicted by allowing ta-to-tu to follow G-Metathesis as in 18) and 20).

It seems correct then that both I.D. Metathesis and G-Metathesis follow ta-to-tu.³ Furthermore, from the preceding it is also correct to impute the ordering Vowel Elision-I.D. Metathesis and Vowel-Elision-G-Metathesis to Arabic phonology, for as noted above, the strong cluster created by application of Vowel Elision is the relevant strong cluster for triggering ta-to-tu. If Vowel Elision precedes ta-to-tu and ta-to-tu precedes I.D. Metathesis, then Vowel Elision precedes I.D. Metathesis and the same for G-Metathesis. At

least with respect to several rules, then, I.D. Metathesis and G-Metathesis behave similarly, again suggesting that they be collapsed, perhaps as 16).

In chapter VII, the singular-plural alternation, CaCaC-'aCCāC was discussed, cf. 7.1.1. Examples included maṭar+u, 'rain', 'amṭār+u, 'rains', among others. It was noted that underlying bawab+u becomes 'abwāb+u in the plural, and bāb+u in the singular, by Glide Eclipsis, etc., what is now referred to as G-Metathesis. A parallel set of forms may be adduced in the doubled stem category. Thus, the singular fanan+u will become 'afnān+u in the plural, meaning 'kinds', and fann+u in the singular by I.D. Metathesis and Truncation.⁴ There are two points to be made here. First, the pluralization process, whatever its formal nature, must be stated in terms of underlying singulars, for it is from bawab+u that we learn that the plural is 'abwāb+u, not from bāb+u. Another way of putting it is to say that the pluralization process precedes G-Metathesis. The same holds for I.D. Metathesis. Secondly, one must now note that given the present formal statement of G-Metathesis and I.D. Metathesis as 15) (or 16)), the latter should apply to the plurals. In other words, 'abwāb+u should become 'abāwb+u, which does not happen, and 'afnān+u should become 'afānn+u which

also does not happen. It seems then that the two metathesis processes, at least the b. cases, must be constrained so as not to apply when V_j is [+long]. So again, the two rules are similar. If this is correct, then G-I.D. Metathesis, 16), may be restated as 21).

21) G-I.D. Metathesis:

$$\left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \left\{ \begin{array}{c} G \\ \langle C_k \rangle_a \end{array} \right\} \check{V}_j \langle C_k V \rangle_b \rightarrow \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \emptyset \check{V}_j \left\{ \begin{array}{c} G \\ \langle C_k \rangle_a \end{array} \right\} \langle C_k V \rangle_b$$

Condition: if $j=[+lo]$, then $i=[+lo]$

Condition: if a, then b

Let us return now to the rule of Glide Elision, which was motivated in some detail in Chapters II and III. The rule applied to lame stems, i.e. to stems bearing a third radical w or y. Some of the environments relevant to the application of Glide Elision included the following:

22) $aG+a \rightarrow a+a$

$aG+i \rightarrow a+i \rightarrow a+a$

$aG+u \rightarrow a+u \rightarrow a+a$

The reader will acknowledge that these constitute a subset of the environments relevant to G-Metathesis, 4), listed in 5) above. Of course G-Metathesis was

collapsed with I.D. Metathesis as 21).

In discussing Glide Elision in Chapter III, we noted that one of the following sets of changes must persist if we are to account for the phonetics of Arabic.

23) A: $iG+a \rightarrow iG+a$
 $uG+a \rightarrow uG+a$
 B: $iG+a \rightarrow i+a \rightarrow iy+a$
 $uG+a \rightarrow u+a \rightarrow uw+a$

Solution A invoked the rule of w-to-y, and, given that rules are transitively ordered, demands a cyclic interpretation of rule ordering. This possibility was termed the Cyclic Solution and is listed in 35) of 6.2.3, and revised as 38) of 6.2.3. The B alternative of 23) above entailed a theory violating the transitivity condition. This possibility was designated the Local Ordering Solution, after Anderson, and is listed in 33) of 6.2.3.

In our earlier discussion of Glide Elision, we also pointed to the length condition. A condition on the length of V_j of Glide Elision was established in 3.4.

The reader will no doubt have already noted the similarity between the earlier rule of Glide Elision and the later rule of Glide Eclipsis, the latter being the present rule of metathesis, stated above as 15)A, and collapsed as 21). In fact, if we allow Glide Elision

to be a metathesis process, then rule 21) automatically subsumes all the examples of lame stems used to motivate Glide Elision in the first place. Indeed we would assume that the process taking ramay+a to rama+a and kawan+a to kaan+a to be identical in the first place. But now note well the fact that if Glide Elision is to be covered by 21), then the local ordering solution of 6.2.3 cannot be correct. This follows for the reason in 9.1 above, namely, we must not allow sikak+u, etc. to become siakk+u, for then, only an ad hoc rule would give us sikak+u as desired. But if Glide Elision is essentially the process represented in 21), then this if-then condition which prevents the unwanted change in the case of doubled stems also holds for lame stems, just as it holds for hollow stems too. If this is correct, then the cyclic solution is to be adopted and 38) of 6.2.3 is to be adopted, but in place of Glide Elision and I.D. Metathesis, we substitute rule 21), G-I.D. Metathesis. This theory is summarized in 24).

24)

Vowel Elision: cf. 35) of 6.2.3

ta-Elision: cf. 35) of 6.2.3

G-I.D. Metathesis: cf. 21)

w-to-y: cf. 35) of 6.2.3

Ablaut: cf. 35) of 6.2.3

Voc. Assim.: cf. 35) of 6.2.3

w-Occultation: cf. 35) of 6.2.3

L-Assim.: cf. 35) of 6.2.3

G-I.D. Metathesis: cf. 21)

w-to-y: cf. 35) of 6.2.3

Truncation: cf. 35) of 6.2.3

Voc. Assim.: cf. 35) of 6.2.3

Syl. Assim.: cf. 35) of 6.2.3

Lengthening

The connecting lines indicate that these three rules are cyclic and apply to the stem and to the word in that order. Of course the rules are to be stated only once in the grammar. Class II rules are stem level rules and all others are word level rules. It is to be noted that I.D. Metathesis, stated as 21), will never apply on the first cycle, i.e. on the stem cycle, because there will never be a final vowel present at this level, and this final vowel is required by 21) when C_{k_a} is taken.

underlying da9aw+uw:

- 26) da9aw+uw
 da9a+uww Glide Elision (restated as 21))
 da9a+uw G-Syncope, case b.
 da9a+u G-Syncope, case a.
 da9a+a a-Assimilation
 da9ā Lengthening

The correct phonetic representation, as pointed out in 4.6, is da9aw, 'they called', not da9ā, which is correct for underlying da9aw+a, as noted above.⁶

This theory requires that Truncation follow G-Syncope, for otherwise da9aw+a would become da9a+aw, and then da9a+w by Truncation, in which case we would never obtain the desired da9ā, 'he called'.

The set of rules listed under 24) seems to offer itself as a likely candidate for the synchronic phonology of Arabic. A good deal of evidence points in this direction, and in Chapter X, we shall attempt to give the hypothesis some historical (and synchronic) motivation. But now we wish to turn to some apparently

conflicting evidence. The ordering arguments which will follow are not at all tight, and we do not place a great deal of trust in them. Particularly the fact that n-Deletion can be stated so as to circumvent the ordering paradox should be noted. Also, keep in mind the fact that the distributional arguments pertain to third radical glides, not to medial radical glides. This is important, for in later chapters, it is shown that the earlier rule of Glide Elision, which applies to third radical glides, must not be collapsed with the two metathesis rules, I.D. Metathesis and Glide Metathesis, which we ultimately conclude are collapsed.

9.3.0 Some Speculation on the Nature of Metathesis

Rule 21) is not consistent with the results obtained in Chapter VIII, where it was argued that if w-to-y were dropped in favor of Diphthongization, then, certain exceptional phenomena would fall out as a natural consequence. The argument in that section is striking in view of the fact that the same general sort of argument was developed in favor of Glottal Epenthesis over Glottal Formation, the latter being the less natural looking rule.

In yet another way, the results of Chapter VIII are at odds with 21). This concerns the length condition placed on \underline{V}_j in 21). It was argued in 8.3 that G-Metathesis does apply to forms such as 'i+ɣtiwāl+u and 'i+n+qiwād+u, giving ultimately 'i+ɣtiyāl+u and 'i+n+qiyād+u, but that forms such as 'i+kti wā'+u, 'i+nṛati wā'+u, etc. do not undergo the rule, explaining why it is that w remains. If the latter were exceptions to G-Metathesis alone, then it would follow that they also failed to undergo Diphthongization. However not so if w-to-y were a rule in the grammar. If this were the case the latter types of examples would be exceptions to w-to-y but not to 21) as its statement prohibits metathesis before long vowels. Yet alternations involving the same roots, e.g. kaway+ā, 'they d. ironed', and taway+ā, 'they d. folded', would be exceptions to the metathesis rule. But in the theory with 21), i.e. with G-Metathesis collapsed with I.D. Metathesis, along with w-to-y, these facts are unrelated. That is, there is no principled reason for why it is that just in case a stem is exceptional with regard to 21), it is also exceptional with regard to w-to-y. The theory incorporating Diphthongization, however, gives a rather deep and plausible reason for why this must be so. Yet the two theories are incompatible with one another. If w-to-y is adopted, then the generalization expressed

in 21) is possible, i.e. the two metathesis processes are collapsed. But here the facts of Chapter VIII are not explained by other than ad hoc means. If 21) is abandoned in favor of 15)A or some similar rule, and if Diphthongization is added to the grammar and w-to-y dropped, then the facts of Chapter VIII are explained, but the fact that I.D. Metathesis functions in much the same way as G-Metathesis is not explained.

Let us point once again to the similarities existing between I.D. Metathesis and G-Metathesis. These may be summarized as 27).

27)	I.D. Metathesis	G-Metathesis
a.	$aC_k aC_k V \rightarrow aaC_k C_k V$	$aGa \rightarrow aaG$
	$aC_k iC_k V \rightarrow aiC_k C_k V$	$aGi \rightarrow aiG$
	$aC_k uC_k V \rightarrow auC_k C_k V$	$aGu \rightarrow auG$
	$iC_k aC_k V \rightarrow iC_k aC_k V$	iGa
	$uC_k aC_k V \rightarrow uC_k aC_k V$	uGa
b.	$iC_k \bar{a}C_k V \rightarrow iC_k \bar{a}C_k V$	$iG\bar{a}$
c.	$CC_k VC_k V \rightarrow CVC_k C_k V$	$CGV \rightarrow CVG$
d.	$CC_k \bar{V}C_k V \rightarrow CC_k \bar{V}C_k V$	$CG\bar{V} \rightarrow CG\bar{V}$

The left-most column summarizes the data bearing on I.D. Metathesis. In the a. and c. examples, \underline{V}_j of 21) is [-long], whereas this vowel is [+long] in the b. and d. examples. The a. and b. examples represent the application of 21) where \underline{V}_i constitutes the first term of the structural description. The c. and d. examples constitute applications of 21) where \underline{C} is taken as the first term of the structural description. Examples of all these cases have been given but one. This is the b. case which may now be motivated by examples such as 'i+mtidād+u, 'stretching', a verbal noun completely analogous to forms such as 'i+γtiyāl+u and 'i+ktywā'+u, repeated above and first noted in 8.3.

It is to be observed that just where the if-then condition is violated and just where \underline{V}_j is [+long], we do not find I.D. Metathesis having any affect on the underlying representations. These cases include the final two examples of a., examples of the b. variety, and those of type d. In all the remaining cases, we do find a change. Rule 21) correctly predicts the total distribution of data tabulated in the left-most column of 27). Turning to the right-most column of 27), headed G-Metathesis, we see that in the clear cases, these parallel the I.D. Metathesis cases undeniably. Further,

such clear cases include not only examples which display a parallel change, i.e. the first three cases of a. and case c., but also one clear set of examples where the change is prohibited, i.e. d., represented by examples such as 'afnān+u, 'abwāb+u, and many others. Thus, as noted in collapsing the two metathesis processes in the first place as 21), the distributional evidence is certainly of some consequence in determining what happens in the unclear cases iGa, uGa, and iGā which are at issue. To repeat, 21) dictates that iGa, uGa, and iGā remain as such, perhaps rightly so in view of the distribution of the clear cases of G-Metathesis as compared with the total distribution of the cases of I.D. Metathesis. However, the results of Chapter VIII, repeated above, argue otherwise, namely, that iGā, and hence iGa and uGa, undergoes G-Metathesis, later to become iyā by Diphthongization. Either way, then, we miss an important generalization, and it is by no means clear what the true nature of things is.

We wish now to turn to some new evidence, which if correct, would allow for the Diphthongization approach. The strongest argument against the Diphthongization approach, however, is given in 9.4. This along with the evidence brought forth in coming chapters would seem to argue in favor of the rule of w-to-y.

9.3.1 The Distributional Argument

To the examples of 27) listed under G-Metathesis we may now append the following:

- 28) a. aG+a --> a+aG
 aG+i --> a+iG
 aG+u --> a+uG
 iG+a
 uG+a
 b. iG+ā
 uG+ā
 c. CG+V --> CG+V
 d. CG+V̄ --> CG+V̄

Here we have listed the environments illustrated much earlier in terms of the rule of Glide Elision. These examples all pertain to lame stems. The last two cases of a. and the b. cases are at issue. Whether they are to be treated by 21), along with w-to-y, or by a relaxed version of 21), along with Diphthongization is

not yet decided. But now note that whereas case d. of 28) parallels case d. of 27), i.e. there is no application of 21), case c. of 28) does not parallel case c. of 27), i.e. in 28) no change takes place. In 27) we do find a change. The latter change is represented by examples such as $ya+xwaf+u \rightarrow ya+xawf+u$, etc. The former lack of change is represented by cases such as ra'y+u+n, 'opinion', which does not become ra'+iy+n which would ultimately give incorrect ra'+ī+n. However, 21) predicts just this incorrect result. To 28) we may now add the following cases relevant to the correct statement of I.D. Metathesis:

- 29) a. $aC_k+aC_kV \rightarrow aC_k+aC_kV$
 $aC_k+iC_kV \rightarrow aC_k+iC_kV$
 $aC_k+uC_kV \rightarrow aC_k+uC_kV$
 $iC_k+aC_kV \rightarrow iC_k+aC_kV$
 $uC_k+aC_kV \rightarrow uC_k+aC_kV$
 b. $iC_k+\bar{a}C_kV \rightarrow iC_k+\bar{a}C_kV$
 c. $uC_k+\bar{a}C_kV \rightarrow uC_k+\bar{a}C_kV$
 $CC_k+VC_kV \rightarrow CC_k+VC_kV$
 d. $CC_k+\bar{V}C_kV \rightarrow CC_k+\bar{V}C_kV$

Here we find that no metathesis ensues. That is to say, we never find I.D. Metathesis applying with the effect of moving C_k over a morpheme boundary. I.D. Metathesis applies only to doubled verbs. Examples illustrating

the non-application of I.D. Metathesis in situations such as those depicted in 29) include badan+u+nā, 'our body', where an+u+nā meets the structural description of I.D. Metathesis, yet does not become bada+un+nā; ʔabbat+at+ā, 'they f.d. fastened', where at+at+ā meets the conditions for I.D. Metathesis 21), and yet there is no change; and so on with numerous analogous examples. In brief then, there is no I.D. Metathesis process analogous to G-Metathesis across morpheme boundaries. This can be accounted for, however, by altering 21) to include the stem boundary].

30) G-I.D. Metathesis:

$$\left\{ \begin{matrix} V_i \\ C \end{matrix} \right\} \left\{ \begin{matrix} G \\ \langle C_k \rangle_a \end{matrix} \right\} V_j \langle C_k] V \rangle_b \rightarrow \left\{ \begin{matrix} V_i \\ C \end{matrix} \right\} \emptyset V_j \left\{ \begin{matrix} G \\ \langle C_k \rangle_a \end{matrix} \right\} \langle C_k] V \rangle_b \quad \begin{matrix} a. \\ b. \end{matrix}$$

Conditions: same as 21)

The symbol] must represent the stem boundary, and not the morpheme boundary, because of examples such as ʔabbat+at+ā noted above.

It is possible to conclude in this subsection, on the basis of examples such as ra'y+u+n, that 21) or 30) is not correct as stated. One means of overcoming this difficulty which readily comes to mind is to account for those cases of elision of third radical glides by a separate rule, the old rule of Glide Elision.

But then an additional generalization would be lost. Let us return to this problem below. Now we wish to turn to a new set of facts relevant to determining the correct synchronic grammar of Arabic.

9.3.2 An Ordering Argument: n-Deletion

Of relevance is the ordering of n-Deletion, a rule we attempt to motivate below, with respect to the metathesis processes. Consider the indefinite marker n, which has been encountered in numerous examples throughout this work. This particle appears finally in the word, after case endings, as in kitāb+u+n, 'book-nom.-indef.', ḡasal+i+n, 'honey-gen.-indef.', bayt+a+n, 'house-acc.-indef.', etc. This indefinite particle also finds its way to plural nouns, as in 'aṣḥur+u+n, 'months-nom.-indef.', 'abwāb+u+n, 'doors-nom.-indef.', kutub+u+n, 'books-nom.-indef.', etc. But when the plural noun is of three or more syllables (excluding case endings), then the indefinite n must be dropped. Compare the examples of 31).

31)	singular		plural
a.	ma+k _t ab+u+n	office	ma+kātib+u offices
b.	9aqrab+u+n	scorpion	9aqārīb+u scorpions
c.	9aṣfūr+u+n	bird	9aṣāfīr+u birds
d.	sāḥil+u+n	shore	sawāḥil+u shores
e.	Ṣāhid+u+n	example	Ṣawāhid+u examples
f.	ṭabīb+u+n	doctor	'aṭibbā'+u doctors
g.	xalīl+u+n	friend	'axillā'+u friends

A couple of plural formation processes are involved here. We have already witnessed CaCCVC+at --> CaCāCiC and CaCīC --> 'aCCiCā'. Examples a.-e. represent the former type, only with at omitted from the singular. Examples f.-g. represent the latter, only I.D. Metathesis applies to the plural. It should be noted that sāḥil and Ṣāhid are actually sawḥil and Ṣawḥid at a more abstract level, accounting for the w in the plural. These forms are discussed in more detail in Chapter XII. The importance of these examples derives from the fact that n cannot co-occur with the plural forms of 31). Yet we know that n was present in the deep representations because adjectives which modify nouns agree with the head noun in definiteness. So that simple balad+u+n, 'town-nom.-indef.' when modified by the adjective 'big' is balad+u+n kabīr+u+n, 'town-nom.-indef. big-nom.-indef.'

indef. big-fem.-nom.-indef.'⁸ But observe that the plurals of 31) select adjectives with the indefinite n, viz. ma+kātib+u kabīr+at+u+n, 'offices-nom. big-fem.-nom.-indef.', 9aqārib+u kaθīr+at+u+n, 'scorpions-nom. many-fem.-nom.-indef.'. This suggests that there is a rule dropping n when the stem of the plural is three or more syllables.

32) n-Deletion: $n \rightarrow \emptyset / \text{CVC}_1^{\text{O}}\text{VCVC}+\text{V}+\underline{\quad}$

This rule will turn ma+kātib+u+n to ma+kātib+u, 9aqārib+u+n to 9aqārib+u, etc. The crucial examples may now be brought forward. Singular jāriy+at+u+n (from jawriy+at+u+n analogous to sāhil+u+n etc.) becomes in the plural jawāri+n, 'slave girls', where the final n signifies indefiniteness. Similarly, nāhiy+at+u+n, 'district' (from nawhiy+at+u+n) takes plural nawāhi+n, 'districts'. We may account for the fact that n remains in these examples if we assume that the third radical glide is moved (or deleted) before the n-Deletion rule has a chance to apply.

33)	<u>jawāriy+u+n</u>	<u>nawāhiy+u+n</u>	
	<u>jawāri+uy+n</u>	<u>nawāhi+uy+n</u>	metathesis
	---	---	n-Deletion
	<u>jawāri+u+n</u>	<u>nawāhi+u+n</u>	G-Syncope
	<u>jawāri+i+n</u>	<u>nawāhi+i+n</u>	i-Assimilation

The examples involving doubled stems, however, behave differently. Consider the following:

- 34) $9\bar{a}mm+u+n$ $9aw\bar{a}mm+u$ public
 ($\leftarrow 9awmim+u+n$) ($\leftarrow 9aw\bar{a}mim+u+n$)
- $ma+h\bar{a}ll+u+n$ $mah\bar{a}ll+u$ places
 ($\leftarrow ma+h\bar{l}l+u+n$) ($\leftarrow ma+h\bar{a}lil+u+n$)

The underlying representation for $9\bar{a}mm+u+n$ is $9awmim+u+n$ analogous to $sawhil+u+n$, etc. of 31). If the plural is not formed, the singular undergoes I.D. Metathesis in a manner identical to that presented in 4.4, cf. 44). The singular $ma+h\bar{a}ll+u+n$, 'place' is underlain by $ma+h\bar{l}l+u+n$, a noun of place of the same pattern as $ma+ktab+u+n$ of 31).. This example also undergoes I.D. Metathesis if it is not pluralized. The plurals are formed from the underlying representations as noted in several places above, cf. 9.2, so that the plural of $9awmim+u+n$ and $ma+h\bar{l}l+u+n$ should be $9aw\bar{a}mim+u+n$ and $ma+h\bar{a}lil+u+n$ respectively as noted in the parentheses of 34). But note carefully that the indefinite n is deleted in the phonetic representations of 34). If I.D. Metathesis applies before n-Deletion, however, as in 33), the n will not be elidable by Rule 32). On the other hand if

n-Deletion applies before I.D. Metathesis, we achieve the desired results.

35)	9awāimim+u+n	ma+hāilil+u+n	
	9awāimim+u	ma+hāilil+u	n-Deletion
	9awāimm+u	ma+hāill+u	I.D. Metathesis
	9awāamm+u	ma+hāall+u	a-Assimilation
	9awāmm+u	ma+hāll+u	Truncation

If this is correct and if the process called metathesis in 33) is really G-Metathesis, then clearly G-Metathesis and I.D. Metathesis cannot be collapsed, for they are ordered differently with respect to n-Deletion: G-Metathesis precedes n-Deletion as in 33) and I.D. Metathesis follows n-Deletion as in 35).

There are two ways of overcoming this consequence. Perhaps n-Deletion could be restated so as to allow the two metathesis processes to apply before n-Deletion.⁹ Secondly, one could enter the different stems in the lexicon with the required orders specified therein. The latter move would, according to the theory advocated by Anderson, require CCG root bearing stems to be entered lexically specified for the order Metathesis-n-Deletion since this is the marked order. The doubled stems need not be specified since they undergo the unmarked order and this according to Anderson

is given by linguistic theory. Either of these attempts to overcome the ordering paradox evinced here may be correct, but our feeling is that both are ill-conceived. Without any evidence to support this intuition, it should be pointed out, nevertheless, that marking CCG stems lexically so as to undergo the rules in the marked order is somewhat suspicious in view of the fact that certain non-lexical material is crucial to the application of n-Deletion, including the obvious indefinite particle n as well as the endings marking case. On the face of it, it would seem strange that lexical items should be specified for any orders other than those directly applicable to the item in question. But then this is still an open question.

Let us recapitulate the central theme of the discussion. The earlier rule of G-Metathesis, 4), may be collapsed with I.D. Metathesis, and there are some reasons for doing this, as noted in 9.1 and 9.2. In addition, G-Metathesis, 4), is also collapsable with a revised version of Glide Elision, i.e. a version in which the latter is also considered to be a metathesis process. All three processes might plausibly be reduced to the single rule 30), which is a highly desirable generalization of a good deal of distributional evidence discussed earlier. But the distributional

evidence unveiled in 9.3.1 and the ordering discrepancy discovered in this subsection, if correct, argue otherwise--that G-Metathesis and I.D. Metathesis not be collapsed. Let us, in accordance with these observations, restate I.D. Metathesis and G-Metathesis as follows:

36) I.D. Metathesis:

$$\left\{ \begin{array}{c} V_i \\ C \end{array} \right\}_{C_k} \check{V}_j C_k]V \quad \rightarrow \quad \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \emptyset \check{V}_j C_k C_k]V \quad \begin{array}{l} \text{a.} \\ \text{b.} \end{array}$$

Condition: if $V_j = [+10]$, then $V_i = [+10]$

37) G-Metathesis:

$$\left\{ \begin{array}{c} V_i \\ C \end{array} \right\}_G \check{V}_j \quad \rightarrow \quad \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \emptyset \check{V}_j G \quad \begin{array}{l} \text{a.} \\ \text{b.} \end{array}$$

Condition: if $V_j = [+10]$, then $V_i = [+10]$

Before turning to a second ordering paradox, it might be appropriate to point out here that once 30) is broken up into two rules, 36) and 37), then the removal of the length condition on 37), along with the if-then condition on this rule, become conceivable. Before discussing this possibility further, however, let us now turn to another set of data of some interest to the correct statement of 37).

9.3.3 A Second Ordering Argument: Infixation

As hinted at earlier, the ordering argument which

follows is somewhat tentative, but nevertheless suggestive and probably correct in principle, although a good deal more needs to be said of detail.

In 8.1 two verb-noun alternations were discussed. These included 'i+n+CaCaC-'i+n+CiCāC and 'i+CtaCaC-'i+CtiCāC. The noun is formed from the verb by lengthening the stem vowel and changing the preceding vowel to i. To these classes can be added two new ones.

38) a. 'i+n+kasar	'i+n+kisār
b. 'i+ktašaf	'i+ktišāf
c. 'a+dxal	'i+dxāl
d. 'i+sta+qbal	'i+sti+qbāl

Classes a. and b. of 38) are those presented in 8.1. The new classes are listed as c. and d. The verbs are listed in the left-hand column (without person suffixes) and the nouns derived from the verbs, the verbal nouns, are listed in the right-hand column (without case endings). As we can clearly see, the same means of forming the noun are used in the c. and d. examples as used in the case of a. and b. The stem vowel is lengthened and the preceding vowel turned to i. We now wish to explain the exact means by which the stem vowel is lengthened. This may be clarified by

substituting hollow roots for those listed in 38).

39)	verb	expected noun	actual noun
a.	'i+n+qawam 'i+n+qām	'i+n+qiwām 'i+n+qiyām	'i+n+qiyām
b.	'i+qtawam 'i+qtām	'i+qtiwām 'i+qtiyām	'i+qtiyām
c.	'a+qwam 'a+qām	'i+qwām	'i+qāma
d.	'i+sta+qwam 'i+sta+qām	'i+sti+qwām	'i+sti+qāma

Under the verb column first the underlying representation is given, then the actual phonetic representation follows. In the a. and b. cases the phonetic verb is derived quite regularly by G-Metathesis, G-Syncope, and Lengthening. The c. and d. verbs are also derived regularly by G-Metathesis, V-Epenthesis, G-Syncope, and Lengthening. The verbal nouns of the a. and b. classes are just those verbal nouns one expects to find, already discussed in Chapter VIII in some detail. However, the verbal nouns of the c. and d. classes are somewhat a surprise, for instead of the expected 'i+qwām and 'i+sti+qwām, we find 'i+qāma and 'i+sti+qāma, with a long stem vowel, but also with a final a. This set of forms differs from the a. and b. ones in an interesting way however. Consider the verbs once again. In the a. and b. verbs it is case a. of G-

Metathesis which sets off the processes which bring about the long a. In the c. and d. cases it is case b. of G-Metathesis which does this. This is because the medial glide of the a. and b. examples has an adjacent vowel on either side, whereas the medial glide of the c. and d. verbs has an adjacent vowel only to the right side. Now it is clear that the long vowel of the actual verbal nouns of c. and d. could have been caused by case b. of G-Metathesis, but the long vowel of the actual verbal nouns of cases a. and b. could not have been so caused, since case a. of G-Metathesis has no effect due to the fact that a phonetic y shows up. What could have caused the lengthening in the a. and b. cases of verbal nouns then? We now have an explanation for this lengthening and for the mysterious final a of the c. and d. verbal nouns. This a may be taken to be the verbal noun morpheme, which infixes in the a. and b. cases to form a long vowel, but not in the c. and d. cases since the long vowel already formed prohibits its infixation here. We could then derive the verbal nouns as follows:

- 40) 'i+n+qawam+a 'i+qtawam+a
 'i+n+qawaam 'i+qtawaam Infixation
 'i+n+qiwaam 'i+qtiwaam Dissimilation
 'i+n+qiwām 'i+qtiwām Lengthening

The y of these forms may be obtained by turning w to y after i, i.e. after Dissimilation applies, or by adopting the suggestion of Chapter VIII and allowing case a. of G-Metathesis to apply after Dissimilation, whereupon y will be later inserted by Diphthongization. The rules of Infixation and Dissimilation may be stated as 41).

41) Infixation: $XVCVC] a \rightarrow XCVaC]_N$

Dissimilation: $a \rightarrow i / _C_{\circ}aaX]_N$

Now the verbal nouns of the c. and d. cases of 39) may be derived as follows:

42)	'a+qwam+a	'i+sta+qwam+a	
	'a+qawm+a	'i+sta+qawm+a	G-Metathesis, case b.
	'ā+qaawm+a	'i+sta+qaawm+a	V-Epenthesis
	'a+qaam+a	'i+sta+qaam+a	G-Syncope
	--	--	Infixation
	'i+qaam+a	'i+sti+qaam+a	Dissimilation
	'i+qām+a	'i+sti+qām+a	Lengthening

Whether Infixation is to apply as indicated in 42) or directly after G-Metathesis, in either case it will be blocked by virtue of the fact that G-Metathesis has

already applied. But in 40) Infixation apparently applies before G-Metathesis has a chance to apply. Here once again we are left with a paradoxical state of affairs. In 42) we find G-Metathesis then Infixation; in 40) we find Infixation then G-Metathesis. Notice, however, that in derivation 40) it is case a. of G-Metathesis that is relevant, cf. 36), while in derivation 42) it is case b. of G-Metathesis. This seems to indicate that these two cases are not to be collapsed as a single rule. Rather they are to be considered as two distinct rules, restated below as 43).¹⁰

- 43) a. Glide Eclipsis: $V_i G \check{V}_j \rightarrow V_i \emptyset \check{V}_j G$
 Condition: if $j=[+10]$, then $i=[+10]$
 b. Glide Metathesis: $C G \check{V} \rightarrow C \emptyset \check{V} G$

Case a. has been designated Glide Eclipsis for facility of reference, although the earlier term was used for this rule in the deletion format. Case b. has been renamed Glide Metathesis. Case b. will apply first, followed by Infixation, whereupon case a. will apply. That is, the following ordering relations have been established by 40) and 42).

- 44) { Glide Metathesis 43)b.
 { Infixation 41)
 { Glide Eclipsis 43)a.

It is probably significant that Glide Metathesis precedes Glide Eclipsis, as illustrated in 44). Recall that in 9.3.1 the following facts were pointed out:

45)		HOLLOW		LAME		
	Glide Eclipsis:	$VG\check{V}C]$	$-->$	$V\check{V}GC]$ $VG]V\check{V}$	$-->$	$V]V\check{V}G$
	Glide Metathesis:	$CG\check{V}C]$	$-->$	$C\check{V}GC]$		$CG]V\check{V}$

That is to say, whereas both hollow and lame stems lose their glides (if the if-then and length conditions are not violated) by Glide Eclipsis, only hollow stems lose their glides by Glide Metathesis, never lame stems.¹¹ Thus, ra'y+u+n, 'opinion', ramy+u+n, 'throwing', da9w+at+u+n, 'call', etc. remain as such in phonetic representations. But this now makes sense, for clearly Infixation is a rule which applies only to stems (note the necessity for inclusion of the stem boundary]), and we have just shown that Glide Metathesis applies solely to the stem. That is, this rule is a rule which applies at the level of the stem, never at the level of the word. It is thus not a coincidence that it is not Glide Eclipsis which precedes Infixation. There is, then, some independent confirmation of the results obtained here in section 9.3, although this evidence is by no means conclusive.

If 43) is correct, i.e. if Glide Eclipsis and Glide Metathesis are two separate rules, and if it is correct to separate the rules of Glide Metathesis and I.D. Metathesis, then the Diphthongization solution becomes possible. However, it should be noted that the argument against collapsing I.D. Metathesis with G-Metathesis, cf. 36) and 37), is due to the n-Deletion argument and the distributional argument. Both are based on the earlier rule of Glide Elision, however, not on the earlier rule of Glide Eclipsis or Glide Metathesis. Thus, it is theoretically possible that I.D. Metathesis should be collapsed with the latter two processes and not with Glide Elision. In other words, the generalization may involve collapsing the metathesis processes applying to the medial root segment, but not the third root. This in fact turns out to be true, as we shall motivate in Chapter XII.

9.4 Conclusion

In this chapter a by no means accidental parallelism between the two metathesis processes, that treating G and that treating identical consonants, has been uncovered. This parallelism, noted in 9.1 and 9.2, suggests that the rules are all to be collapsed. However the evidence of 9.3 suggests otherwise. This whole matter will be cleared up once and for all in Chapter XII. However, now we wish to note that it is theoretically impossible to adopt the Diphthongization solution without additional ad hoc machinery. This follows from the fact that the glides do not elide from the following forms:

- 46) ṣalaw+āt+u+n prayers
 fatay+āt+u+n girls
 qawām+u+n stature
 bayān+u+n statement

If the length condition were dropped from the rule which drops the glides, then quite obviously no rule, Diphthongization or otherwise, can in principle predict the correct high glide given the current theory of generative phonology. These examples argue that it is entirely correct to place a length condition on the rule in question, as in fact indicated by the

need for the condition for I.D. Metathesis. The only means of side-stepping examples such as 46), if Diphthongization is to be maintained, is to add a new condition to the Glide Elision rule, as stated in 47).

47) $G \rightarrow \emptyset / V \underline{\quad} V$ Condition: if a, then b
 $\langle +hi \rangle_b \langle +lg \rangle_a$

Although 47) is theoretically available, it will become clear in the following chapters that this is really a move in the wrong direction. Consequently we shall adopt the theory outlined in 24) above, although to focus more clearly on the metathesis process as it applies to the glide, or as it applies to identical consonants, we retain the individual designations, G-Metathesis and I.D. Metathesis. If this is correct, still the problems exposed in the preceding section must be overcome. Footnote 9) offers us an easy escape from this paradox. The problem of the ordering of Glide Metathesis and Glide Elision will be discussed further in Chapter XII.

Footnotes to Chapter IX

1. Underlying representations such as these were motivated in terms of hollow stems in 7.2.2. The same arguments apply to doubled verbs and the reader should review 7.2.2 to verify this.
2. According to the theory of local ordering, ta-to-tu followed by I.D. Metathesis bears an unmarked order in 17), but a marked order in 19), i.e. feeding in the former and bleeding in the latter. Consequently the non-causatives of 19) must be specified lexically to undergo the rules in the marked order while the causatives need not be so specified, since the unmarked order is given by linguistic theory. But note that the theory of local ordering allows for both of 17) and 18) since with causatives either ta-to-tu followed by I.D. Metathesis or I.D. Metathesis followed by ta-to-tu is an unmarked order. If one of 17) or 18) could be given independent justification, then the theory of local ordering would be refuted (barring any redefinition, of course). The theory of Chomsky and Halle allows for 17) and not 18) because of 19). That is, it makes the stronger claim, and therefore is, *ceteris paribus*, to be preferred.
3. They need not follow Caus-Del. however. Cf. 31) of 7.3.
4. Actually singular fann+u can be represented as fann in the lexicon since some instances of CaCC singulars do become 'aCCāC plurals. However there should exist some CaC_iaC_i singulars in underlying representations, or otherwise there would be a gap in the lexicon. That is, all stems would display roots of the shape CC_iC_i and CC_iC_j, $i \neq j$, except one type, the singular CaCaC which would be CaC_iaC_j. For this reason, we assume that phonetic fann+u takes as its basic stem, fanan. However little rests on this assumption, for other types of examples could readily be adduced to make the point that pluralization must take place before I.D. Metathesis as well as before G-Metathesis.

5. Of course it is always possible to drop Diphthongization in favor of w-to-y and still adopt a theory of local ordering. But we shall continue to make the strongest claim possible (i.e. that rules are transitively ordered) until a potent reason presents itself for doing otherwise. Such a reason would be a paradoxical rule ordering situation which finds no natural cyclic interpretation, such as the Diphthongization approach entails.
6. Recall that braces are to be expanded conjunctively, parentheses and angles disjunctively. Cf. The Sound Pattern of English for an explication of these universal principles.
7. Actually in Chapter X it will become clear that a somewhat more abstract version of 21) was the historical antecedent.
8. Note that non-human plurals select feminine singular adjectives, accounting for why we find at in kabir+at+u+n.
9. For example, the rule could be restated as (i).
 (i) n-Deletion: $n \rightarrow \emptyset / \text{CVC}_1^b \text{VC}_0^1 \text{VC}_1^2 + \text{V} + _$
 This rule would correctly delete n from 9awāim+u+n after metathesis, but not from jawāriy+u+n after metathesis. Thus, one order could be maintained and thus, the difficulty mentioned in the text overcome.
10. The preceding argument is tentative because of the following reasons: The a of 'i+qām+a and 'i+sti+qām+a, which we take to be the infix in other derived forms, is followed by t in certain constructions and when the case ending is appended, viz. 'i+qām+at+u l+mu+'tamar+i, 'the convening of the conference', etc. There is a question as to status of t. Is it underlying or epenthetic? If it is underlying, then there may be some difficulty in correctly predicting its disappearance in the infixed examples. However, whatever difficulties may exist are probably not totally insuperable.
11. However this must be qualified, which we do in Chapter X with a few cases of lame stems which apparently undergo the rule. But these forms clearly do not reflect a productive class. Rather they are historical relics, and as such, give us an important hint as to the earlier situation in Arabic.

Chapter X

HISTORICAL MOTIVATION

10.0 In 9.1-9.2 a number of similarities between the various metathesis processes were brought to light, suggesting that all these cases be collapsed as a single rule. In this chapter we attempt to determine the historical antecedent of this collapsed metathesis rule. Before turning to this conjecture, and the evidence brought forward to support it, we may offer one additional piece of evidence for collapsing the two metathesis rules, G-Metathesis and I.D. Metathesis, as a single schema.

10.1 Exceptions Again

In Chapter VIII a whole slew of exceptional classes were turned up. These were found to be exceptions to the rule of G-Metathesis, and if w-to-y is to be preferred to Diphthongization, to this rule as well. One class of exceptions noted in that discussion was the class of verbs of defect, including 9awij+a, 'it became crooked', 9awir+a, 'he became one-eyed', etc. It would be a striking fact if we found doubled verbs of this class also to be exceptions to I.D. Metathesis. This would be explained if both G-Metathesis and I.D. Metathesis were the same process. This seems to be true

as Wright, for example, lists the following exceptions to I.D. Metathesis:

- 1) $\underset{\cdot}{\text{sakik}}+a$ he was knock-kneed
 $\text{ma}\overset{\cdot}{\text{š}}\text{i}\overset{\cdot}{\text{š}}+a$ he had a swelling on the pastern
 $\text{'alil}+a$ he smelled badly
 $\text{lahih}+a$ he was sore (of the eye)
 $\text{9azuz}+at$ she had narrow orifices of the teats

One naturally expects these forms to undergo I.D. Metathesis just as $\underline{\delta alil}+a$ becomes $\underline{\delta dill}+a$, and eventually $\underline{\delta all}+a$. Thus, just as the hollow verbs of defect refuse to allow G-Metathesis to change their character, so it is also with doubled verbs and I.D. Metathesis, which strongly supports our claim that the two rules are to be collapsed as a single rule.

10.2 The Historical Antecedent

Let us restate G-IID. Metathesis below as 2).

$$2) \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \left\{ \begin{array}{c} G \\ \langle C_k \rangle_a \end{array} \right\} V_j \langle C_k \rangle V \rangle_b \quad \rightarrow \quad \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \emptyset \quad V_j \left\{ \begin{array}{c} G \\ \langle C_k \rangle_a \end{array} \right\} \langle C_k \rangle V \rangle_b \quad \begin{array}{l} a. \\ b. \end{array}$$

Conditions: if $j=[+10]$, $i=[+10]$

if a, then b

This rule is a schema composed of two conjunctively ordered subcases. Historically we know that such cases may arise when two rules which are similar in statement

come together in the set of ordered rules. When two such rules are adjacent, we assume they collapse.¹ Thus, one might suspect that this is the situation in Arabic. That G-Metathesis and I.D. Metathesis eventually came together in the ordered set of rules, and as a result were conflated as a single schema. While this is plausible, and while some fairly convincing cases have been found of this kind of change, we shall argue that 2) was in a fact once a far simpler rule. This suspicion must be reckoned with in the first place, for the rule of I.D. Metathesis does not appear to be the natural type of metathesis rule that would appear independently in any grammar. Thus, we shall argue that instead of 2), originally the following rule was part of the grammar of Arabic:

$$3) \begin{Bmatrix} V_i \\ C \end{Bmatrix} X V_j C]V \rightarrow \begin{Bmatrix} V_i \\ C \end{Bmatrix} \emptyset V_j X C]V$$

condition: if $V_j = [+10]$, $V_i = [+10]$

That is we want to press the claim that G and C_k once constituted a natural class of sounds, and hence the metathesis rule was not to be viewed as two subcases as far as these segments were concerned. Now it is the case that metathesis rules normally operate on sonorants such as the liquids, nasals, glides, and vowels. Thus, it is not strange that X would in part

represent the class \underline{G} , i.e. \underline{w} and \underline{y} , which is already assumed to be relevant to metathesis. Following this up, we might expect C_k , part of X , also to be a glide, for then X would indeed form a natural class of elements. Let us then restate 3) with the symbol G' to keep in mind this conjecture.

$$4) \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} G' V_j C]V \rightarrow \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \emptyset V_j G' C]V$$

Condition: same as 3)

If this is true a later rule of gemination will take those glides now relevant to I.D. Metathesis and assimilate them to the following radical, giving us C_k . Let us designate this subclass of G' by the new symbol Y . Our task is to determine the nature of Y . There is some empirical evidence which supports this hypothesis and delimits \underline{y} as the glottal stop '_1 , which falls together with \underline{w} and \underline{y} quite naturally. The argument is based on well-known distributional constraints on underlying adjacent radicals. It is a fact that first and second, or second and third, radical segments may not differ in just one of the lower order features such as voicing, emphasis, etc. Thus, we find no roots of the pattern \underline{dtC} or \underline{tdC} , where the first and second radicals differ only in the feature of voicing. Nor do we find any roots

of the pattern Cdt or Ctd, where the second and third radicals differ in only the feature of voicing. The constraints on first and second radical co-occurrence are thus largely mirrored by constraints on the second and third radical co-occurrence. Now notice that it is not only true that the first and second radicals may not differ in only one low-level feature, it is also true that they may never be identical, i.e. there are no roots of the shape $C_k C_k C$. We would surmise from this fact that there should be no roots of the shape $CC_k C_k$, where the second and third radicals are identical. But these are just the root types which participate in I.D. Metathesis, i.e. those for which Y is represented by phonetic C_k . If the medial radical of such stems were specified as underlying Y, however, then the distribution is just that expected from the distribution of first and second radical segments. There is, then, morpheme structure evidence supporting our hypothesis that C_k is the more abstract Y, a member of the class G'. But how is one to identify Y? The procedure is as follows: All roots with identical

second and third radicals are prohibited by the general morpheme structure conditions which prohibit all such adjacent radicals. Further, since X will invariably assimilate to the following radical, we may discover the true nature of X by determining what doubled stem is absent from the total set of doubled stems. That is, CXC_i will invariably become CC_iC_i. It is just the underlying configuration CXX which by assimilation would yield CXX, but by the morpheme structure condition will be ruled out as a possible underlying root. Since both the underlying and phonetic representations would be identical, we simply need look for what doubled stem is non-existent in order to determine what X is. If, for example, no roots of the shape Cdd can be found, we might conclude that X=d. It is probably no coincidence that there are no doubled roots of the shape C'', i.e. where the second and third radicals are both glottal stop. By the morpheme structure condition, the abstract X, if glottal stop, would automatically be prohibited in the configuration CXX, which is to say that C'' could never exist. It is no coincidence that ' falls together so naturally with w and y and is furthermore a likely candidate to initiate gemination. There is then ample reason to believe that at one point in time doubled

roots were the more abstract C'C discussed above and that 4) was the original rule of metathesis.

To further point out the similarity between C_k and G, we might note the following paradigm:

- 5) xif+tu I feared
 xif+ta you feared
 xif+ti you f. feared
 xāf+a he feared
 xāf+at she feared

These alternations are accounted for in the following chapter. For the present we may merely note that the underlying stem is in every case xawif, as demonstrated for the latter two cases in Chapter VII. Compare the differences in the two types of stems with that of the doubled verb.

- 6) ḍalil+tu I remained
 ḍalil+ta you remained
 ḍalil+ʃf you f. remained
 ḍall+a he remained
 ḍall+at she remained

In both 5) and 6) we find the third person stems differing from the first and second persons stems. The difference is due to the fact that third person stems begin with V, and the others, with C. Now

texts exhibit in place of ḍalil+tu, ḍalil+ta, etc., the forms ḍil+tu, ḍil+ta, etc. The latter are of course exactly parallel to 5). It appears, then, that doubled verbs and hollow verbs did at one time function identically. But this is captured by setting up ḍa'il+tu, ḍa'il+ta, etc., parallel to xawif+tu, xawif+ta, etc. The changes were once brought about by rule 4) with the final V deleted. Once ' assimilated to the final radical, the first and second person stems no longer underwent the earlier rule and we may assume that there was a restructuring in the lexicon, with C_k no longer recognized as ' , and with the angled brackets a new development of this restructuring.²

There is good reason to believe that C_k is no longer recognized as synchronic ' . First the angled brackets of 2) suggest that this is so, although still ' could be substituted for C_k in this rule. The fact of the matter is, however, that the glottal stop assimilation rule is no longer an active part of Arabic phonology, although glottal stop assimilation rules do exist, e.g. 'i+'tamar+a becomes 'i+ttmar+a, 'he deliberated', which is related to 'amar+a, 'he ordered'. The same type of assimilation is found in the case of initial w and y, cf. e.g. 'i+wtaṣal+a, which becomes 'i+ttasal+a, 'he contacted', which is

related to wasal+a, 'he arrived'. Thus, 't, wt, and yt become tt in such examples, proving that w, y, and ' do function as a natural class and do assimilation to the following consonant in such examples. It is therefore natural that ' should have assimilated to the third radical to form doubled verbs. But this particular assimilation rule is no longer alive.

A second reason for the restructuring pertains again to the exceptional classes noted in Chapter VIII. We have already noted that one class of these exceptions holds for both hollow and doubled verbs. The others however do not. Compare the following table:

7) Defect:	9awir+a	ṣakik+a
Comparative:	'atwal+u	'aṣadd+u
Surprise:	ma 'a+ṭwal+a	ma 'a+ṣadd+a

Whereas 'atwal+u, 'taller', was shown to be an exception to G-Metathesis, 'aṣadd+u derives from 'aṣdad+u and therefore obviously is not. The same goes for the verbs of surprise. The doubled verbs undergo metathesis, the hollow verbs do not. It is only the verbs of defect which apparently retain the older identify of exceptionhodd which once existed.

Thus, it appears that the conjunctively ordered rule is the correct synchronic rule of Arabic. We shall in a moment briefly discuss the rule of Glide Elision and its relation to these processes, giving a hint as to things to come in the future development of Arabic. First, however, we shall give one more class of examples, demonstrating the affinity of hollow and doubled verbs.

There is another fact which is explainable by recourse to the more abstract glottal stop etymology of doubled verbs. Notice that the following is a typical singular-plural alternation:

8) singular	plural
CaCC+at+u	CaCaC+āt+u
ḥaml+at+u attack	ḥamal+āt+u attacks
ṯany+at+u fold	ṯanay+āt+u folds
ḥalb+at+u race track	ḥalab+āt+u race tracks
ba9a+at+u delegation	ba9aā+āt+u delegations

The plural of singulars of the shape CaCC+at is formed by two changes: the feminine ending at is lengthened, and an a is inserted between the second and third radicals. One could conjecture that instead of being inserted, this a is present in underlying representations, and dropped only in the singular. However, the fact that there are many singulars of the shape CaCaC+at indicates that this a is not underlying. Compare the following examples.

9) CaCaC+at+u	
9ataḏ+at+u	doorstep
ṣabak+at+u	net
ṯamar+at+u	fruit
9aqab+at+u	incline

It is not possible, therefore, to assume a CaCaC+āt source for the singulars of 8), for then the forms of 9) would not be predictable by other than ad hoc means. But now notice the following singular-plural alternations which must be compared with those of 8).

10)	singular		plural
	CaCC+at+u		CaCC+āt+u
	wayl+at+u	calamity	wayl+āt+u calamities
	mawz+at+u	banana	mawz+āt+u bananas
	9ayb+at+u	disgrace	9ayb+āt+u disgraces
	ḥabb+at+u	kernel	ḥabb+āt+u kernels
	ḥayy+at+u	snake	ḥayy+āt+u snakes
	marr+at+u	time	marr+āt+u times

Whereas in 8), a vowel is inserted between the second and third radicals in the plural, no such vowel is inserted in the forms of 10). But the plural forms 10) consist of hollow and doubled stems. In other words, there must be a condition put on the epenthesis rule which prohibits the insertion of a to hollow and doubled stems. But clearly this condition can be much simplified if both the doubled and hollow stems are of the same type when the rule applies. The proposal whereby

doubled verbs derive from roots with second radical
 ' allows for this simplification, although it is
 dubious that this is still the synchronic representa-
 tion.

Note that what we claim was the earlier rule of
 Arabic, 4) [but perhaps without the final V], immediately
 eliminates the possibility that this rule could have
 applied to lame stems, i.e. to stems with third radical
 glides, cf. ramay+a --> rama+a. This is consonant with
 the historical observations that can now be made. We
 know that Glide Elision was added to the grammar much
 later than the metathesis rules. This follows from
 historical evidence from Ethippic (=Ge'ez) and Canaanite,
 where final radical glides were apparently pronounced,
 since they are written, but medial radical glides were
 not, since they were not written, cf. Ethiopic kōn+a,
 'he was' (Arabic kān+a, 'he was', from kawan+a) and
talaw+a, 'he followed' (Arabic talā from talaw+a).
 In other words, Glide Elision is a later innovation
 to Arabic, and it seems reasonable that this rule has
 not yet collapsed with the metathesis rules stated
 as 2). This will in fact be borne out by later dis-
 cussion, where we show that Glide Elision is a word
 level rule. It seems quite probable that Glide Elision
 is on its way to being collapsed with G-Metathesis.
 For indeed a number of the distributional similarities

point in this direction, e.g. the if-then condition. The real difference is that whereas CGV --> C \bar{V} in hollow verbs, this is not the normal case for lame verbs, i.e. CG+V does not become C \bar{V} . There are nevertheless a small handful of examples which do seem to display this change. Consider the following:

11)	'ax+u+n	brother	'ax+ \bar{u} +ka	your brother
	'ab+u+n	father	'ab+ \bar{u} +ka	your father
	bayt+u+n	house	bayt+u+ka	your house
	ra'y+u+n	opinion	ra'y+u+ka	your opinion

First, we expect the case ending u to show up in both columns for all forms, but for some strange reason we find long u in the first set of examples in the right-most column. If we realize that these examples apparently possess only two radicals, contrary to the principle of triplicity of root consonants, we emerge with an explanation. If we posit underlying 'axw and 'abw, then the first set of examples is explainable by the metathesis derivation.

12)	'axw+u+n	'axw+u+ka	
	'ax+uw+n	'ax+uw+ka	metathesis
	'ax+uu+n	'ax+uu+ka	V-Epenthesis and G-Syncope
	'ax+u+n	'ax+uu+ka	Truncation
	'ax+u+n	'ax+ \bar{u} +ka	Lengthening

We may in fact prove that there was an underlying w by citing alternations such as 'axaw+iiyy+u+n, 'brotherly', and 'abaw+iiyy+u+n, 'fatherly', where iiyy is a morpheme commonly encountered in forms such as 9arab+iiyy+u+n, 'Arab, adj.' (cf. 9arab+u+n, 'Arabs'), etc.

The examples which appear to exhibit the change $CG+V \rightarrow C\bar{V}$ are no more than a handful, being for the most part kinship terms. The normal situation is for there to be no change, cf. ra'y+u+n, da9w+at+u+n, etc. It would appear then that either these few cases which do seem to undergo metathesis are representative of a new tendency, that the Glide Elision rule is moving up the set of ordered rules so as to collapse with the metathesis rule, or else the two rules are separate and the kinship terms are some traces of the earlier time when all cases of $CG+V$ underwent the change. The evidence from Ethiopic, etc. indicates that the former is the direction of the change, although the latter is not implausible. At any rate, we shall see later that Glide Elision and G-Metathesis are indeed two separate rules, even though the conditions placed on these rules are the same.

It seems reasonable to conclude from the discussion in Chapter VIII that Diphthongization was once the means of accounting for ɪwa \rightarrow iya, etc. That is, it seems likely that there was no if-then condition placed on metathesis at an earlier stage in the

history of the language. But because of the imposition of this condition, it seems that the rule of w-to-y is now the correct approach. This could account for the fact that two rules of w-to-y are needed in the cumulative set of rules given in Chapter XIV. On the other hand, the change might be the other way. That is, the newer approach might be that of Diphthongization. That is, it may be that the G-Metathesis and I.D. Metathesis rules are splitting up into new rules, which is not an unnatural continuation of the change from 4) to 2). Before these problems are cleared up, a good deal of work is still needed in this area. Let us return now to the synchronic grammar of Arabic, to the problem of more adequately accounting for the alternations which hollow stems display.

Footnotes to Chapter X

1. For a particularly striking example of this type of change, see Kiparsky (1968). But also see Anderson (1969) for some important observations concerning this example.
2. There is a long standing dispute among workers in historical Semitic. One group, no doubt the majority, argues that Semitic was originally biliteral, i.e. that roots were once composed of two radicals, not three. Their evidence consists first, of some examples where a third radical has apparently been attached. Such examples are quite rare. The second piece of evidence these gentlemen use to argue for their position is the fact that doubled verbs disobey the constraint noted above and hence must once have been bi-radical. They never consider the theory advanced above. Nor do they ever analyze the data in any depth whatsoever. These people also claim that hollow verbs are underlying bi-radical historically. The complete and utter bankruptcy of this position had already been pointed out by Fleisch (1968) who notes

si w, y sont venus constituer la 1^{re} ou la 3^e consonne d'une racine, pourquoi n'auraient-ils pu aussi constituer la 2^e? Pourquoi l'exclure? Pourquoi ces w, y, consonnes fortes comme les autres, signalees plus haut pour l'arabe, le geez, le tigray, seraient-ils tous necessairement de formation secondaire?

This, then, constitutes the second position, held by linguists who have some respect for the data, and who know that a theory must be based on evidence. Until the evidence is forthcoming to the contrary, we may safely assume that Semitic is, and was, tri-consonantal in nature.

Chapter XI

Hollow Verbs

11.0 The study of hollow stems was begun in Chapter VII. In this chapter we wish to give a more exhaustive treatment of hollow verbs. This discussion leads quite naturally to more detailed investigation of stem rules such as L-Assimilation, w-Occultation, and others, some of which were touched upon in earlier sections of this work. We are proceeding on the assumption that 24) of 9.2 is correct, but we retain the terms G-Metathesis and I.D. Metathesis for facility of reference.

11.1 Regular Hollow Verbs

In the preceding chapter, the following alternations were noted in conjunction with G-I.D. Metathesis.

1)a.xif+tu	I feared	xif+nā	we feared
xif+ta	you m.s. feared	xif+tum	you m.p. feared
xif+ti	you f.s. feared	xif+tunna	you f.p. feared
b.xāf+a	he feared	xāf+ū	they m.p. feared
xāf+at	she feared		

We know from the discussion of Chapter VII that the stems of 1) are underlain by xawif, cf. xawwaf+a, 'he frightened', etc. Thus, the a. stems of 1) must pass from xawif to xif, those of b., from xawif to xāf. We have already proposed a mechanism by which the b. stems may be realized. The following derivation is representative of this change.

- 2) xawif+at
 xaiwf+at G-Metathesis
 xaaf+at a-Assimilation
 xāf+at Lengthening

How now are the stems of 1)a. to be derived? If the glide elides from these stems in a manner analogous to 2), then these stems will also end up with an a-grade vowel, although short in this case, due to the subsequent application of Truncation. The a. examples, then, differ from the b. examples in having pre-consonantal suffixes. This distinction may now be relied on to account for the difference in the stem vowel. Suppose

we propose the following highly tentative rule:

3) VG-Elision: VG --> Ø / __VC]C

This rule will correctly take xawif+tu into xif+tu, xawif+ta into xif+ta, etc., while not affecting sequences such as xawif+a, xawif+at, etc.

Turning now to underlying Class-A stems such as kawan and bayar, which become kān and sār when followed by suffixes beginning with vowels, e.g. kān+a, 'he was', sār+ū, 'they went', etc., we may now note that analogous to the a. examples of 1), we encounter the following:

4) kun+tu	I was	kun+nā	we were
kun+ta	you m.s. were	kun+tum	you m.p. were
kun+ti	you f.s. were	kun+tunna	you f.p. were
sir+tu	I went	sir+nā	we went
sir+ta	you m.s. went	sir+tum	you m.p. went
sir+ti	you f.s. went	sir+tunna	you f.p. went

Notice that Rule 3) does not directly account for these examples, because kawan+tu, etc., and sayar+tu, etc., become kan+tu, etc., and sar+tu, etc.¹ by this rule. There is an obvious explanation for these

data. Whenever w is the second radical of a Class-A stem, u will show up in forms of the type illustrated in 4). When y is the second radical of Class-A stems, i occupies the medial position. This suggests the following rule:

5) Stem-vowel Assim: a --> $\begin{Bmatrix} u \\ i \end{Bmatrix} / \begin{Bmatrix} w \\ y \end{Bmatrix} _C]$

This rule will take underlying kawan+tu and sayar+tu, etc., into kawun+tu and sayir+tu, etc., whereupon VG-Elision yields the desired kun+tu, sir+tu, etc. Note that 5) will apply to a only, since underlying xawif+tu does not become xawuf+tu, for this would give the undesired sequence xuf+tu, instead of the desired xif+tu. It is also to be noted that the stem boundary] is included in 5) so as to prevent forms such as wasal+a, 'he arrived', from becoming the incorrect sequence wu₁sal+a. Finally note that it makes little difference whether underlying kawan+a, sayar+at, etc. undergo 5), for after Glide Elision, a-Assimilation will always be available to turn kaun+a, sair+at, etc. to the desired result. If we wished to block 5) in such cases, we could simply add v after the stem boundary in 5).

Turning now to the imperfect aspect of hollow verbs, we might once again consider the class-B stem xawif. If we prefix Ca, by Vowel Elision we get Ca+xwif+u in the indicative mood, and Ablaut now applies, yielding Ca+xwaf+u. At this point, G-Metathesis, V-Epenthesis, and G-Syncope may apply, giving Ca+xaaf+u, which by Lengthening becomes the desired Ca+xāf+u, e.g. 'a+xāf+u', 'I fear', 'ta+xāf+u', 'you fear', etc. The complete derivation is given in 6).

6)	ta+xawif+u	
	ta+xwif+u	Vowel Elision
	ta+xwaf+u	Ablaut
	ta+xawf+u	G-Metathesis
	ta+xaawf+u	V-Epenthesis
	ta+xaaf+u	G-Syncope
	ta+xāf+u	Lengthening

The class-A stems will undergo a similar derivation.

7)	ta+kawan+u	ta+sayar+u	
	ta+kwan+u	ta+syar+u	Vowel Elision
	ta+kwun+u	ta+syir+u	Ablaut
	ta+kuwn+u	ta+siyr+u	G-Metathesis
	ta+kuuwn+u	ta+siiyr+u	V-Epenthesis

ta+kuun+u	ta+siir+u	G-Syncope
ta+kūn+u	ta+sīr+u	Lengthening

Now consider the derivation given in 6). Once ta+xwif+u becomes ta+xwaf+u by Ablaut, if 5) were to apply, ta+xwaf+u would be incorrectly changed to ta+xwuf+u, which would give incorrect ta+xūf+u ultimately. Thus, it would appear that Rule 5) is to precede Ablaut. On the other hand, when we consider all the examples of the class-A type, i.e. of the type illustrated in 7), we note that all stems of this type take u in the imperfective if the medial radical is w, and i if the medial radical is y. In other words, Ca+CwaC+u invariably becomes Ca+CwuC+u, and Ca+CyaC+u invariably becomes Ca+CyiC+u. In order to account for this fact by Ablaut, it would be necessary to state the following redundancy in the lexicon.

8) CawaC --> [+F]

Recall that [+F] is the feature which accounts for the change of a to u by Ablaut, as outlined in detail in Chapter V. But here we are losing a generalization. For instead of 8), we could utilize ~~anew version of~~

Rule 5) to account for this distribution of data. And this implies that 5) follows Ablaut. The new rule of Stem-vowel Assimilation must therefore be stated to apply to any vowel, but only to class-A stems. The restatement of 5) desired, then, is found in 9).

9) Stem-vowel Assim: $V \rightarrow \begin{Bmatrix} u \\ i \end{Bmatrix} / \begin{Bmatrix} w \\ y \end{Bmatrix} \text{---}C] / [+A]$

The feature [+A] is assumed to be the feature needed to distinguish class-A stems from class-B and class-C stems. Rule 9), then, will not only take kawan and sayar into kawun and sayir in the perfective aspect as desired, but also Ca+kwan will become Ca+kwin by Ablaut, and then Ca+kwun by 9). If rule 9) were to apply before Ablaut, the imperfective ta+sir+u would not be derivable, for ta+syar would become ta+syir by 9), and then ta+syar by Ablaut, which would give ultimate ta+sär+u rather than the desired ta+sir+u. Thus, if 9) is the correct way of accounting for the redundancies existing in perfective and imperfective class-A hollow verbal stems, then it follows that Stem-vowel Assimilation follows Ablaut. Rule 9) thus accounts for why it is that there are no imperfectives of the shape Ca+CwiC or Ca+CyuC as well as accounting for the perfective CawuC and CayiC,

which must arise in the course of the derivation from CawaC and CayaC to CuC and CiC respectively.

To conclude this section, we have now motivated two new rules, first, VG-Elision, which must precede G-Metathesis, and Stem-vowel Assimilation, and second, Stem-vowel Assimilation, which follows Ablaut and precedes VG-Elision, as illustrated below.

- 10) { Ablaut
 { Stem-vowel Assimilation
 { VG-Elision
 { G-Metathesis

11.2.0 Exceptional Hollow Verbs

There are several classes of examples which behave quite differently from the examples adduced in 11.1 with respect to VG-Elision and Stem-vowel Assimilation. These examples are of two types: the truly irregular or exceptional forms, and those which do not undergo the rules as a result of the particular statement of the rules. Let us commence with the interesting class of irregular verbs.

11.2.1 Irregular Verbs

In Chapter VIII the interesting class of exceptional stems bearing glides in both the second and third

radical positions was discussed. Examples included forms such as kaway+tu, 'I ironed', taway+ta, 'you m.s. folded', 'away+tâ, 'you m.s. sought shelter', etc., and it was pointed out in that chapter that forms such as the latter are exceptional as regards the rule of G-Metathesis. We may now note that these forms are also exceptions to the rule of VG-Elision 3). We do not find the following expected changes:

- 11) kaway+tu --> kay+tu
 taway+ta --> tay+ta
 'away+ta --> 'ay+ta

Thus, if 3) is a rule of Arabic, these forms must be marked as exceptions to this rule.

In Chapter VIII it was also noted that verbs of color and defect are exceptions to G-Metathesis. Thus, it was pointed out that sawâd+a, 'he became black', and 9awir+a, 'he became one-eyed', do not undergo the rule of G-Metathesis. We may now note that sawâd+tu, 'I became black', and 9awir+ta, 'you m.s. became one-eyed', do not undergo the rule of VG-Elision 3). Thus, once again we are confronted with a situation where several apparently distinct classes of examples are exceptions to more than a single rule. We would like to

follow the procedure of Chapter VIII and attempt to reduce the exceptional rules to one (even though this is apparently not the case for the present synchronic grammar of Arabic, for w-to-y, cf. Chap. XII). Let us once again investigate the relevant abstract stems (which have already undergone Stem-vowel Assimilation).

12) xawif+tu	kawun+tu	sayir+tu	a.
xawif+ta	kawun+ta	sayir+ta	
xawif+a	kawun+a	sayir+a	b.
xawif+at	kawun+at	sayir+at	

Recall that the a. stems of 12) undergo VG-Elision. The b. stems do not. In addition, those stems of column I are class-B stems. Those of column II and III are class-A stems. Hence xawif does not undergo Stem-vowel Assimilation as do the others. Suppose now we were to apply the rule which assigns stress in Arabic to 12)? The rule of stress assign-

ment of Arabic is very much like the Romance Stress Rule. It stresses the last strong cluster of the word, with one exception to be noted in Chapter XII. If there is no strong cluster, stress is placed according to the Romance Stress Rule for all categories of speech. This may be illustrated by the following examples.

13)

dáxxal+at	kitāb+u+n	kātab+at
daxál+tu	kātib+u+n	malík+at+u+n
sāfár+tu	katab+ú+hu	málik+u+n
qábl+a	sāfar+a	fáqat
daxxál+tu+hu	kātib+ī+na	lán

Thus, the rule of Stress Assignment is essentially 14).

14) Stress Assignment: $V \rightarrow [1 \text{ stress}] / _C_0((VC)VC_0^1)\Psi$

This rule predicts that should a form contain a strong cluster followed by three weak syllables, stress will be assigned on the weak syllable following the strong cluster, not on the strong cluster syllable. This prediction is borne out by examples such as yādár+a+hu, 'he left it', ya+ftátih+u, 'he opens it (ceremoniously)', etc., where stress is correctly assigned by 14). Returning now to the examples of 12), we now see that 14) will assign those forms which undergo VG-Elision

stress on the penultimate syllable, being a strong cluster, whereas those forms which undergo Glide Elision will receive stress on their antepenultimate syllable. It is now evident that the phonetic difference between those stems deriving from CaGVC+CV sequences and those deriving from CaGVC+V(C) may be due to stress. Let us therefore assign stress before applying G-Metathesis. This gives the following changes.

- 15) xawif+tu xawif+a kawun+tu kawun+a sayir+tu sayir+a
 xawif+tu xawif+a kawun+tu kawun+a sayir+tu sayir+a 14)
 xaif+tu xaif+a kaun+tu kaun+a sair+tu sair+a G-Meta-
 thesis,
 etc.

In addition the following rule may be added to the grammar of Arabic.

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

This rule will correctly bring about the following:

- 17) xaif+tu xaif+a kaun+tu kaun+a sair+tu sair+a
 xiif+tu -- kuun+tu -- siir+tu -- Prog. Assim.
 -- xaaf+a -- kaan+a -- saar+a a-Assim.
 xif+tu -- kun+tu -- sir+tu -- Truncation
 -- xaf+a -- kan+a -- sar+a Lengthening
 xif+tu xaf+a kun+tu kan+a sir+tu sar+a

By proceeding in this way, we totally eliminate the need for the rule of VG-Elision in Arabic. Rather, the already needed rule of G-Metathesis performs the task of eliminating the medial glide. This is not necessarily a simplification of the phonology, for a new rule, 16), is now needed. However, when we now return to the exceptional classes, repeated as 18), we observe that now these forms are no longer exceptions to both G-Metathesis and VG-Elision. Rather, they are exceptions to the one rule of G-Metathesis.

18)a. kaway+tu I ironed taway+tu I folded
 kaway+ta you ironed taway+ta you folded

b. sawid+tu I became black 9awir+tu I became one-eyed
 sawid+ta you became black 9awir+ta you became one-eyed

We may now show that 16) is wrong in view of the fact that I.D. Metathesis precedes Stress Assignment.

19) ta+madad+u
 ta+mdad+u Vowel Elision
 ta+mdud+u Ablaut
 ta+mudd+u I.D. Metathesis
 ta+müdd+u Stress Assignment

In other words, I.D. Metathesis creates the strong cluster which is relevant to Stress Assignment. It feeds the rule of Stress Assignment, whereas this is not the case if Stress Assignment precedes G-Metathesis as in 15) and 17). Earlier we argued that I.D. Metathesis and G-Metathesis are to be collapsed as a single rule of G-I.D. Metathesis. The reader may interpret this as an argument against that move. However, it may be shown now that there is independent evidence for assuming that Stress Assignment follows, not precedes, G-Metathesis. This evidence consists in the fact that phonetic ta+kūn+u, ta+xāf+u, etc. are stressed not on the initial syllable, but on the penultimate syllable. In other words, the following derivation is required.

20)	ta+kwun+u	ta+xwaf+u	
	ta+kuwn+u	ta+xawf+u	G-Metathesis
	ta+kúwn+u	ta+xáwf+u	Stress Assignment ²
	ta+kūn+u	ta+xāf+u	V-Epenthesis, G-Syncope, and Lengthening

If Stress Assignment applied before G-Metathesis, then we would expect to find tá+kūn+u and tá+xāf+u, which is untrue.

It is also possible to show that Stress Assignment

is a very low level rule. It must follow Truncation for the following reasons: In Chapter I, we noted that the jussive mood is marked by the absence of any mood suffix. Thus, we find ta+ktub, ta+nzil, etc. conjugated in the jussive. However, ta+kwun, ta+xwaf, etc., after Vowel Elision and Ablaut have applied, yield tá+kun and tá+xaf in the jussive. The following derivations will account for this stress pattern.

21)	ta+kwun	ta+xwaf	
	ta+kuwn	ta+xawf	G-Metathesis
	ta+kuun	ta+xaaf	V-Epenthesis, G-Syncope
	ta+kun	ta+xaf	Truncation
	tá+kun	tá+xaf	Stress Assignment

If Stress Assignment applies after G-Metathesis, as proved by 20), but before Truncation, then we would have expected ta+kún and ta+xáf, which is incorrect.

Therefore Stress Assignment follows Truncation.

The conclusion to this discussion, then, is that 15) and 17) are incorrect as they stand. But if we reconsider these derivations carefully, we may notice that the crucial ordering is not really Stress Assignment and G-Metathesis, but rather Stress Assignment and a-Assimilation. That is, it is important that the stress distinction be made before the quality of the stem vowel resulting from

Stem-vowel Assimilation loses its identity. If we further restate Truncation as 22), note that derivations 15) and 17) may be replaced by 23).

22) Truncation: $V \rightarrow \emptyset / _VC \left\{ \begin{array}{c} \Psi \\ C \end{array} \right\}$

23) Derivations of Hollow Stems

xawif+tu xawif+a kawun+tu kawun+a sayir+tu sayir+a

xaiɸ+tu xaif+a kaun+tu kaun+a sair+tu sair+a G-Metathesis,
V-Epen., G-Syn.

xif+tu xaif+a kun+tu kaun+a sãɸtɸtu sair+a Truncation

xíɸ+tu xáif+a kún+tu káun+a sír+tu sáir+a Stress Assign.

xíɸ+tu xáaf+a kún+tu káan+a sír+tu sáar+a a-Assim.

xíɸ+tu xáf+a kún+tu kán+a sír+tu sár+a Lengthening

In other words, the rule of Progressive Assimilation is no longer even needed in the grammar, for the re-statement of Truncation automatically accounts for the phonetic representations.

If we return bræefly to the discussion of lame stems initiated in Chapter IV, we will recall that there it was shown that ta+rmū+nà, 'you m.p. throw', derives from underlying ta+rmiy+uw+na, and ta+d9ī+na, 'you f.s. call', derives from underlying ta+d9uw+iy+na, both by means of Glide Elision, i-u-Assimilation, the old version of Truncation, and Vocalic Assimilation. This was the sole motivation in fact for the second

application of Vocalic Assimilation, cf. 24) of 9.2. However, according to our new conception of Truncation, there is no longer any need for this second application of Vocalic Assimilation, nor is there any reason for the assimilation rules to apply.

24)	ta+rmiy+uw+na	ta+d9uw+iy+na	
	ta+rmi+uw+na	ta+d9u+iy+na	Glide Elision (or metathesis, epenthesis and syncope)
	ta+rm+uw+na	ta+d9+iy+na	Truncation
	ta+rm+uu+na	ta+d9+ii+na	Syl. Assim.
	ta+rm+ū+na	ta+d9+ī+na	Lengthening

(We henceforward omit Stress Assignment where irrelevant.)

This discussion, which began with an inspection of the exceptional weak verbs (cf. 11) and 18), leads to a number of interesting results for the phonology of Arabic as a whole. First, there is no rule of VG-Elision. Second, there is no rule of Progressive Assimilation. Third, there is no second application of Vocalic Assimilation. And finally, Truncation may be restated as 22), which must precede Stress Assignment, and apparently, the assimilation processes as well.

It now seems correct to believe that the irregular forms listed in 18) are exceptions, not to G-Metathesis and VG-Elision, but only to the former, for the latter

does not exist. However, it should now be noted that the irregular forms of the a. category of 18) are not only exceptions to G-Metathesis, they are also exceptions to Stem-vowel Assimilation, 9).

That is, kaway+tu does not become kawuy+tu, taway+tu does not become tawuy+tu etc. It appears that we may correctly block application of this rule to forms such as these by requiring the final consonant of Stem-vowel Assimilation be a true consonant, which we may represent by the informal abbreviation c. Stem-vowel Assimilation is thereby restatable as 25).

25) Stem-vowel Assimilation: $V \rightarrow \begin{Bmatrix} u \\ i \end{Bmatrix} / \begin{Bmatrix} w \\ y \end{Bmatrix} _c] [+A]$

Note that 25) will not apply to the b. examples of 18) by virtue of the fact that these examples are not class-A verbs, but rather class-B verbs.

11.2.2 Apparent Exceptions to Stem-vowel Assimilation

In this subsection the investigation of hollow verbs will proceed. However, here, as in 11.2.1, we are interested in apparently irregular cases. It will be seen that the remaining apparent exceptions to the new rule of Stem-vowel Assimilation do not in fact display any exceptionality whatsoever.

11.2.2.1 Passives

In several earlier passages, it was noted that passives are formed by switching the quality of the vowels internal to the stem. In the case of the perfective stem CaCVC, this is accomplished by turning the first a to u and the stem vowel to i. In this way katab becomes kutib in the passive, cf. kutib+a, 'it m. was written', rakib becomes rukib, cf. rukib+a, 'he was ridden', etc. We now wish to investigate analogous passives of hollow verbs. Underlying kawan and sayar, exemplified earlier, are not normally conjugated in the passive due to the fact that these forms are intransitive. Therefore, we may turn to the transitive stems baya9 (cf. bā9+a, 'he sold', bi9+tu, 'I sold') and qawal (cf. qāl+a, 'he said', gul+tu, 'I said'), for which we can motivate medial y and w respectively by noting alternations such as bay9+u, 'sale', qawl+u, 'saying', etc. We would expect the third person singular passives of these verbs to be the following in underlying representations:

26)	<u>buyi9+a</u>	<u>quwil+a</u>
	<u>buyi9+at</u>	<u>quwil+at</u>

From these representations, it is expected that the glide will elide by G-Metathesis, etc., leaving bui9+a and quil+a, bui9+at and quil+at. According to the

rule of u-Assimilation, we would expect ui to become uu, analogous to the change of iu to ii noted earlier. However the correct phonetic representations are not those expected.

27) $bi9+a$ it m. was sold $qil+a$ it m. was said
 $bi9+at$ it f. was sold $qil+at$ it f. was said

This indicates that ui becomes ii, and not uu. That is, u must be switched to i when occurring before i. The rule needed to account for this change may be stated as 28).

28) u-to-i: u --> i / i

The first and second person singular passive forms are $bi9+tu$, 'I was sold', $bi9+ta$, 'you m. were sold', $bi9+ti$, 'you f. were sold', and $qil+tu$, 'I was said', $qil+ta$, 'you m. were said', and $qil+ti$, 'you f. were said'. Of course the last three examples are semantically anomalous, a fact having no bearing on the phonology, however. We may derive these forms either by allowing Truncation to apply before 28) or after. Let us arbitrarily adopt the first alternative.

29) buyi9+tu quwil+tu
 bui9+tu quil+tu G-Metathesis, G-Syncope
 bi9+tu qil+tu Truncation

Thus, there seems to be a straightforward means of accounting for the passives of hollow verbs. This consists of merely adding rule 28) to the grammar.

Now notice that quwil+a possesses a middle radical w, so that it might be suspected that Stem-vowel Assim.

should apply to forms such as this giving quwul+a, which of course would lead to the incorrect result, qūl+a, instead of the desired qīl+a. This is a confusion, however. For although active qawal is a class-A stem, all passives take stem-vowel i, and therefore, as already noted in 5.2.1, belong to class B. And the rule of Stem-vowel Elision is stated in 9) so as to apply only to class-A stems. Thus, upon reflection, it becomes clear that there is no reason why qīl+a cannot be derived directly. Indeed, the fact that we get qīl+a, and not qūl+a, further supports our present statement of Stem-vowel Assimilation.

In 3.3 and 4.5 we noted that imperfective passives are formed by changing the prefix and stem of the active forms to the pattern Cu+CCaC. Since the stem-vowel i of the perfective passive is the underlying stem-vowel, this pattern reduces to essentially that of the passive of the perfective in underlying representations. That is, both CuCiC and Cu+CCiC are identical as regards vowel sequences. The latter becomes the desired Cu+CCaC by Ablaut, as expected. Thus, the imperfective passive of the hollow verb roots by9 and gw1 should be, in the third person singular indicative, underlying yu+byi9+u, tu+byi9+u, yu+gwil+u, and tu+gwil+u. These forms

should exhibit the following stages:

30)	yu+byi9+u	tu+byi9+u	yu+qwil+u	tu+qwil+u	
	yu+bya9+u	tu+bya9+u	yu+qwal+u	tu+qwal+u	Ablaut
	yu+baa9+u	tu+baa9+u	yu+qaal+u	tu+qaal+u	Glide Metathesis, V-Epen., G-Syn.
	yu+bā9+u	tu+bā9+u	yu+qāl+u	tu+qāl+u	Lengthening

We do in fact find yu+bā9+u, 'it m. is sold', tu+bā9+u, 'it f. is sold', yu+qāl+u, 'it m. is said', and tu+qāl+u, 'it f. is said', in phonetic representations. Note, however, that after Ablaut applies, Stem-vowel Assimilation does not apply, following, of course, as a consequence of these forms being specified as class-B.

11.2.2.2 Derived Verbs

At first glance the set of derived verbs seem to constitute a class of counterexamples to Stem-vowel Assimilation, or alternatively, it might be supposed that these examples dictate that the rule of Stem-vowel Assimilation be specified so as not to apply to derived verbs. That is, we might include in the formal statement of this rule, the feature [-derived]. This might be deduced from the following paradigms:

31) strong forms

hollow forms

xarraġ+tu	qawwal+tu	
'a+xraġ+tu	'a+qwal+tu	--> 'a+qal+tu
ta+xarraġ+tu	ta+qawwal+tu	
'i+n+xraġ+tu	'i+n+qawal+tu	--> 'i+n+qal+tu
'i+xtraġ+tu	'i+qtawal+tu	--> 'i+qtal+tu
'i+sta+xraġ+tu	'i+sta+qwal+tu	--> 'i+sta+qal+tu

The derived forms of 31) should be compared with the more complete set listed in Chapter I as 10). The left-most column of 31) consists of strong stems. We have utilized the root xrj in all forms, although the form 'i+xtraġ+tu is not normally encountered. However, it is simple enough to find a form which actually occurs. By the same token, we have held the hollow root constant in the right-most column of 31), even though some of the forms do not actually occur with the root qwl. Again these may be replaced by actually occurring hollow forms in the particular derived class for which qwl does not appear.

Of interest is the fact that the hollow forms do not undergo Stem-vowel Assimilation, for if they had, in place of 'a+qal+tu, we should find 'a+qul+tu, just as we find qul+tu and not qal+tu in the non-derived form. But it is clear that a is the perfective

stem-vowel in all cases of 31), so that Stem-vowel Elision as presently stated should apply to the underlying hollow stems of 31).

If we once again refer to the set of verb forms listed as 10) in 1.1, we notice that the imperfective of all the derived classes but two possess stem-vowel i. Further, it is not difficult to show that the two derived classes not possessing imperfective stem-vowel i, class V and VI, actually do pass through such a stage. This becomes apparent when one notes that active participles are formed on the basis of imperfective stems, while passive participles derive from perfective stems. Thus, xarraj is the perfective stem of class II, and its passive participle is mu+xarraj+u, with prefixed mu. xarrij is the imperfective stem of this class II form, and mu+xarrij+u is the corresponding active participle. The same holds for the others. Thus, sta+qbal, a class X perfective stem, cf. 'i+sta+qbal+a, 'he received', takes mu+sta+qbal+u, 'received', as its passive participle, and sta+qbil, the imperfective stem, cf. ta+sta+qbil+u, 'you receive', takes mu+sta+qbil+u, 'receiving', as its active participle. Now note that the passive participle of perfective ta+kallam, class V, is mu+ta+kallam+u, but the active participle of ta+kallam, the phonetic imperfective stem as well, is mu+ta+kallim+u, with i, not a. This proves that

the imperfective ta+ta+kallam+u, 'you discuss', actually derives from the more abstract ta+ta+kallim+u, and only later, after participles have been derived, becomes ta+ta+kallam+u, by an ad hoc rule which also applies to class VI imperfectives, for which analogous examples could readily be adduced. This ad hoc rule, we state as 32).

32) V-Lowering: $i [+imperf, \left\{ \begin{array}{l} +V \\ +VI \end{array} \right\}] \rightarrow a / _C]$

This rule will play no role in the arguments to follow. We now wish to argue that in the case of derived classes of verbs, it is the imperfective stem-vowel i which is the underlying vowel, and hence it is a which is brought about by Ablaut, i.e. the exact opposite of the situation which holds for non-derived verbs.

The argument showing imperfective i to be the underlying vowel of derived verbs is identical to that showing perfective i to be underlying in the case of class-B non-derived verbs. That is, we shall show that underlying w shows up as y in the perfective following a, which can be explained if we assume i to be underlying, and further that w-to-y precedes Ablaut. Consider the following alternations.

33)

I

jilw+at+u
unveiling

II

jalaw+ta
you clarified

III

II. jallay+ta you revealed
IV. 'a+jlay+ta you drove away
V. ta+jallay+ta you became clear¹⁵
VII. 'i+n+jalay+ta you were cleaned
VIII. 'i+jtalay+ta you disclosed
X. 'i+sta+jlay+ta you sought to clarify

The alternations listed under columns I and II prove that w is the underlying third radical. However, under column III, in place of w, we find y. Indeed there is absolutely no derived root with phonetic w in the third radical position, a curious distribution in itself, inasmuch as both w and y contrast in third radical position in non-derived forms, as noted in earlier sections. But since all derived verbs take i in their imperfective representations at some point in their derivational history from underlying to phonetic representations, we may explain the distributional oddity evidenced in 33) by assigning all derived verbs i in underlying representations in the stem-vowel position, and further, by allowing w-to-y to apply before Ablaut, which indeed is true. Thus, to take jallay+tu as a model for this possible explanation of the data of 33), we hypothesize the following:

34) jalliw+tu
 jalliy+tu w-to-y
 jallay+tu Ablaut

There appears to be no way of collapsing the ablaut process needed to effectuate 34) and that discussed earlier in Chapter V, for the former applies

only when the feature [-imperf] is present, while the latter applies only when the feature [+imperf] is present. That is, the former applies when the underlying stem-vowel appears in the perfective aspect, the latter, when the underlying stem-vowel appears in the imperfective aspect. The obvious means of collapsing these rules, i.e. as 19) of 5.2.2, seems inadequate in view of the comments made in Chapter 5. Perhaps a new rule of Ablaut should be added to the grammar. This is really not necessary, however, for the following rule will correctly account for the two ablaut processes:

35) Ablaut:
$$\begin{array}{c} V \\ [\alpha hi] \\ [-C] \\ \langle [+F] \rangle \end{array} \rightarrow \begin{array}{c} [-\alpha hi] \\ \langle [+bk] \rangle \\ \langle [+rd] \rangle \end{array} / \begin{array}{c} [\beta imperf] \\ [-\beta derived] \end{array}$$

This rule will correctly apply when the feature [+imperf] is present in non-derived verbs, and when the feature [-imperf] is present in derived verbs.

Let us now return to the central concern of this section, which is the question--Why don't the underlying hollow stems of 31) undergo Stem-vowel Assimilation? An answer may now be given to this question which squares with the observations made directly above. This is simply that if the imperfective i of derived verbs is the underlying stem-vowel, then

all these stems belong to class B, not class A stems, and hence may not be operated on by 9), Stem-vowel Assimilation. On the other hand, it may still be that Stem-vowel Assimilation is to be stated so as to include the feature [-derived], which would also block this rule from applying to those hollow stems of 31). Relevant to this problem are the following examples:

36)	perfect	imperfect	
I.	qata ₉ +at	ta+qta ₉ +u	she cuts, cut
II.	qatta ₉ +at	tu+qatti ₉ +u	she cuts up, cut up
I.	qara'+at	ta+qra'+u	she reads, read
IV.	'a+qra'+at	tu+qri'+u	she makes read, made read
X.	'i+sta+qra'+at	ta+sta+qri'+u	she examines, examined
I.	ba ₉ a ₀ +at	ta+b ₉ a ₀ +u	she sends, sent
VII.	'i+n+ba ₉ a ₀ +at	ta+n+ba ₉ i ₀ +u	she was sent, is sent
I.	fatah+at	ta+ftah+u	she opens, opened
VIII.	'i+ftatah+at	ta+ftatih+u	she opens (ceremoniously), opened (ceremoniously)

As noted in 5.2.3, cf. 23) of that section, the non-derived verbs, listed above as I, undergo the rule of L-Assimilation, accounting for why we find stem-vowel a in both the perfective and imperfective conjugations.

This rule of L-Assimilation may be repeated as 37).

37) L-Assimilation: $i \rightarrow a / \left\{ \begin{array}{c} \text{L} \\ \text{L} \end{array} \right\} / [+imperf]$

This rule does not apply to any of the derived forms listed in 36), however. And this is always true.

There is no derived verb to which 37) is applicable.

In order to prevent L-Assimilation from applying to these derived forms, we might restate it as 38).

38) L-Assimilation: $i \rightarrow a / \left\{ \begin{array}{c} \text{L} \\ \text{L} \end{array} \right\} / \begin{array}{l} [+imperf] \\ [-derived] \end{array}$

If this is correct, then, the implication is that Stem-vowel Assimilation may indeed be stated so as to include the feature [-derived], which would account for why this rule does not apply to derived verbs.

This restatement would look like 39).

39) Stem-vowel Assimilation: $V \rightarrow \left\{ \begin{array}{c} u \\ i \end{array} \right\} / \left\{ \begin{array}{c} w \\ y \end{array} \right\} \text{---}c] / \begin{array}{l} [+A] \\ [-derived] \end{array}$

We must now turn to the imperfective conjugation of the derived hollow verbs. The following underlying sequences and changes are clear and straightforward:

40)	I	II
	II. tu+qawwil	
	IV. tu+qwīl+u	--> tu+qīl+u
	VII. ta+n+qawwil+u	--> ta+n+qāl+u
	VIII. ta+qtawwil+u	--> ta+qtāl+u
	X. ta+sta+qwīl+u	--> ta+sta+qīl+u

Again, as in 31), we have taken the root qwl as the canonical skeleton. Not all these forms exist in phonetic representations, derived from the qwl root. However, many many examples can be found for each derived class which are changed exactly as indicated in 40), e.g. tu+xwif+u --> tu+xīf+u, 'you frighten', ta+n+qawid+u --> ta+n+qād+u, 'you are led', etc.

Further, it should be pointed out that the forms listed under column I of 40) are not the most abstract representations. We have omitted the stem vowel from classes IV and X, which drop by Vowel Elision, as well as the causative morpheme of IV, and the more basic a of the person prefix. These are all minor details. The point is that 40) is exactly as predicted by our rules.

41)	tu+qwīl+u	ta+n+qawwil+u	
	tu+qiil+u	ta+n+qail+u	Glide Metathesis, Glide Elision, V-Epenthesis, and G-Syncope
	tu+qiil+u	ta+n+qaal+u	a-Assimilation
	tu+qīl+u	ta+n+qāl+u	Lengthening

Stress Assignment plays no crucial role in 41) and for this reason has been omitted.

Let us now return to blind verbs and the rule of w-Occultation, which may be repeated below as 42) for convenience of reference.

42) w-Occultation: $w \rightarrow \emptyset / _Ci$

It will be recalled that Syllabicity Assimilation applies much later than w-Occultation, cf. 38) of 6.2.3. Given the class IV underlying imperfective (minus Caus.-Del., ta-to-tu, and Vowel Elision) form yu+wdih+u (cf. 'a+wdah+a, 'he made clear'), one expects the following derivation to obtain:

43) yu+wdih+u
yu+dih+u w-Occultation

This change is expected due to the fact that non-derived ya+wsil+u, ya+wsif+u, etc. become ya+sil+u, ya+sif+u, etc. However, yu+dih+u does not exist. Instead we find yūdh+u, 'he makes clear', indicating that Syllabicity Assimilation has applied, which of course means that 43) is wrong. What is needed is the following derivation:

- 44) yu+wdih+u
 --- w-Occultation
 yu+udih+u Syl. Assim.
 yūdh+u Lengthening

The rule of w-Occultation must be blocked from applying in 44) and all similar derivations. Another such example is imperfect ya+sta+wrid+u, 'he procures', which is a class X derived blind verb that does not undergo w-Occultation, although the non-derived stem does, viz. ya+wrid+u --> ya+rid+u, 'he comes'. The non-application of w-Occultation, then, is a general fact about derived verbs. Never do we have an instance of w-Occultation applying to derived blind verbs. Consonant with this observation is the following re-statement of w-Occultation.

- 45) w-Occultation: w --> ∅ / __CiC] / [-derived]

Not only have we included the feature [-derived] so as to prevent derivations such as 43), we have also included the stem boundary (and hence C), so as to prevent this rule from eliding the w from examples such as da9aw+ti, 'you f.s. called', which do not admit of elision. That is, da9aw+ti does not become da9a+ti, proving that 45) should apply only to blind verbs.

Let us now summarize the rules motivated in the preceding, in which the feature [-derived] is to be included.

46) Stem-vowel Assimilation:

$$v \rightarrow \begin{Bmatrix} u \\ i \end{Bmatrix} / \begin{Bmatrix} w \\ y \end{Bmatrix} _c] / \begin{matrix} [+A] \\ [-derived] \end{matrix}$$

w-Occultation:

$$w \rightarrow \emptyset / _CiC] / [-derived]$$

L-Assimilation:

$$i \rightarrow a / \begin{Bmatrix} L \\ _L \end{Bmatrix} / \begin{matrix} [+imperf] \\ [-derived] \end{matrix}$$

It is certainly no coincidence that these rules function similarly in not applying to derived stems. It would be desirable if we could factor out the feature [-derived] from these rules. We noted earlier that by including [+A] in the rule of Stem-vowel Assimilation, it would automatically predict the non-application of this rule to derived stems, since derived stems are [+B] stems, if, as argued above, the imperfective vowel underlies these stems. The same move could be taken in regard to w-Occultation and L-Assimilation, since these rules indeed apply only to [+A] stems. Thus, the feature [+A] could be

substituted for [-derived] in all the rules of 46) and we would still obtain the correct results in every case. However, this does not succeed in capturing the generalization, because now we are faced with the problem of factoring out the feature [+A]. Perhaps, then, it is to be expected that a segment of the phonology will tend to cluster around a particular domain of the basic stem, as hinted at earlier in 6.0, and that a consequence of this is a good deal of repetition in the rules needed to operate on the domain in question. This suggests that perhaps Ablaut is to apply to [-derived] forms in its original statement, along with a second rule of Ablaut which applies only to derived verbs, in place of 35). Although this may be so, we shall not take this step at this time.

Let us now repeat 24) of 9.2 in accordance with the developments of this chapter.

47)

I

Vowel Elision

ta-Elision

II

G-I.D. Metathesis

w-to-y

Ablaut

Voc. Assim.

Stem-vowel Assim.

w-Occultation

L-Assimilation

III

G-I.D. Metathesis

Truncation

Stress Assignment

a-i Assimilation and w-to-y

Syl. Assimilation

Lengthening

The second occurrence of Vocalic Assimilation has been deleted in accordance with the observations made above. Note that Truncation can either precede or follow Stress Assignment and the crucial derivation 23) still goes through correctly.

We are now interested in the rule of G-I.D. Metathesis. We have been assuming that this rule is cyclic because of the reasons advanced in 6.2.3, cf. 36) and 37) of that section. The only example of G-I.D. Metathesis which could possibly apply on the stem cycle, i.e. with II, is that case of this rule which applies to hollow stems, i.e. kawan+a --> kaawn+a, ya+xwaf+u --> ya+xawf+u, etc. I.D. Metathesis may never apply on the stem cycle, because part of the environment relevant to its application is outside the stem cycle. Let us repeat G-I.D. Metathesis below to make this clear.

48) G-I.D. Metathesis:

$$\left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \left\{ \begin{array}{c} G \\ <C_k>_a \end{array} \right\} V_j <C_k]V>_b \quad \text{-->} \quad \left\{ \begin{array}{c} V_i \\ C \end{array} \right\} \emptyset V_j \left\{ \begin{array}{c} G \\ <C_k \end{array} \right\} <C_k]V>_b$$

Condition: if $j=[+lo]$, then $i=[+lo]$
if a , then b

Now several of the rules listed in II are stated with the stem boundary]. So is G-I.D. Metathesis, where] is relevant to I.D. Metathesis. It would not be strange if I.D. Metathesis were part of the so-called stem-rules of 47) then. In fact, it would then be appropriate to consider stem-rules, not those which apply on the internal stem cycle, but rather those clustering around the domain referred to earlier, where the stem-vowel invariably comes into play, either as affected or affecting segment. We may now prove that I.D. Metathesis must necessarily apply alone with the other rules of II, for we may prove that I.D. Metathesis precedes both L-Assimilation and w-Occultation. Let us turn to the following section where this is demonstrated.

11.3 More on L-Assimilation and w-Occultation

According to 47) I.D. Metathesis follows L-Assimilation. This is incorrect, for consider the following examples:

- 49) $fah\dot{a}h+tu$ $'a+fih\dot{h}+u$ I hissed, hiss
 $fah\dot{h}+at$ $ta+fih\dot{h}+u$ she hissed, hisses
 $sah\dot{h}+at$ $ta+sih\dot{h}+u$ it f. flowed, flows

The imperfects and third person perfective derive by undergoing I.D. Metathesis.

- 50) $'a+f\dot{h}ih+u$ $ta+f\dot{h}ih+u$ $fah\dot{a}h+at$
 $'a+fih\dot{h}+u$ $ta+fih\dot{h}+u$ $faah\dot{h}+at$ I.D. Metathesis
 --- --- $fah\dot{h}+at$ Truncation

This gives the desired results. But note that L-Assimilation should be applicable before I.D. Metathesis applies, giving $'a+fah\dot{h}+u$, $ta+fah\dot{h}+u$, etc. We may explain the lack of L-Assimilation in this case if we order I.D. Metathesis before L-Assimilation and restate L-Assimilation as follows:

- 51) L-Assimilation: $i \rightarrow a / \left\{ \begin{array}{c} L \quad C \\ C \quad L \end{array} \right\} / \begin{array}{l} [+imperf] \\ [-derived] \end{array}$

This restatement of L-Assimilation should be compared with that of 46). This restatement is given

a good deal of plausibility by the fact that

the stem rules of 46), and others, are stated with the stem boundary]. Moreover, we may now note that I.D. Metathesis must precede w-Occultation. This is clear from the fact that the w does not elide from forms such as the following:

- 52) ta+widd+u she likes
ya+widd+u he likes

These forms must derive from ta+wddid+u and ya+wddid+u. Obviously if w-Occultation applies before I.D. Metathesis, then these forms should become ta+did+u and ya+did+u, and then by I.D. Metathesis, ta+idd+u and ya+idd+u, and ultimately by a-Assimilation and Truncation, ta+dd+u and ya+dd+u. But 52) is the correct phonetic realization of these forms, proving that I.D. Metathesis precedes w-Occultation. This falls nicely in line with the ordering motivated above with respect to L-Assimilation. That is, if I.D. Metathesis precedes w-Occultation, it must precede L-Assimilation, since w-Occultation must precede L-Assimilation, as proven in 5.2.4. This, incidentally, is of some interest for the theory of ordering, for both ordering relations, I.D. Metathesis followed by w-Occultation, and I.D. Metathesis followed by L-Assimilation, are marked orders. According to the theory of local ordering,

both orders must be assigned to the respective lexical items, which in itself would seem to constitute a loss of generalization, since it is the complete class of blind verbs which take the marked orders. In order to capture the generalization, the theory of local ordering must allow for the following redundancy rules in the grammar of Arabic:

- 53) $waC_i aC_i \rightarrow$ I.D. Metathesis < w-Occultation
 $waC_i aC_i \rightarrow$ I.D. Metathesis < L-Assimilation

The symbol < means less than or precedes. Note that the theory of local ordering makes no statement about the relative ordering of w-Occultation and L-Assimilation, this being an unmarked order. But it is no coincidence that these rules are more highly structured along the lines of transitivity. That is, local ordering claims that it is no more than coincidence that I.D. Metathesis precedes L-Assimilation. The theory of transitive rule ordering claims that it cannot be otherwise, for I.D. Metathesis precedes w-Occultation, and w-Occultation precedes L-Assimilation. We shall return to this discussion of the relative merits of the two ordering theories in Chapter XIV.

Similar ordering relations hold for G-Metathesis. This should already be obvious from the mention of imperfect ta+bī9+u, which derives from ta+byi9+u by G-Metathesis, V-Epenthesis, and G-Syncope. According to the new statement of L-Assimilation, along with the ordering G-Metathesis, then L-Assimilation, it follows that i or ī should not be affected by the latter rule.

54) ta+byi9+u
 ta+bi9+u G-Metathesis, V-Epenthesis, G-Syncope
 ta+bii9+u L-Assimilation (inapplicable)
 ta+bī9+u Lengthening

It makes no difference whether L-Assimilation applies as in 54) or directly after G-Metathesis.

There are no forms of the underlying shape ta+wyl9+u, which would prove that G-Metathesis precedes w-Occultation. But it is clear that such a form, if taken into Arabic, say by borrowing or innovation, would be pronounced in only two possible ways. First, the speaker might not apply any rules, giving the word the foreign pronunciation, or second, the speaker might pronounce the word ta+wīl+u, by the application of G-Metathesis etc. However, ta+yil+u, by application of w-Occultation first, is not possible.

I.D. Metathesis and G-Metathesis do seem to be ordered identically, then, giving a good deal of support to the earlier contention that these rules are to be collapsed as a single rule of G-I.D. Metathesis.

Once it is decided that I.D. Metathesis does apply along with the other rules of II in 47), then it becomes imperative to reinterpret stem rules not as those applying cyclically on the first cycle, i.e. the stem cycle, but rather as those rules applying to the domain mentioned above, including in particular, those rules stated with the boundary symbol]. Following this line of reasoning, it seems plausible that] should also be included in the G-Metathesis subcase of 48). This may be accomplished by restating 48) as 55).

55) G-I.D. Metathesis:

$$\left\{ \begin{matrix} V_i \\ C \end{matrix} \right\} \left\{ \begin{matrix} G \\ \langle C_k \rangle_a \end{matrix} \right\} V_j C_k] \langle V \rangle_b \rightarrow \left\{ \begin{matrix} V_i \\ C \end{matrix} \right\} \emptyset V_j \left\{ \begin{matrix} G \\ \langle C_k \rangle_a \end{matrix} \right\} C_k] \langle V \rangle_b$$

Condition: if $j=[+10]$, then $i=[+10]$

if a, then b

This restatement of G-I.D. Metathesis is of some interest, for now 55) is not applicable to glides occupying the third radical position. That is, ramay+a, etc. will not

be affected by 55). The earlier rule of Glide Elision must carry out this operation if 55) is correct. But there is some evidence beyond that presented here that this is in fact right. The evidence given against collapsing G-Metathesis and I.D. Metathesis, presented in 9.3, was, for the most part, grounded on the assumption that G-Metathesis applied both to the medial radical glides and the third radical glides. Thus, it was argued that Glide Elision precedes n-Deletion, and that n-Deletion applies before I.D. Metathesis, but then Glide Elision is not relevant for medial radical glides. Further, the differing distributional evidence consisted in the fact that C_kG_kV did not undergo G-Metathesis, but here again it is the third radical glide, not the second radical glide, which cannot function as the I.D. Metathesis change $CC_kVC_kV \rightarrow CVC_kC_kV$. Thus, two of the arguments against collapsing G-Metathesis and I.D. Metathesis completely disappear, for 55) is not relevant to third radical glides in the first place. If this is correct, then, Glide Elision is a separate rule of the grammar, which may be stated as follows:

- 56) Glide Elision: $G \rightarrow \emptyset / V_i \underline{V}_j$
 Condition: if $j=[+lo]$, then $i=[+lo]$

Glide Elision is stated with the stem boundary. This is given empirical support by the fact that the high glides of class V derived blind verbs does not elide, as it should if 56) were stated without the boundary. That is, ta+wassal+a, 'he arrived', and ya+ta+wassal+u, 'he arrives', do not become ta+assal+a or ya+ta+assal+u as a relaxed version of Glide Elision would predict. Now let us return to the argument for making Glide Elision cyclic in the first place, i.e. the argument given in 6.2.3. This argument was based on the earlier conception of stem-rules, i.e. that they apply only on the stem cycle. But this is now refuted. Stem rules do consider material external to the stem. Thus the first occurrence of Glide Elision may be deleted, and it may follow Ablaut and L-Assimilation as earlier argued (cf. ya+s9iy+a --> ya+s9ay+a --> ya+s9a+a) proving L-Assimilation then Glāde Elision). Also note that making G-I.D. Metathesis cyclic was predicted on the fact that Glide Elision was part of this rule and that Glide Elision was cyclic. Now it is obvious that this no longer holds, so that G-I.D. Metathesis no longer need be considered a cyclic rule. Thus, in place of 47), we need the following set of rules:

57)

I

Vowel Elision

ta-Elision

II

G-I.D. Metathesis

w-to-y

Ablaut

Voc. Assim.

Stem-vowel Assim.

w-Occultation

L-Assimilation

Glide Elision

III

Truncation

Stress Assignment

a-i Assimilation, w-to-y

Syllabicity Assimilation

Lengthening

Now not only has the rule of Vocalic Assimilation been eliminated as a cyclic rule, so also has the Glide Elision process been eliminated as a cyclic rule. The only rule which is repeated in 57) now is the rule of w-to-y.

Note that the ordering of Glide Elision after L-Assimilation and the ordering of G-I.D. Metathesis before L-Assimilation, both orders of which have been given independent justification, means that Glide Elision cannot be collapsed with G-I.D. Metathesis.

There are no reasons yet for ordering G-I.D. Metathesis before any rules of II other than Stem-vowel Assimilation, w-Occultation, and L-Assimilation. In fact we feel that G-I.D. Metathesis should follow Ablaut. However, in the following section a reason is given for why G-I.D. Metathesis must apparently precede Ablaut. Let us turn now to that discussion.

11.4 Past Participles of Hollow Stems

We have already indicated that adjective and noun forming infixes ī and ū may be represented as iy and uw, or even yi and wu (with G-Metathesis, etc.), in our discussion in Chapter VII. Let us now turn to the past participles of non-derived stems.

- 58) ma+ktūb+u written
 ma+ftūh+u opened
 ma+šrūb+u drunk

The forms listed in 58) illustrate the typical pattern encountered for this form, i.e. ma+CCūC, which we may take to derive from underlying ma+CCuWC. In support of this latter claim, we might cite the past participle of the root d9w, which is ma+d9uww+u, not ma+d9ūw+u. What about lame roots ending in y? Here we expect the underlying representation to be ma+rmuwy+u for a root such as rmy. But the phonetic representation turns out to be ma+rmiyy+u, 'thrown'. How is this form to be derived? It will be recalled that there is already a rule in the grammar turning w to y before y, cf. 8.1. This rule may be repeated below as w-Fronting.

59) w-Fronting: w --> y / __y

This rule should apply to underlying ma+rmuwy+u, giving ma+rmuyy+u. It remains now only to have Vocalic Assimilation apply to this intermediate stage to obtain ma+rmiyy+u, the desired result. But as things now stand, w-to-y precedes Vocalic Assimilation.

If w-to-y applies to ma+rmuyy+u, however, we are back where we started with ma+rmuwy+u (w-to-y so takes y to w after u). There are a number of ways out of this difficulty. First, one might attempt to restrict w-to-y so as to apply before true consonants, but not before glides. This seems untenable, however, in view of the fact that w-to-y applies before vowels; as witness the change radiw+a --> radiy+a, du9iw+a --> du9iy+a, etc., examples which originally motivated the first instance of w-to-y. A second attempt at preventing the bad results noted above is to order w-Fronting after w-to-y but before Vocalic Assimilation. By this action, we allow for the following derivation:

60) ma+rmuwy+u
 -- w-to-y (inapplicable)
 ma+rmuyy+u w-Fronting
 ma+rmiyy+u Vocalic Assimilation

While this procedure appeals at first flush, there is good reason to believe that it is wrong. Let us return to the primary motivation for Vocalic Assimilation found in 4.3, cf. 32) of that section. There it was noted that underlying buyd+u must become biyū+u, and thence bīd+u. But buyd+u does not become buwd+u, for this would give the incorrect result būd+u. This example, taken together with ma+rmuyy+u --> ma+rmiyy+u, indicates that Vocalic Assimilation actually precedes

w-to-y. This possibility will be pursued below. First, however, let us consider another plausible suggestion. One could plausibly argue that underlying ma+rmuwy+u becomes ma+rmiyy+u directly by an extension of w-Fronting as follows:

$$61) \begin{array}{l} [-cns] \\ [+hi] \end{array} \rightarrow \begin{array}{l} [-bk] \\ [-rd] \end{array} / \text{---}y$$

This rule will take any number of high nonnasal consonants and assimilate them to y in backness and roundness. Thus, ma+rmuwy+u would become ma+rmiyy+u directly by this rule. Although 61) seems plausible enough, there are two good reasons for rejecting it. First, it predicts incorrect results. For example, ta+twiy+a, 'that she fold', does not become ta+twiy+a as 61) predicts. True twy is one of the doubly weak exceptional roots, but as shown in Chapter VIII, this root does undergo w-Fronting, viz. ta+twy+u --> ta+y+u. In order to prevent ta+twiy+a from becoming the incorrect ta+twiy+a, some ad hoc device must be resorted to. The second argument against 61) is more complex. Consider the fact that w become y not only when occurring to the left of y in abstract representations, but also when occurring to the right of y. So that underlying hayw+u become hayy+u, 'alive'. We know the root of this word to be hw, because of forms such as hayaw+ān+u,

'animal', which is related to hayv+u. The change of w to y after y, we feel, should be collapsed with w-Fronting as rendered by 62).

$$62) \quad w \rightarrow y / \left\{ \begin{array}{c} y \\ _y \end{array} \right\}$$

One can of course further collapse 62) by Bach's notation. However, what is important here is that yu does not become yi, cf. yu+ktab+u, 'it m. is written', and this is what is expected if the star notation is incorporated into 62) as done in 61).

Let us then return to the possibility of ordering Vocalic Assimilation before w-to-y. First, let us reconsider the reason for ordering Vocalic Assimilation after w-to-y. In Chapter V this ordering was proposed to account for the fact that imperfects class-A lame stems in w always take u in the stem-vowel position. However, 6.2.2 an alternative treatment was suggested. This consisted in adding a redundancy rule to the lexicon insuring that u comes about by Ablaut. This suggestion is in fact in keeping with the similar redundancy rules needed to account for the ablaut alternation of blind verbs. Thus, there seems to be no bar to reordering Vocalic Assimilation to precede w-to-y, other than the fact that if this is done radiw+a, du9iw+a, etc. will become the incorrect raduw+a,

du9uw+a, etc. However, compare now these latter examples with the cases of Vocalic Assimilation.

- 63) a. buyd+u --> biyd+u
 ma+rmuyy+u --> ma+rmiyy+u
- b. radiw+a --> radiy+a
 du9iw+a --> du9iy+a

Note that the difference here is, once again, one founded on the difference between third radical position and second radical position. Vocalic Assimilation must apply to the a. cases, which possess medial radical glides. The examples listed in b. must undergo w-to-y, which applies to third radical glides. Thus, we may state these rules as follows:

64) Vocalic Assimilation: $\begin{Bmatrix} u \\ i \end{Bmatrix} \rightarrow \begin{Bmatrix} i \\ u \end{Bmatrix} / _ \begin{Bmatrix} y \\ w \end{Bmatrix} C]$

w-to-y: $\begin{Bmatrix} w \\ y \end{Bmatrix} \rightarrow \begin{Bmatrix} y \\ w \end{Bmatrix} / \begin{Bmatrix} i \\ u \end{Bmatrix} _$

In other words, Vocalic Assimilation appears to be a stem rule, and thus, it is not surprising that it is stated with a stem boundary. It is probably also the case that this application of w-to-y is a stem rule for it applies only to the third radical, whereas the second application of w-to-y applies to forms such as yu+ytum and yi+wjal, as well as to forms such as ya+rmi+u, if i-Assimilation is in-

deed part of the w-to-y collapsed process.

There would still be two rules of w-to-y, but one would be stated in terms of the stem boundary], the other not, being a lower level phonetic process, i.e. a member of the group III rules of 47). We shall assume that w-to-y as it applies to 63)b. is stated with].

To determine now the ordering of G-I.D. Metathesis in relation to Vocalic Assimilation, we must turn to the past participles of the hollow roots. We might again pick the roots qwl and by9 to illustrate these forms. The past participle of the root qwl is expected to be ma+qwuwl+u in underlying representations. We find in phonetic representations ma+qūl+u, 'spoken, said'. We may derive this latter form from ma+qwuwl+u by applying first the rule of G-Metathesis, if we also allow for the dropping of one of the glides that results. That is, once ma+qwuwl+u becomes ma+quwwl+u by G-Metathesis, we may delete one w by a new rule.

65) C --> ∅ / C__C

Rule 65) is not too suspicious due to the fact that there are no tri-consonantal clusters in underlying representations. However, note that the correct phonetic representation is derived without resort to 65).

- 66) ma+qwuwl+u
 ma+qwwl+u G-Metathesis
 ma+quuwl+u V-Epenthesis
 ma+quwl+u G-Syncope
 ma+qwl+u Truncation
 ma+qul+u Syl. Assim.
 ma+qūl+u Lengthening

Turning now to the root by9, we know that the past participle of this root should be ma+byuw9+u in underlying representations. After G-Metathesis, we are left with ma+buyw9+u to which w-Fronting may apply, giving ma+buyy9+u. Now the fact that ma+bi9+u is the phonetic representation argues strongly that Vocalic Assimilation has applied, giving the following complete derivation.

- 67) ma+byuw9+u
 ma+buyw9+u G-Metathesis
 ma+buyy9+u w-Fronting
 ma+biyy9+u Vocalic Assimilation
 ma+biiyy9+u V-Epenthesis
 ma+biiy9+u G-Syncope
 ma+biy9+u Truncation
 ma+bii9+u Syl. Assim.
 ma+bi9+u Lengthening

The problem with 67) is that Vocalic Assimilation as

stated in 64) is not applicable to ma+buyy9+u. This can be remedied either by changing the rule to be compatible with 67) or by adopting 65). Either move may be taken. We shall arbitrarily adopt 65), requiring 67) to be substituted by 68).

68) ma+byuw9+u

ma+buyw9+u G-Metathesis

ma+buy9+u 65)

ma+biy9+u Vocalic Assimilation

ma+bī9+u V-Epenthesis and G-Syncope, or Syl. Assim.

A similar derivation can be given in place of 66).

Note that the change of ma+byuw9+u to ma+bī9+u offers good supporting evidence for the rule of G-Metathesis, for otherwise there is no good way of predicting the front quality of the vowel.

Footnotes to Chapter XI

1. It is interesting to note that this is what we do find in several other Semitic languages, indicating that the rule to follow is not a part of the phonology of these languages.
2. Of course it is possible that Stress Assignment follows V-Epenthesis and G-Syncope, which we suspect more closely approximates the truth.

Chapter XII

THE STATUS OF LONG VOWELS IN ARABIC

12.0 In this chapter we shall attempt to determine whether or not long vowels are to be admitted in underlying representations. Three classes of forms displaying long vowels are reviewed and it is shown that these forms do not in fact possess long vowels in underlying representations. The feature long is therefore no more than a low-level phonetic fact of little significance to the phonology.

We have already discovered various means by which long vowels arise in the course of phonological derivations. Particularly important in this regard are the rules of Glide Elision and G-Metathesis, which trigger the ultimate creation of long vowels in many contexts. Some of the forms to which these rules apply may be listed below as 1).

- 1) Glide Elision: ramay+a --> rama+a
 ta+rmⁱiy+u --> ta+rmi+u
 ta+lqay+u --> ta+lqa+u
- G-Metathesis: ta+xwaf+u --> ta+xawf+u
 xawif+a --> xaⁱwf+a
 ma+byuw⁹+u --> ma+buyw⁹+u

Because so many long vowels are created in this way, it is of some interest to determine whether any long vowels exist at the most abstract level of analysis. We shall therefore turn to several quite productive classes of forms exhibiting long vowels in phonetic representations to see if there is not some reason for deriving these long vowels from more complex sequences.

12.1 Plurals and their Singulars

In Chapter IX the following singular-plural alternations were discussed:

2) ma+ktab+u+n	office	ma+kātib+u	offices
ʕaqrab+u+n	scorpion	ʕaqārīb+u	scorpions

We assumed that there is a pluralization process which accounts for these plurals on the basis of the underlying singular. Hence the long vowel of this plural class is not a property of underlying representations. Of course it is entirely conceivable that the long a of the plurals derives from a more complex sequence, but it is not easy to determine the exact nature of this specification. Therefore we shall simply assume that

the long vowel of these plurals, as with all, is created by the pluralization process itself.

Turning again to the plural pattern found in 2) above, it will be recalled that plurals such as sawāhīl+u, 'shores' and šawāhid+u, 'examples', were listed along with 2) as 31) in Chapter IX. It was also noted there that this pointed to sawhīl+u+n and šawhid+u+n as the underlying representations of the singulars. It is now possible, in view of the fact that awC is the type of sequence which the rule of G-Metathesis creates to derive these singulars from yet more abstract swahīl+u+n and šwahid+u+n.

3)	<u>swahīl+u+n</u>	<u>šwahid+u+n</u>	
	<u>sawhīl+u+n</u>	<u>šawhid+u+n</u>	Glide Metathesis
	<u>saawhīl+u+n</u>	<u>šaawhid+u+n</u>	V-Epenthesis
	<u>saahīl+u+n</u>	<u>šaahid+u+n</u>	G-Syncope
	<u>sāhīl+u+n</u>	<u>šāhid+u+n</u>	Lengthening

However, this move towards greater abstractness is countered by the fact that if swahīl and šwahid are chosen as underlying singulars, this type of example will then constitute the only lexical entries of the shape [CGVX], i.e. the only underlying forms commencing with consonant plus glide within the basic

stem. This anomaly is probably to be avoided. Either our proposal is incorrect or else swahil+u+n and šwahid+u+n have yet deeper representations. The latter seems to be the case, as w does not appear to be one of the underlying radicals of these stems. Compare saḥal+a, 'he planed, filed', related to sāḥil+u+n, and šahid+a, 'he witnessed', related to šāḥid+u+n. Thus, it seems clear that the w of these forms is an infix. Consequently in place of 3), we propose 4).

4)	w+sahil+u+n	w+šahid+u+n	
	swahil+u+n	šwahid+u+n	new rule
	sawhil+u+n	šawhid+u+n	Glide Metathesis
	saawhil+u+n	šaawhid+u+n	V-Epenthesis
	saahil+u+n	šaahid+u+n	G-Syncope
	sāhil+u+n	šāhid+u+n	Lengthening

The new rule needed to infix w may be stated as 5).

5) w-Infixation: w[CVX --> [CwVX

It should be emphasized that we earlier concluded that plurals are formed prior to the application of Glide Elision. Thus, bawab+u+n (--> bāb+u+n, 'door') becomes 'a+bwāb+u+n, 'doors', in the plural. Clearly,

the glide must be retained so that the plural may be formed from the singular. If the rule of Glide Elision applied before the plural was formed, the glide would no longer be available for the plural. It may also be the case, then, that the pluralization process precedes Glide Metathesis, although not necessarily so. We tend to think that all morphological processes, such as plural formation, should precede the more truly phonological processes, and thus, there is the probability that pluralization precedes Glide Metathesis. If so, then 4) is at odds with the corresponding plurals, for as noted above, plurals are derived from sawhil+u+n and šawahid+u+n, forms which are the result of Glide Metathesis. The suggestion is, then, that instead of w, the prefix be wa (which mirrors the shape of many other prefixes, such as the person prefixes, 'a, etc.), and that 6) replace 4).

6)	wa+sahil+u+n	wa+šahid+u+n	
	sawahil+u+n	šawahid+u+n	5) restated
	saahil+u+n	šaahid+u+n	Glide Elision
	sāhil+u+n	šāhid+u+n	Lengthening

Rule 5) may now be restated as 7).

7) wa-Infixation: wa [CVX --> [CVwaX

It must now be noted that active participles of non-derived verbs in Arabic are of the same shape as sāhil+u+n and Ṣāhid+u+n. They may take the same plurals as well. This indicates that active participles are also derived from the basic stem plus the wa prefix. Thus, kātib+u+n, 'writing', derives from wa+katib+u+n by steps identical to those of 6). Now note that all derived active participles possess the prefix mu.

8) II.	mu+sallim+u+n	greeting
III.	mu+sāfir+u+n	traveling
IV.	mu+xbir+u+n	informing
V.	mu+ta+xarrij+u+n	graduating
VIII.	mu+9tarif+u+n	recognizing
X.	mu+sta+qbil+u+n	receiving

Also all derived past participles possess the mu prefix.

9) II.	mu+sallam+u+n	greeted
IV.	mu+xbar+u+n	informed
VIII.	mu+9taraf+u+n	recognized
X.	mu+sta+qbal+u+n	received

However, the non-derived past participle displays not mu but ma as its prefix.

10)	ma+ktūb+u+n	written
	ma+šrūb+u+n	drunk
	ma+rkūb+u+n	ridden
	ma+qtūl+u+n	killed

We may account for the ma--mu alternation with the following insignificant rule:

11) ma --> mu / [+derived]

This leaves only the non-derived active participle to be accounted for. But above, we independently concluded that these participles derived from stems with wa prefixes. It is probably not a coincidence that this prefix turned out to be wa and not ya (viz. the plural kawātib+u, etc., and not kayātib+u). Apparently, ma is switched to wa when infixes. Let us restate 7) in its final form as 12)

12) ma-Infixation: ma [CVX --> [CVmaX --> [CVwaX

12) may be stated more formally as a single transformation or as two individual processes. If the latter

possibility is adopted, ma must be specified with a special feature delineating it as an infix, for not all instances of [CVmaX become [CVwaX. This seems to indicate that 12) is one transformational process.

If wa is the correct infixed element, i.e. from ma, then it may seem that a slight contradiction has arisen. For we need CawCiC from which to form the plural, cf. 2) above, and not CawaCiC. There are two ways of clearing this inconsistency up. One, we might claim that the plurals of 2) are in fact formed from singulars of the shape CVCVCVC, and not from CVCCVC. If this is done, then clearly ma+katab+u+n and 9aqrab+u+n must derive from underlying ma+katab+u+n and 9aqarab+u+n. There is some evidence indicating that these are the underlying representations. First, Vowel Elision would account for ma+katab+u+n from ma+katab+u+n already, and the latter is the desired underlying representation, for if it is not, then forms such as these are the only stems with underlying initial CC sequences. Further, it is certainly desirable that we generalize the noun stem with the verb stem katab already encountered. Secondly, there are in fact no basic stems of the shape CVCVCVC, so that if 9aqrab derived from 9aqarab, the former could

be accounted for by what would otherwise necessarily be a morpheme structure condition. The rule may be stated as 13).

13) $V \rightarrow \emptyset / [XVC_CVX]$

The stem boundaries are included in 13) so as to prevent katab+at from becoming katb+at, as noted in conjunction with the initial motivation of Vowel Elision. Rule 13), thus, applies only to basic stems. However, later we shall see that it collapses with the earlier rule of Vowel Elision quite naturally. Now if 13) is part of the grammar, we may rid ourselves of our inconsistency in another way. We may still derive plurals from CVCCVC, but allow 13) to apply to underlying CawaCaC sequences such as sawahil+u+n and sawahid+u+n, giving sawhil+u+n and sawhid+u+n. The correctness of this latter possibility is borne out by the following subsection, where it is noted that the stage CawCiC is justified for independent reasons. Thus, we assume that 13) is a rule of the grammar of Arabic, and not a morpheme structure condition. The problem remains as to why sawhil+u+n becomes later sāhil+u+n by V-Epenthesis and G-Syncope (or by any other equivalent theory), but not gawd+u+n, etc., i.e. the

latter does not become qād+u+n. This problem is discussed in the following chapter, but no adequate solution is in view. Nevertheless, the basic approach adopted in this chapter seems to be correct, but only future research will clarify the outstanding problems.

If we adopt this approach, then clearly one more long vowel is eliminated from underlying representations, the long a of singular nouns and active participles of the shape CāCiC. We now turn to a class of forms somewhat similar to those mentioned above, the class III and VI derived verbs.

12.2 Class III and VI Verbs

In Chapter VII the rule of ta-to-tu was motivated in terms of the following changes:

- 14) II. ta+daxxil+u --> tu+daxxil+u
 III. ta+kātib+u --> tu+kātib+u
 IV. ta+'a+dxil+u --> tu+'a+dxil+u (--> tu+dxil+u)

To these examples may be added the so-called quadriliterals, i.e. the stems possessing four underlying radicals, this class being somewhat rare to Semitic. We find ta+saytir+u --> tu+saytir+u, 'she commands', ta+barhin+u --> tu+barhin+u, 'she proves', etc. So that ta-to-tu seems to be a quite general rule.

15) ta-to-tu: Ca [+person] --> Cu / CS

The symbol S was the informal abbreviation for strong cluster used in the earlier presentation.

Note that if we make more explicit what we mean by S, we must restate 15) as 16).

16) ta-to-tu: Ca [+person] --> Cu / C $\left\{ \begin{array}{c} \bar{V} \\ VC \end{array} \right\}$ C

In other words, both the long vowel and the closed syllable appear to function as strong clusters. But note that form III of 14) possesses the long vowel of the same pattern as the forms discussed in 12.1. If we blindly adopted the suggestions made in 12.1, we would conclude that this long vowel also derived from awa by Infixation. Indeed, there now appear two good reasons for assuming that form III derives from a more abstract representation via steps identical to those of 6). First, kātib, the form III derived verb, does consist of added material, this, by virtue of being a derived verb. This added material is the long vowel itself, cf. tu+kātib+u, 'she corresponds', and ta+ktub+u, 'she writes', kātab+at, 'she corresponded', and katab+at, 'she wrote'. It is only reasonable,

then, to assume that the long a of class III is infixal in nature. Secondly, if we allow the infix to be w, we simplify 16). Consider the derivation needed to bring this about.

- 17) ta+w+katib+u
 ta+kwatib+u new rule
 ta+kawtib+u Glide Metathesis
 tu+kawtib+u ta-to-tu
 tu+kaawtib+u V-Epenthesis
 tu+kaatib+u G-Syncope
 tu+kātib+u Lengthening

If 17) is correct it allows for the restatement of 16) as 18).

- 18) ta-to-tu: Ca [+person] --> Cu / __CVCC

On the other hand, in place of w, wa may be the correct choice of prefix, in which case the rule Stem-vowel Elision must be employed.

- 19) ta+wa+katib+u
 ta+kawatib+u wa-Infixation
 ta+kawtib+u Stem-vowel Elision
 tu+kawtib+u ta-to-tu
 tu+kaawtib+u V-Epenthesis
 tu+kaatib+u G-Syncope

There is one good reason for suspecting that 19) is correct. First, the 'a of form IV verbs, cf. 14), is of utmost importance to ta-to-tu, although this morpheme is later elided. But as noted in 7.2, cf. 18) therein, I.D. Metathesis follows ta-to-tu, so that the 'a of ta+'a+mdid+u will also be relevant to turning the prefix ta to tu and md will constitute the strong cluster triggering this change, viz. tu+'a+mdid+u (and later tu+midd+u). It might be suspected that Glide Metathesis should also bear the same ordering relation to ta-to-tu as does I.D. Metathesis, and this can be shown by the same means of argumentation as utilized in 7.2. If Glide Metathesis applies before ta-to-tu, then we incorrectly derive tu+xāf+u instead of the desired ta+xāf+u by the following derivation:

20) ta+xwaf+u
 ta+xawf+u Glide Metathesis
 tu+xawf+u ta-to-tu
 tu+xaawf+u V-Epenthesis
 tu+xaaf+u G-Syncope
 tu+xāf+u Lengthening

This derivation must be prohibited as may be if 17)

is eschewed in favor of 19), which again allows for the simplification of ta-to-tu as 18).

Class VI derived verbs of the shape ta+ta+CāCaC+u in the imperfect indicative derive from class III by prefixation of ta, another derivational affix. Thus, we assume that this long a is also created by infixation of wa. Note that ta-to-tu does not apply to this second instance of ta since it is the derivational affix, i.e. [-person].

There is good reason for suspecting that class III and VI derived verbs do not possess long vowels in underlying representations, which, once again, suggests that this is a general fact about the lexicon.

12.3 A Final Class of Long Vowels

Section 12.2 pretty well exhausts the remaining cases of derived verbs. . The outcome of course is that the long vowels do not exist in underlying representations. In this section we shall take a glance at one outstanding class of examples with a long vowel, again long a, following the second radical. Representative examples of this class include nouns such as kitāb+u+n and yazāl+u+n, meaning 'book' and 'deer' respectively. We would now like to show that the long a common to these forms does not exist as such in underlying representations. In order to prove this, it is necessary to briefly sketch the method of forming diminutives in Arabic. Consider the following alternations:

21)	singular		diminutive
	jabal+u+n	mountain	jubayl+u+n little mountain
	qalam+u+n	pencil	qulaym+u+n little pencil
	kalb+u+n	dog	kulayb+u+n little dog
	rajul+u+n	man	rujayl+u+n little man
	9aqrab+u+n	scorpion	9uqayrib+u+n little scorpion
	daftar+u+n	notebook	dufaytir+u+n little notebook
	dafda9+u+n	frog	dufaydi9+u+n little frog

The diminutive is formed by substituting u between the first and second radicals of the stem, ay between the second and third radicals, and i between the third and fourth, if the stem has a fourth radical. Let us informally state this process as 22).

22) Diminutive Formation:

$$\text{CVC(V)C(V C)} \rightarrow \text{CuCayC(iC)}$$

The rule is actually slightly more complicated, but these details are irrelevant to this discussion. Earlier we argued that a noun such as sadiq+u+n, 'friend', derives from the more abstract sadiyq+u+n by Syl. Assim. and Lengthening. We also hinted that sadyiq+u+n was the more abstract representation to which Glide Metathesis applies. If the latter is truly the underlying representation, we might expect the diminutive to be formed on this base form. If 22) is applied to sadyiq+u+n, we should get sudayyiq+u+n, 'little friend', i.e. with two y's. This is in fact the correct phonetic representation, proving that the y was present in the underlying representation, thus, confirming our earlier discussion. Now suppose we wish to form the diminutive of forms such as kitāb+u+n and yazāl+u+n noted above. The phonetic representations turn out to be kutayyib+u+n and yuzayyil+u+n for 'little book' and 'little deer' respectively, proving

that a glide was present in kitāb+u+n and yazāl+u+n at the most abstract level of analysis. In other words, if kityab+u+n and yazyal+u+n were the underlying representations, we would be able to derive the diminutives by the rule of Diminutive Formation without any additional ad hoc mechanism. Further, if the diminutives are not formed, then kityab+u+n and yazyal+u+n will become the desired kitāb+u+n and yazāl+u+n by processes independently motivated, i.e. by Glide Metathesis, V-Epenthesis, and G-Syncope, followed of course by Lengthening. It is possible that the glide underlying these forms is w and not y, for then the diminutive would still be correctly formed by the following derivation:

23) kitwab+u+n yazwal+u+n
 kutaywib+u+n yuzaywil+u+n Diminutive Formation
 kutayyib+u+n yuzayyil+u+n w-Fronting

We shall assume that y underlies these stems since we have no independent evidence pointing to w.

This final class of long vowels clearly do not belong to underlying representations. It is possible to account for the phonetic long vowels by means of rules already seen to be part of the phonology of Arabic.

12.4 Conclusion

The data of each section presented in this chapter support the claim that there do not exist long vowels in underlying representations. Long vowels are simply the result of the application of various phonological rules, particularly Glide Metathesis and Glide Elision. The feature [+long] is, if it exists at all, a low level phonetic process of little interest to the phonology of Arabic. And it is not coincidental that the rule of Lengthening was seen to operate at the very end of our rules, cf. Chapter IV. If we recall the earlier statement of G-I.D. Metathesis, we see that this rule was stated so that V_j had to be [-long]. The symbol utilized was \check{V}_j . If there are no long vowels at this point in the derivations, i.e. no vowel with the feature [+long], rather only sequences of two or more morae, then this statement loses any content it once had. It is no longer V_j that must be specified [-long], rather it must be stated that no V may follow V_j . Returning now to the restatement of G-I.D. Metathesis 55) of 11.3, we see that this is precisely what is done. Since $V_jC]$ is a part of the rule, it follows that this rule will not apply when the glide is followed by two or more morae. This convergence

of deductions argues forcefully for the hypothesis entertained in 11.3. Note further that this completely rules out the possibility that Diphthongization is a rule of Arabic, which inserts glides into the hollow stems. That is, the condition in terms of the subscripts \underline{i} and \underline{j} of 55) may not be dropped. What about the rule of Glide Elision? In order to insure that this rule does not apply when the third radical glide is followed by two or more morae, it must be restated as 24).

24) Glide Elision: $G \rightarrow \emptyset / V_{\underline{i}} _] V_{\underline{j}} [-\text{voc}]$

Condition: if $j=[+\text{lo}]$, then $i=[+\text{lo}]$

Or alternatively the Diphthongization approach is possible if [-voc] is omitted from this rule along with the if-then condition. We shall continue to assume that 24) is correct, however, on the basis of the fact that Diphthongization is probably the incorrect approach to hollow stems. If this is correct, then the new theory must be favored over the theory of local ordering discussed earlier.

It seems reasonable to question the validity of the feature [+long] for deep phonology in general. It appears likely that this feature will never be needed in the deep phonology of any language, although this is an empirical question. The evidence in Arabic is particularly clear, however, and we are confident

that [+long] is of little consequence to the deep phonology of this language.

There remain only a few long vowels for which no alternations can be discovered proving the existence of a phantom glide. However, these long vowels are part of the suffix system discussed in Chapter I. Consider the following two examples.

- 25) katab+nā+hu wrote-we-it = We wrote it
 katab+at+ā+hu wrote-she-dual-it = They f.d. wrote it.
 katab+at+hā wrote-she-it f. = She wrote it.

The person suffixes nā and hā have long ā, as does the dual ending ā itself. As for the feminine singular object suffix, we have hiya, 'she', as independent subject pronoun, which may indicate the underlying presence of medial y. However, this alternation is not easily accountable for, and we assume there is no longer any synchronic relation, phonologically speaking. There is the independent pronoun nahnu, 'we', indicating that nā originally possessed intervocalic h. Again there is little to be gained by assuming the more abstract nahā. There are no relic alternations for ā, the dual ending, however. These three forms, on the basis of the preceding discussion, may be derived from vocalic sequences of aa. Thus, these affixes are no only exception to the generalization

that no such sequences exist lexically. However, the generalization still holds, it should be noted, for the basic vocabulary, i.e. for all stems. Further, the generalization that no length feature exists in the lexicon can be maintained.

Chapter XIII

THE STEM AND THE WORD CYCLE

13.0 In this chapter we shall pursue the topic of the stem. First we define the notion stem, as opposed to basic stem. We then pass to the evidence for the cyclic nature of stress, which is not without its difficulties.

13.1 On the Notion Stem

In this section the notion stem will be clarified. It will be seen that the stem includes not only the basic stem, i.e. the three basic radicals plus internal vocalic material, but also all derivational material in the prefix position.

13.1.1 The Passive Voice

It has already been demonstrated that CVCVC perfectives become CuCiC in the passive, and that CV+CVVC imperfects become Cu+CCaC in the passive. We now wish to investigate the passives of the derived forms, which may be listed below as 1). The root ktb re-

presents all canonical shapes.

1)	Perf.	Imperf.
	I. kutib+at	tu+ktab+u
	II. kuttib+at	tu+kattab+u
	III. kūtib+at	tu+kātab+u
	IV. 'u+ktib+at	tu+ktab+u
	V. tu+kuttib+at	tu+ta+kattab+u
	VI. tu+kūtib+at	tu+ta+kātab+u
	VII. 'u+n+kutib+at	tu+n+katab+u
	VIII. 'u+ktutib+at	tu+ktatab+u
	IX. 'u+ktubib+at	tu+ktabab+u
	X. 'u+stu+ktib+at	tu+sta+ktab+u

The perfective forms are all preceded by derivational prefixes, with the exception the initial 'u of VII, VIII, IX, and X (but not IV), which is prosthetic. The initial prefix of the imperfective forms is the third feminine person marker chosen at random, as is the at suffix found in the perfective forms. We have also arbitrarily chosen the indicative suffix, u, to accompany the imperfectives. The forms of IX will later undergo I.D. Metathesis unless a suffix beginning with a consonant is substituted for at of the perfect, or u of the imperfect.

It is obvious from 1) that it is not enough to merely say that the basic stem becomes CuCiC in the passive of the perfective. Rather, we must stipulate that the stem vowel i is preceded by any number of u vowels. But when we consider the imperfect conjugations, we learn that stem-vowel a is not preceded by any number of a's. Rather a, like u has a particular domain. Namely, the basic stem plus any derivational prefixes, but never any inflectional material, such as the tu of the imperfective conjugations, or the at of the perfective. It thus appears there is some reason for identifying the basic stem plus derivational prefixes as a basic unit. Let us henceforth call this unit the stem, reserving basic stem for the unit including the three radicals along with internal vocalic and infixal material.

We now wish to explain why it is that the imperfective prefix is u and not the expected ta? Clearly the fact that we have tu in the imperfective is related to the fact that u precedes i in the perfective. Let us assume that perfective i is the basic stem vowel. Imperfective a is now accounted for by Ablaut, for the stem-vowel. Suppose further that the passive morphology is created by the following rule:

2) Passive Formation: $V \rightarrow i / _C] / [+passive]$

We assume that the feature [+passive] is assigned to active stems by the passive, syntactic transformation. This rule takes active CaCVC, which we assume is specified [+passive], into CaCiC. We now add the additional rule of Quasi-Assimilation to account for the i of form I perfective.

3) Quasi-Assimilation: $a \rightarrow u / _CiC] / [+passive]$

This rule takes CaCiC on to CuCiC as desired. Thus, by these two rules katab may be correctly turned to passive kutib, accounting for class I perfective passives. However, we wish rule 3) to turn all a's of the stem to u, so that we may account for all derived perfective passives. Rule 3) may now be restated as 4).

4) Quasi-Assimilation: $a \rightarrow u / _ (C_o V)^* C_o iC] / [+passive]$

By use of the star notation we allow for the following derivation of tu+kuttib+at, of class V.

5) ta+kattab]at
 ta+kattib]at Passive Formation
 tu+kuttib]at Quasi-Assimilation

Let us now account for the imperfective passives. The stem-vowel a is accounted for by Ablaut. But clearly the other a's of the imperfective derived forms may be accounted for by Ablaut if we require that Ablaut apply only to the stem. That is, we allow Ablaut to apply to all vowels of the stem, but to none outside the stem, in the passive conjugation only. This will explain why tu shows up in the imperfect and not ta.

- 6) ta[ta+kattab]u
 ta[ta+kattib]u Passive Formation
 tu[tu+kuttib]u Quasi-Assimilation
 tu[ta+kattab]u Ablaut

This gives some explanation for the fact that tu shows up in the imperfective passive. But note that the cost of this theory is one new statement of Ablaut, for Ablaut does not normally apply to any but the stem-vowel. This new rule of Ablaut may be stated as 7).

- 7) Ablaut-Passive: V --> [-ahi] / [X__X] / [+passive]
 [ahi] [-rd]

We shall assume that this is correct, although there

are alternative approaches to the forms of 1). We might point out, however, that given the restatement of Ablaut as 35) of 11.2.2.2, perfective stem-vowel i of the derived conjugations cannot be changed to a as desired. This follows from the use of the β convention. Clearly, either that restatement must be abandoned, in which case a new rule of Ablaut is needed anyhow, or else our proposal must be adopted. In either case two rules of Ablaut are needed, so that our proposal does not result in a loss of generalization as compared with alternative approaches which are in sight. Because our approach explains a further problem, i.e. it predicts tu, we shall continue to adopt it until the time evidence can be evinced to prove it wrong.

13.1.2 Diminutive Formation

In 12.3 of the preceding chapter, the rule of Diminutive Formation was stated as 22). We repeat that rule now as 8).

8) Diminutive Formation: $CVC(V)C(V)C \rightarrow CuCayC(i)C$

Note that suffixes may not be included in the analysis of this rule because of the following examples:

- 9) ḥafl+at+u+n party ḥufayl+at+u+n little party
 waraq+at+u+n leaf wurrayq+at+u+n little leaf
 naml+at+u+n ant numayl+at+u+n little ant
 mawz+at+u+n banana muwayz+at+u+n little banana

In other words at is not considered to be a part of the domain relevant to 8), since at does not become it, i.e. we do not find numayl+it+u+n, muwayz+it+u+n, etc. Indeed the example kulayb+u+n from the last chapter proves that case endings are not relevant. Diminutive Formation must therefore be stated as 10).

- 10) Diminutive Formation: $\text{CVC(V)C(VC)]} \rightarrow \text{CuCayC(iC)]}$

We see, then, that Diminutive Formation applies to stems, never to suffixal material. Now note the fact that derivational material is relevant to the correct application of 10).

- 11) ma+ktab+u+n office mu+kaytib+u+n little office
 mu+slim+u+n Muslim mu+saylim+u+n little Muslim

It seems correct, on the basis of these data, and those of 13.1.1, that basic stems plus derivational endings make up the domain of many rules. This is what we term the stem.

13.2 Stem Rules

That the basic stem plus derivational prefixes should constitute the stem is of some interest. First, the distinction between stems and words may be accounted for by lexical means. It seems probable that stem boundaries are part of the lexical entry. If this is true, then it follows that derived verb forms are lexical entries, and not derived by syntactic transformations. This is, incidentally, exactly what was concluded in Chapter VIII for class IV causatives on the basis of independent evidence.

Stem rules, then, are rules which change material internal to the stem. We have already noted that a number of rules which appear to be stem rules are stated so as to include material external to the stem. However, it is significant that no stem rule ever affects these external segments in any way.

Let us return now to the two rules that elide vowels in open-ended syllables.

- 12) Vowel Elision: $V \rightarrow \emptyset / V+C_CV$
 $V \rightarrow \emptyset / [XVC_CVX]$

It was noted in footnote 2 of Chapter V that Vowel

Elision is incorrectly stated, for it takes samak+at+u+hum+ā into the incorrect sequence samak+at+u+hm+ā. Now notice that this incorrect derivation will be blocked if Vowel Elision is a stem rule, for the u of hum is outside the stem, and by our definition of stem rules, segments external to the stem are never affected. Let us then collapse the two cases listed in 12) as a single rule of Vowel Elision.

13) Vowel Elision: $V \rightarrow \emptyset / VC_ [CVX]$

This rule rightly predicts that katab+at does not become katb+at. It also rightly takes underlying ta+katub+u to ta+ktub+u. There is but one class of exceptions to this generalization, the ta prefix, which is the derivational prefix found in class V and VI derived verbs. For example, ta+ta+kallam+u, 'she speaks', does not become ta+t+kallam+u, ta+ta+fāham+ā, 'they f.d. understood one another', does not become ta+t+fāham+u, etc. This prefix may be specified in the lexicon so as not to undergo 13). Alternatively, it may be that the a of this prefix is due to a later epenthesis rule. Some

evidence does support the latter alternative. Note that this ta does not undergo ta-to-tu. We specifically stated this rule with the feature [+person] so as to prevent this. But if we insert the a of this derivational prefix after ta-to-tu, then there is no reason to complicate the ta-to-tu rule. Secondly, it was noted above that w and y do not elide from class V derived blind verbs, cf. ta+wassal+a. This may be explained if the a is epenthesized after Glide Elision applies. This obviates the need for] in the statement of ~~Glide~~ Elision. Finally it is common for aC_oā to become iC_oā, as noted in Chapter IX, where the rule of Dissimilation was proposed. There are a number of exceptions to this rule, one being the class VI forms. That is, ta+ta+fāham+u does not become ta+ti+fāham+u. Viewing the relevant a as an epenthesis element could help solve these problems. This would then eliminate a large class of exceptions to a large class of rules. We shall adopt this suggestion in the final list of rules of Chapter XIV.

13.3 The Word Cycle

According to Stress Assignment final long vowels should be stressed. They are not with one

exception.

- 14) rāmā he threw
 da9ā he called

The one exception is the dual ending ā̄, encountered above.

- 15) katab+at+ā̄ they f.d. wrote
 da9aw+ā̄ they m.d. called

One could account for the stress of 14) if Stress Assignment preceded Glide Elision, also accounting for 15), since the latter do not possess underlying glides.

- | | | | | | |
|-----|---------|---------|--------------|-----------|-------------------|
| 16) | ramay+a | da9aw+a | katab+at+aa | da9aw+aa | |
| | rāmāy+a | dā9aw+a | katab+at+ā̄a | da9aw+ā̄a | Stress Assignment |
| | rāma+a | dā9a+a | --- | --- | Glide Elision |
| | rāmā | dā9ā | katab+at+ā̄ | da9aw+ā̄ | Lengthening |

This is clearly wrong, however, for consider the following forms:

- 17) ramāy+nā we threw
 da9āw+nā we called

Suppose we form the feminine dual of da9aw, which on the basis of katab+at+āa, cf. 15), we expect to be da9aw+at+aa in underlying representations. But if this is true, then the following derivation should obtain: (omitting stress)

- 20) da9aw+at+aa
 da9a+at+aa Glide Elision
 da9āt+ā Lengthening

But this is wrong, for instead of da9āt+ā, we find da9at+ā, i.e. with the penultimate syllable short. The correct derivation immediately follows from the underlying sequence da9aw+atΨaa.

- 21) da9aw+atΨaa
 da9a+atΨaa Glide Elision
 da9aatΨaa Truncation
 da9+atΨā Lengthening

(Of course the boundaries are not present in the phonetics.) But this is just what is needed to obtain the correct stress assignment in 19). Thus, the two ~~sets of facts~~, ~~stress~~ and ~~truncation~~, converge, proving that Ψ must be present when dual ā is appended to verbs, and further, that the stress rule must apply cyclically, analyzing ā as part of the second cycle.

Let us now note that the long vowel of masculine hollow stems conjugated in the dual do not truncate, cf. qāl+ā, 'they m.d. said', which if it were derived from underlying qawalΨā, should undergo the following derivation:

- 22) qawalΨaa
 qaalΨaa G-Metathesis, G-Syncope
 qalΨaa Truncation
 qalΨā Lengthening

(Actually Stem-vowel Assimilation should have been applied giving ultimate qulā, but this step is irrelevant.) But this is wrong, for we find qāl+ā, 'they m.d. said'. The reason for this is obvious. To feminine katab+at and da9aw+at, the dual ā is suffixed. The same should hold for the masculine. That is ā is appended not to the stem as in 22), but to the stem plus the masculine marker a, giving underlying qawal+aΨaa. Now clearly, the lack of Truncation follows as a result of this underlying representation which is independently motivated.

- 23) qawal+aΨaa
 qaal+aΨaa G-Metathesis, G-Syncope
 --- Truncation (inapplicable)
 qāl+ā Lengthening

It is really irrelevant that Lengthening is oblivious to the boundary Ψ , for it is extremely dubious that Lengthening is even a rule in the grammar, cf. Chapter XII. But if it is, then it disregards Ψ . Now returning to the masculine dual da9awā, cf. 15) and 19), we see that it must be replaced in 19) by the following: $[[da9aw+a]\Psi aa]$. But this means that Glide Elision must not be a cyclic rule, for if it were it would incorrectly elide the w of this form, which does exist in phonetic representations. Thus, we conclude that Glide Elision is a word level rule, which is very interesting because this now proves that G-Metathesis and Glide Elision cannot in principle be collapsed, for the former precedes Stress Assignment, as noted in Chapter XI.

We may conclude, then, that Stress Assignment is a cyclic rule, where cycle has a particular definition. The first cycle includes the stem plus person suffixes. The second or last cycle incorporates the dual ending as well. But this now means that the object pronouns are part of the last cycle, since they follow the dual ending.

- 24) $\overset{\cdot}{d}a9aw+\overset{\cdot}{a}+hu$ they m.d. called him
 $\overset{\cdot}{k}atab+\overset{\cdot}{a}t+\overset{\cdot}{a}+hu$ they f.d. wrote it m.

There is now some interesting phonetic evidence proving that this is correct.

25) $\overset{\text{u}}{\text{k}}\overset{\text{a}}{\text{t}}\overset{\text{a}}{\text{b}}+\text{tu}+\text{hu}$
 $\overset{\text{u}}{\text{k}}\text{atab}+\overset{\text{a}}{\text{t}}+\text{hu}$

Note that the first a of katab+tu+hu is reducible. The first a of katab+at+hu, however, is not. This coincides perfectly with the cycle dictated by the examples of 24) in conjunction with the cyclic theory proposed earlier.

26) [[katab+tu]hu][[katab+at]hu]

1st cycle	1	1		Stress Assignment
2nd cycle	1	2	1	Stress Assignment
	ø			Reduction

Thus, since subject pronouns are included in the first cycle, the first a of katab+tu+hu will never be stressed, and hence is subject to reduction. Not so with the feminine katab+at+hu, however, since it is stressed on the first cycle. Examples such as these confirm the theory advocated here in a powerful way. The cycle lives.

Footnotes to Chapter XIII

1. I have reached this conclusion for Lebanese Arabic on the basis of evidence which differs from this. Cf. Brame, 1970.

Chapter XIV

CONCLUSION

14.1 Cumulative Rules

Redundancy Rules

Class_A Redundancies: waLaC --> [-L-Assimilation]
 waCa $\left\{ \begin{array}{c} h \\ h \end{array} \right\}$ --> [-L-Assimilation]
 waCaC --> [-F]
 CaCay --> [-F]
 CaCaw --> [+F]
 Ca $\left\{ \begin{array}{c} ' \\ h \\ h \end{array} \right\}$ aC --> [-F]

Exception Redundancy: G --> [-G-I.D. Metathesis] / __VG]
 [-w-toy]

Stem Rules

ma-Infixation: ma - [CV - X
 1 2 3 -->
 Ø 2 wa 3

Passive Formation: V --> i / __C] / [+passive]

Quasi-Assimilation: a --> u / __ (C₀V) C₀iC] / [+passive]

Diminutive Formation: CVC(V)C(VC)] --> CuCayC(iC)]

Vowel Elision: V --> Ø / VC__CVX]

ta-Elision: ta --> Ø / __[/ [+imper]
 [-neg]
 ma --> mu / [+derived]

ta-to-tu: Ca --> Cu / __CØVCC

Caus. Deletion: 'a [+caus] --> Ø / CV__[

G-I.D. Metathesis:

$$\left\{ \begin{matrix} V_i \\ C \end{matrix} \right\} \left\{ \begin{matrix} G \\ <C_k>_a \end{matrix} \right\} V_j C_k] <V>_b \rightarrow \left\{ \begin{matrix} V_i \\ C \end{matrix} \right\} \emptyset V_j \left\{ \begin{matrix} G \\ <C_k>_a \end{matrix} \right\} C_k] <V>_b$$

Condition: if $j=[+lo]$, then $i=[+lo]$

if a, then b

w-Fronting: $w \rightarrow y / \left\{ \begin{matrix} y \\ _y \end{matrix} \right\}$

Vocalic Assimilation: $\begin{matrix} V \\ [+hi] \end{matrix} \rightarrow \begin{matrix} [abk] \\ [\beta rd] \end{matrix} / \begin{matrix} [-cns] \\ [-voc] \\ [+hi] \end{matrix} _C$

$C \rightarrow \emptyset / C _ C$ $\begin{matrix} [abk] \\ [\beta rd] \end{matrix}$

w-to-y: $\begin{matrix} [-cns] \\ [-voc] \\ [+hi] \end{matrix} \begin{matrix} V \\ \end{matrix} \rightarrow \begin{matrix} [abk] \\ [\beta rd] \end{matrix} / \begin{matrix} V \\ [abk] \\ [\beta rd] \end{matrix} _$

Passive-Ablaut: $\begin{matrix} V \\ [\alpha hi] \end{matrix} \rightarrow \begin{matrix} [-ahi] \\ [-rd] \end{matrix} / [X _ X] / [+passive]$

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

V-Epenthesis: $\emptyset \rightarrow V_i / CV_i _ GC$

G-Syncope: $G \rightarrow \emptyset / VV _ C$

Stem-vowel Assimilation: $V \rightarrow \begin{matrix} [+hi] \\ [abk] \\ [\beta rd] \end{matrix} / \begin{matrix} [-cns] \\ [-voc] \\ [+hi] \\ [abk] \\ [\beta rd] \end{matrix} _ C / \begin{matrix} [+A] \\ [-derived] \end{matrix}$

w-Occultation: $w \rightarrow \emptyset / _ CiC / [-derived]$

L-Assimilation: $i \rightarrow a / \left\{ \begin{matrix} L _ C \\ _ L \end{matrix} \right\} / \begin{matrix} [+imperf] \\ [-derived] \end{matrix}$

V-Lowering: $i [+imperf, \left\{ \begin{matrix} +V \\ +VI \end{matrix} \right\}] \rightarrow a / _ C$

Word Level Rules

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

w-to-y: $\begin{matrix} [-cns] \\ [-voc] \\ [+hi] \end{matrix} \rightarrow \begin{matrix} [\alpha bk] \\ [\beta rd] \end{matrix} / \begin{matrix} V \\ [\alpha bk] \\ [\beta rd] \end{matrix} _$

Glide Elision: $G \rightarrow \emptyset / V_i _ V_j [-cns]$, if $j=[+lo]$, $i=[+lo]$

Truncation: $V \rightarrow \emptyset / _ VC \begin{Bmatrix} \Psi \\ C \end{Bmatrix}$

Glottal Epenthesis: $\emptyset \rightarrow ' / aa _ V$

Stress Assignment: $V \rightarrow [1 \text{ stress}] / _ C_o ((VC_o^1)VC_o^1)\Psi$

u-to-i: $u \rightarrow i / _ i$

a-i-Assimilation: $V \rightarrow \begin{matrix} [\alpha bk] \\ [\beta rd] \\ [\gamma hi] \\ [\delta str] \end{matrix} / \begin{matrix} V \\ [\alpha bk] \\ [\beta rd] _ \\ [\gamma hi] \\ [\delta str] \end{matrix}$

$' \rightarrow V_i / 'V_i _$

$u \rightarrow i / i+h _$

Syllabicity Assimilation: $[-cns] \rightarrow [+voc] / \begin{matrix} V \\ [+hi] \end{matrix} _ \begin{Bmatrix} \Psi \\ C \end{Bmatrix}$

Phonetic Rules

$V_2^C \rightarrow \bar{V}$

The division may have no theoretical significance. Yet it is probably not a coincidence that those rules stated with] do tend to cluster as one group.

One of the most interesting results evident in this set of rules is the fact that w-to-y is still needed in two places in the grammar. It may still be that this rule is a rule which applies cyclically, however it may also be that the first application of w-to-y is to be stated with]. It is hard to find empirical reasons, other than ordering, for distinguishing to two applications as two distinct rules. Either the cyclic or the local ordering theory is capable of capturing this generalization, if indeed it is to be captured. But one thing seems intuitively clear. If there existed an underlying root of the shape w*C*iw, it would undergo the following derivation to produce the command of the feminine plural.

- 1) ta+w*C*iw+na
 ta+w*C*iw+na Vowel Elision
 w*C*iw+na ta-Elision
 w*C*iy+na w-to-y
 w*C*ay+na Ablaut
 'i+w*C*ay+na Prosthesis (and ' insertion)
 'i+y*C*ay+na w-to-y
 'i+i*C*ay+na Syllabicity Assimilation
 'i*C*ay+na Lengthening

Unfortunately, we can find no examples. (There is a condition ruling out C_iVCVC_i at the abstract level.) If 1) is correct, and there is little doubt in our mind that it is not, then the theory of local ordering must be defined so as to allow unmarked orders to prevail with respect to the particular domain of the rule in question, not with respect to the form as a whole. That is, one does not simply apply two rules in the unmarked order at the first available opportunity to a single form and then cease. Rather, the application continues as long as a new domain arises in the same form. This seems quite natural and may be the desired approach. On the other hand, it may be that the stem-cyclic solution is to be favored. The first application of w-to-y is internal to the stem, the second across morpheme boundaries.

2)	radiw+a	-->	radiy+a	first application
	du9iw+a	-->	du9iy+a	
	'i+wjal	-->	'i+yjal	second application

As noted earlier, this may be no coincidence. Finally note that w-to-y may not be collapsed with a-i-Assimilation. This follows from the fact that yu and wi remain the same in surface representations. A further alternative to the w-to-y problem is now in sight. One might

suppose that w-to-y is actually part of the Syl. Assim. process. These two rules could be combined as follows:

$$3) \quad G \rightarrow V_i / V_i \left\{ \begin{array}{c} \Psi \\ C \end{array} \right\}$$

This rule would bring about the following changes:

$$\begin{array}{l} 4) \quad uwC \rightarrow uuC \\ \quad uyC \rightarrow uuC \\ \quad iyC \rightarrow iiC \\ \quad iwC \rightarrow iiC \end{array}$$

If this analysis is adopted, then the last candidate for the stem cycle disappears. Rule 3) may be the correct analysis. However, if it is, then it must still be recognized that the first application of w-to-y and Rule 3) are functioning very much alike, which fact the grammar must capture. This is essentially the problem of 'conspiracies' which has been discussed in some recent papers. It should be emphasized that the elimination of one problem does in fact create another in this instance.

Finally, it must be noted that Stress Assignment, of all the word level rules is a cyclic rule. But here the cycle is defined as follows:

$$5) \quad [[\text{stem+subj. prnoun}] (\text{dual}) + \text{object prnoun}]$$

That is, the first cycle is constituted by the stem plus subject pronouns. The second cycle is constituted by the dual ending, which is optional, and object pronouns. By an extension of the earlier discussion it is easy to show that subject prefixes must function as part of the first cycle, so that 5) must also incorporate subject prefixes. It is probably significant that what we have been calling stem rules correlates pretty well with the first cycle, except that subject pronoun suffixes may never be altered.

Finally let us note where our rules break down.

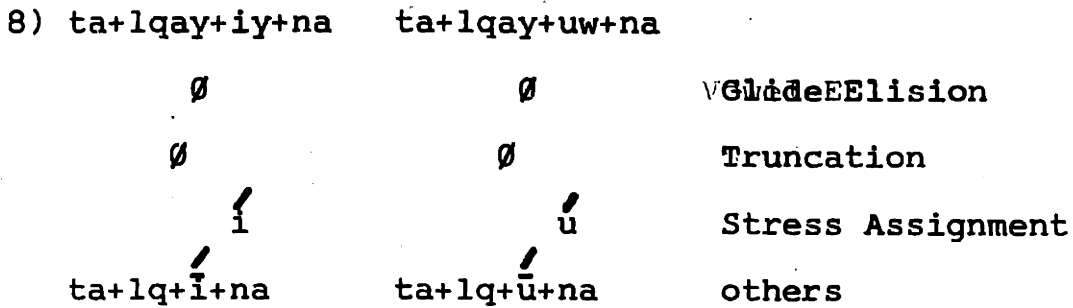
The following derivations were shown to exist earlier:

6) kawun+tu	xawif+tu	ta+d9uw+iy+na	ta+rmiy+uw+na	
∅	∅	∅	∅	G-Metathesis, etc. and Glide Elision
∅	∅	∅	∅	Truncation
kun+tu	xif+tu	ta+d9+ī+na	ta+rm+ū+na	others

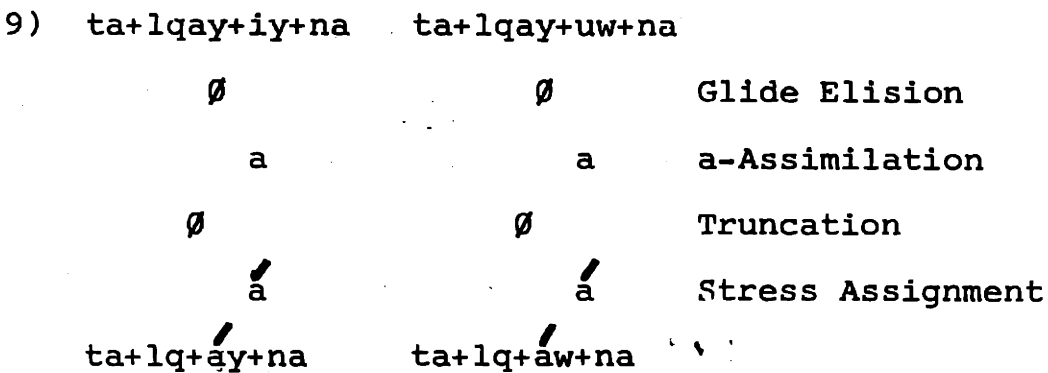
This gives the correct results in each case. Also needed was 7).

7) kawun+a	xawif+a	
kaun+a	xaif+a	G-Metathesis, etc.
káun+a	xáif+a	Stress Assignment
káan+a	xáaf+a	a-Assimilation
kān+a	xāf+a	Lengthening

But let us see what these orderings give in the case of underlying ta+lqay+iy+na and ta+lqay+uw+na.



But we find ta+lqay+na and ta+lqaw+na and not what 8) predicts. It seems that Anderson's theory might well come into play here. Suppose we allow the forms of 8) a-Assimilation before Truncation. Then the correct forms are derived.



Clearly this is the unmarked order, whereas 6) illustrates the marked order. We may now note that opposite orders are also needed for u-to-i.

Earlier we noted that buyi9+tu becomes bi9+tu in the passive, cf. 11.2.2.1. The derivation runs as follows:

- 10) buyi9+tu
 bui9+tu G-Metathesis, etc.
 bi9+tu Truncation

Of course if u-to-i were to apply first, still the correct result would be derived. However, the doubled verbs do not end up with i in the stem-vowel for corresponding passives, They take u in the non-derived stem. Compare mudd+a, 'it was stretched', and mudid+tu, 'I was stretched'. The former must be derived from mudid+a via the following derivation.

- 11) mudid+a
 muidd+a I.D. Metathesis
 muudd+a a-i-Assimilation
 mudd+a Truncation

That here, once again as in 9), the assimilation rule must precede Truncation. Apparently these different orderings are to be accounted for by a theory of local ordering, although these discrepancies may be cleared up only if the older rule of Truncation is adopted along with the rule of Progressive Assimilation.¹

(Cf. 16) of 11.2.1) Either theory presents problems and we may leave this area to future research.

Returning to the cumulative list of rules above, which we assume to be linear, except for a few cases mentioned above, we might note that this linear condition requires that G-I.D. Metathesis precede Prosthesis. We have already demonstrated that G-I.D. Metathesis precedes L-Assimilation and w-Occultation and that L-Assimilation and w-Occultation both precede Prosthesis. Therefore, G-I.D. Metathesis must precede Prosthesis if the transitivity condition is correct. And this may be proven by the need for the following derivations to which ta-Elision applied:

12)	byi9+na	mdud+a	
	bii9+na	mudd+a	G-I.D. Metathesis, etc.
	bi-	--	Prosthesis
	bi9+na	mudd+a	Truncation

That is, b₉+na, 'seɛl, f.p.', and mudd+a, 'stretch m.s.', are commands to which the rule of metathesis must have applied before Prosthesis, or otherwise we should find 'i+bi9+na and 'u+mudd+a. Thus, the ordering is perfectly consistent with earlier conclusions. Also note that

Prosthesis precedes both u-to-i and Truncation (or Glide Elision), proved by the following derivations:

13)	stuwīq+at	rmiy+uw	d9uw+iy	
	stuiq+at	---	---	G-Metathesis, etc.
	'u+stuiq+at	'i+rmīy+uw	'u+d9uwwīy	Prosthesis
	---	'i+rmī+uw	'u+d9u+iy	Glide Elision
	'u+stīiq+at	---	'u+d9ī+iy	u-to-i
	---	'i+rm+ū	'u+d9+ī	Truncation
	'u+stīq+at	'i+rm+ū	'u+d9+ī	Syl. Assim. and Lengthening

These are the correct phonetic representations. That is, the class X passive of the hollow stem stuwīq+at become 'ustīqat, 'she was longed for', and not 'istīqat, the plural command of the root rmy is 'irmū, 'threw, m.p.', and not 'urmū, the feminine command of the root d9w is 'ud9ī, and not 'id9ī, proving that the more abstract representation determines the quality of the prosthetic vowel. The ordering relations explicit in the final list of rules is, then, approximately that needed to correctly generate the phonology of Arabic.

Footnotes to Chapter XIV

1. Which means there are two rules of Vocalic Assimilation in the grammar.

AFTERWARD

It was noted in the later chapters that the double verbs do not undergo Stem-vowel Assimilation. That is, whereas kawan+a becomes kawun+a by this rule, kaway+a does not. The rule was stated so as to exclude the latter example. I now believe that this is wrong. I would now account for the stems kun+tu vs. kān+a as follows:

kauan+tu	kauan+a	
kaaun+tu	kaaun+a	Metathesis
kun+tu	--	Truncation
--	kaaan+a	a-Assimilation
	kān+a	Lengthening

This completely eliminates the need for Stem-vowel Assimilation. Further, it will be seen that now the fact that kaway+a (underlying kauay+a) does not undergo Metathesis insures that u never shows up in the stem as in kun+tu. The reduction of the exception rules to one is in the spirit of Chapter VIII. The analysis I now favor entails a restatement of Truncation as follows:

Truncations: $V^* \rightarrow \emptyset / _C \left\{ \begin{array}{l} \Psi \\ C \end{array} \right\}$

It also means that any underlying segment may constitute a radical, but the tri-literal principle is still valid. Later rules (or earlier rules in some cases) give glides.

This approach also obviates the need for V-Epenthesis and G-Syncope, rules which represented the major inconsistency of this work in that not all instances of CawC underwent this rule. For example ya+xwaf+u, it was argued, became ya+xawf+u, and then ya+xaaf+u by V-Epenthesis and G-Syncope. But what about underlying qawd+u or bayt+u? These should undergo V-Epenthesis and G-Syncope too. But they do not. In the old theory the only way out of this contradiction was to claim that only forms which undergo metathesis later undergo V-Epenthesis and G-Syncope, i.e. that there is a derivational constraint binding the two stages of the derivation. This powerful mechanism is to be avoided at all costs, for it is tantamount to eliminating a good deal of the structure imposed on the phonology. It is an extremely powerful device and consequently allows for the generation of many many phonologies. One wants to constrain in linguistics. This new approach completely avoids this non-Markovian device, for it is now possible to require that underlying qaud+u and baiṭ+u become qawd+u and bayt+u before metathesis. Hence ya+xuaf+u becomes ya+xauf+u and then is free to become ya+xāf+u without contradiction. This seems to dictate that this approach must prevail. There are, then, no glides in underlying representations in Arabic.

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