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City University of New York

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THE PHONOLOGY AND MORPHOLOGY
OF MOROCCAN ARABIC

by

JOHN M. KEEGAN

A dissertation submitted to the Graduate
Faculty in Linguistics in partial fulfillment
of the requirements for the degree of Doctor of
Philosophy, the City University of New York.

1986

This manuscript has been read and accepted for the Graduate Faculty in Linguistics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Ellen Broselow
Alan Stevens
Supervisory Committee

The City University of New York

THIS DISSERTATION IS DEDICATED WITH LOVE
TO MY PARENTS

ACKNOWLEDGEMENTS

During 1981-1982 I spent 8 months living in Northern Morocco in the town of Chaouen, some 60 kilometers to the south of Tetuan. For the first four months I did nothing but attempt to learn the local variety of Moroccan Arabic. My previous exposure to Arabic had been limited to a conversational knowledge of Chaddian Arabic picked up as a Peace Corps volunteer in southern Chad, and limited self-study of Classical Arabic. From the beginning, the people I knew in Chaouen were extremely helpful in this regard; they invited my family and me into their homes, and patiently taught and encouraged me, constantly flattering my initial efforts to learn their language. We were also befriended by a young student of English, Fouad Chokri. He invited us on several occasions to his home in Dar alWad, a tiny village in the mountains between Suk alHad and Mokrisset. Fouad's family and friends soon became ours, and many pleasant days were spent talking, joking, eating "tāzin" and drinking tea. On many other occasions we were honored by visits from our friends from Dar alWad to the home we were renting in Chaouen. I do not think I would have made much progress in learning Moroccan had it not been for the enthusiasm and wonderful patience of these people, and especially Fouad Chokri, Mohamad Chokri and his family, Lahsen Haddad and his parents and sister, Mohamad Radi, Abdel Rahim, and Ahmad Ghoulani.

I began attempting to study Moroccan Arabic from a more theoretical point of view only during the last four months. During that time, I wrote down most of the charts, which are included here as appendices. I assembled these with the help of native speakers, who methodically ran through all the possible verbal, nominal, and prepositional paradigms I could imagine. I wrote a first version of this work before returning to New York in September, 1982. I originally intended using it towards the completion of my second exam, but Professor Alan Stevens read it and highly recommended that I revise it for use as my doctoral dissertation.

After the completion of my second exam, I again took up the writing of this dissertation in September, 1983. In the course of completing it, I have benefited greatly from the comments and constructive criticisms of my committee members, Prof. R. M. R. Hall, Prof. Ellen Broselow, Prof. Charles Cairns, Prof. D. T. Langendoen, Prof. Alan Stevens, and Prof. Robert Vago. Their knowledge and insights have greatly improved the analysis presented here and enabled me to eliminate many of the errors found in previous versions. I am grateful for their help. Special thanks is due to Ellen Broselow for agreeing to serve as an outside reader for this dissertation, and for drawing from her broad knowledge of the literature in Semitic to fill so many gaps which original versions of this work contained.

Finally, I wish to thank the chairman of my committee, Prof. R. M. R. Hall, for the special role he has assumed throughout my academic career. His encouragement was a key factor in my decision to first begin graduate studies in Linguistics, and he has played a part in virtually every linguistics effort with which I have been involved. There is no doubt that without his encouragement this work would never have been completed.

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CHAPTER 1

Introduction

1.1 Scope of Study

This thesis is concerned with the phonology and morphology of Moroccan Arabic. The objectives are twofold: first, the formal description of the phonological and morphological processes of this language within a generative framework; and secondly, an examination of the impact that the Moroccan data has upon current generative models of phonology and morphology. These theoretical models have their basis in Chomsky and Halle¹ (henceforth SPE), and the present work assumes familiarity with the basic rule conventions developed in SPE. The SPE model has undergone important revisions and amplifications, particularly in two areas; morphology and suprasegmentals. It is also in these two areas where, I believe, the Moroccan data carries interesting implications.

In the field of suprasegmentals, two post-SPE theories have been put forth, each concentrating on different aspects of prosodic phenomena. On the one hand, autosegmental theory has attempted to account for such phenomena as tonal processes and vowel harmony by means of the association of one string of segments with a second string at a different level (e.g. Goldsmith² and others). In Arabic, attempts have been made to use this theory to account for the structure of stems, as well as for the quality and position of inserted short vowels in Classical Arabic paradigms (e.g. McCarthy^{3,4}). In this paper

I will argue instead that there is an alternative to the autosegmental approach: I propose here separate root and stem levels, the former applying directly to roots to form word stems, while the latter will apply directly to word stems to form the inflected word. I argue that this approach will account for the same types of data in a simpler fashion.

Metrical theory, on the other hand, has attempted to account for stress and syllabic phenomena by means of the assignment of hierarchical structure to strings of segments (e.g. Liberman and Prince,⁵ Selkirk⁶ and others). This latter theory has proven useful in the description of the Moroccan data; it permits a fairly straightforward account of syllabic structure and the complicated stress patterns. Further, metrical formalizations provide a revealing description of a number of morphophonemic alternations, including the glide/long vowel alternations and the short vowel/∅ alternation. In this work, I will propose an important amplification of metrical theory; it will be argued that metrical structure can be viewed as a cyclic output condition on phonological processes. Using this approach, many inflectional processes can be formalized simply as context free, unordered rules.

The second area where I believe that the Moroccan data has important implications on linguistic theory is in morphology. Morphology was initially a neglected area in SPE and early generative phonological work. In the immediate post-SPE years, much research was done on the problem of rule ordering (e.g.

Anderson⁷, Koutsoudas, Sanders and Noll⁸, and many others), and there was a great deal of disagreement as to whether phonological rules were to be extrinsically ordered, as claimed in SPE, or whether some general principle could be appealed to so that rules can be allowed to apply in a more theoretically desirable manner: unordered except for the intrinsic ordering imposed by universal theory. This theoretical dispute was, in general, unproductive. One reason for this was the lack of sufficient theoretical distinction between phonological and morphological processes, and between derivation and inflection. Many of the rule ordering problems discussed during this period can be avoided if it is assumed that phonological change associated with morphology is distinct from more general phonological rules. Since that time, important studies in morphology have been conducted, which have attempted to determine the properties of derivational (word-formation) processes and inflectional processes, and their relationship (e.g. Anderson⁹, Aronoff¹⁰, Kiparsky¹¹, Strauss^{12,13}, and others).

The Moroccan data has, I believe, important ramifications on current views of morphology. In this thesis I will present evidence which suggests that derivational processes in Moroccan are best considered morpheme-based rather than word-based as has been assumed by most generative morphologists. The word-based theory of derivational morphology encounters serious descriptive problems in Moroccan: first, the assumption that morphologically complex words are derived from simple words results in unnecessary complication of the phonological aspects

of morphological rules; and second, in many cases it is not possible to predict the meaning of the derived word on the basis of the meaning of the base. Instead, I will propose a morpheme-based view of morphology for Moroccan, which permits a more elegant description of morphological processes.

I will also argue that the adequate description of Moroccan morphological processes requires that they be split into two types: derivational processes, which apply directly to roots (a special class of morphemes) to form word-stems, and inflectional processes, which apply to word-stems to form the inflected word. The question of the criterion for this distinction will be examined, and I will demonstrate that Moroccan morphological processes are particularly enlightening in the quest to establish a principled basis for the derivational/inflectional distinction.

1.2 Moroccan Arabic Background

This work is concerned with the northern dialect of Moroccan Arabic, in particular that spoken in the town of Chaouen [šawən]. It is based for the most part on data collected there in 1981-1982. In addition, data from dialects spoken in southern areas, especially forms found in Harrell^{14,15} will be used both to fill gaps in my own data base, and for purposes of comparison.

The term Moroccan Arabic is actually somewhat misleading, in that it implies that there exists a single homogeneous dialect of Arabic spoken throughout Morocco. This is not the

case. According to Abboud¹⁶ the major division of modern Arabic dialects is formed by a line running roughly from the western borders of Egypt to Lake Chad, dividing them into Eastern and Western groups. The numerous Moroccan dialects constitute, together with similar dialects spoken in Algeria, Tunisia and Libya, the main part of this western group. However, dialectal divisions within the Western group are not at all the result of present political borders. Unfortunately, thorough studies of the dialect geography of Western Arabic do not exist; while there are a few studies dealing with dialects spoken in Algeria (e.g. Cantineau¹⁷) and Morocco (e.g. Levi-Provençal¹⁸), I know of no general study of the dialect geography within this area. The different Arabic dialects spoken within Morocco, and for the most part, within Western Arabic, are mutually intelligible.

Moroccan Arabic has doubtlessly been influenced to a certain degree by Berber, and as a result it sounds very different from Eastern dialects of Arabic, such as Egyptian. A speaker of an eastern dialect will not normally understand everyday conversation of a speaker of Moroccan.¹⁹ While there are some cases of lexical borrowings from Berber (e.g. /letśîn/ 'orange'), the most obvious similarity is in the syllabic structure. Saib²⁰, for example, notes that in Berber the schwa occurs only in closed syllables. Berber has no long vowel/short vowel distinction, and the Berber schwa behaves very much like short vowels in Moroccan Arabic (see chapter 3, section 4). The exact position of the schwa depends on the nature of the

adjacent consonants, and varies widely in different dialects of Berber. (For a description of this process, see Saib²¹.) The placement of the schwa in two Berber dialects can be seen in the following examples:

(1) <u>Tachelhiyt</u>	<u>Twareg</u> ²²	
neg	eng	'to kill'
reg	erg	'to be warm'
esfed	sfed	'to wipe'

Unlike Moroccan Arabic, Berber dialects tolerate word-initial schwa. Nonetheless, it is usually possible to find in Moroccan Arabic a canonical shape similar to that occurring in some dialect of Berber, and not occurring in the Eastern dialects of Arabic.²³

The closeness of the relationship between Arabic dialects such as Moroccan Arabic and Classical or Modern Standard Arabic is easy to exaggerate, and is doubtlessly more distant than that suggested by Brame,²⁴ who states:

...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...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.

While it cannot be denied that Moroccan Arabic is closely related to Classical (literary) Arabic, there are, nonetheless, significant morphological and phonological differences, and more importantly, a large portion of the more commonly used lexical items are not the same. As a result, the Moroccan who has not studied literary Arabic at school is unable to understand television and radio broadcasts in this language.

There is a substantial wealth of linguistic materials dealing with Moroccan Arabic. The bulk of these are pedagogical works (e.g. Abdel-Massih²⁵, Brunot²⁶, Cleeman²⁷, Harrell, Abdu-Talib and Carroll,²⁸ Mercier,²⁹ etc.) and ethnographic texts (e.g. Abdel-Massih,³⁰ Colin,³¹ Levi-Provençal,³² etc.). There are a few descriptive grammars: Harrell's reference grammar has proved most useful, although it focuses heavily upon morphological processes at the expense of phonology. The most comprehensive Arabic-English dictionary in this dialect is doubtlessly Harrell's dictionary. There exists only one recent generative study of Moroccan Arabic: Sayed's³³ thesis. While this work constitutes an important step in the study of Moroccan Arabic, with one important exception its scope is limited to segmental phonology. I will argue in this work that many of the processes discussed in Sayed, as well as others not discussed, are better described within a metrical framework. None of the above works attempt to treat any Northern dialects, although Sayed's sources include a speaker from Tangiers.

1.3 Arabic Terminology

One of the basic notions standardly employed in the description of semitic languages such as Arabic is that of the "root". A root is a set of segments, with a fixed form and a broad semantic association, from which a larger set of words can be derived. In literary Arabic, the derivation of words from roots is fairly predictable and extremely productive. In Moroccan Arabic, it is of significant but more limited

application, and it is not possible to predict which processes will apply to any given root:³⁴

(2)						
Root	<u>frh</u>	<u>kdb</u>	<u>smh</u>	<u>šrb</u>	<u>klm</u>	
<u>Loose Gloss</u>	<u>'happy'</u>	<u>'lie'</u>	<u>'excuse'</u>	<u>'drink'</u>	<u>'talk'</u>	
Verb.Noun 1	fāreh	--	--	šāreb	--	
Verb.Noun 2	--	kdūb	--	--	--	
Verb.Noun 3	--	--	--	šrīb	--	
Verb.Noun 4	--	kedbā	--	šerbā	kelmā	
Noun of Inst.	ferḥā	--	--	šerbā	--	
Adjective 1	ferḥān	--	--	--	--	
Adjective 2	--	--	smīh	--	--	
Meas. I Verb	freḥ	kdeb	smeḥ	šreb	--	
Meas.II "	ferreḥ	keddeb	--	šerreḥ	kellem	
Meas.III "	--	--	sāmeḥ	--	--	
Meas.IX "	--	--	--	--	--	
Meas.a "	--	--	--	--	tkellem	
Agentive	--	keddāb	--	šerrāb	--	

The examples in (2) are but a sample of the large number of morphological operations which can occur. Only a relatively small and unpredictable subset of these actually apply to any given root.

It should be emphasized that the underlying forms of roots in Moroccan Arabic are not the same as those for Literary Arabic. Thus, verb forms which in Literary Arabic have the shape CVCVC(V) (with no long vowels) always appear in Moroccan Arabic with only one short vowel -- usually CCVC. Thus:

(3)	<u>Literary Arabic</u> ³⁵	<u>Moroccan Arabic</u>	<u>Gloss</u>
	kataba	kteb	'he wrote'
	ʿarafa	ʿref	'he knew'
	sakana	skun	'he lived'

Further, while the Moroccan forms do exhibit an alternation between a form of the shape CCVC and one of the shape CVCC (e.g. /kteb/ 'he wrote' vs. /ketbāt/ 'she wrote'), this apparent metathesis is completely predictable, but only if it

is assumed that the underlying form of the root is CCVC, and not Literary CVCVC. (See 3.4 for further discussion.)

In the description of Arabic roots, the following terms are commonly used:

radical: A radical is any segment which can be used in the formation of roots. Radicals can be consonants, glides, and long vowels, but not short vowels.

tri-literal roots: a tri-literal root is one which contains three radicals (e.g. /kdb/ loosely 'to lie'); the vast majority of Arabic roots are tri-literal.

quadri-literal roots: a quadri-literal root is one which contains four radicals (e.g. /trzm/ loosely 'to translate').

sound roots: a sound root is one which contains only radicals that are [+consonantal] (no glides or long vowels), none of which are geminate cluster (e.g. /kdb/ loosely 'to lie').

hollow roots: a hollow root is tri-literal root with a second member that is a glide or a long vowel (e.g. /swq/ loosely 'market' or /bāt/ 'to spend the night').

final-weak roots: a final-weak root is one whose third member is a glide or a vowel (e.g. /šry/ loosely 'to buy' or /nsā/ 'to forget').

doubled roots: a doubled root is a tri-literal root whose second and third members constitute a geminate cluster (e.g. /ḥll/ loosely 'to open').

1.4 Phonetic Facts and Notation

At the systematic phonetic level, the following sounds are found in the northern dialect under discussion:³⁶

(4)	A.										Obstruents									
	<u>Lab</u>		<u>Alv</u>		<u>Emph</u>		<u>Post-Alv</u>		<u>Vel</u>		<u>Uvul</u>		<u>Phar</u>		<u>Lar</u>					
Stop	- b		t d		t̥ d̥		- -		k g		q -		- -		ʔ					
Fric	f -		s z		ʃ -		ʃ ʒ		- -		x ɣ		ħ ʕ		h					
	B.										Sonorants									
	<u>Labial</u>				<u>Alveolar</u>				<u>Palatal</u>				<u>Velar</u>							
Nasal	m				n															
Liquid					l, r															
Glide									y				w							
	C.										Vowels									
	<u>High</u>				<u>Mid</u>				<u>Low</u>											
Back	u, ʊ				[ə]				a, æ											
Front	i, I								a, æ											

With exception of the vowel symbols (3.C), the symbols found in (4) will be used throughout this work. Note that the symbols /x/ and /ɣ/, standardly used to represent velar fricatives, are for convenience used here for uvular fricatives. Sayed³⁷ notes that previous authors have claimed the existence of a number of other consonants. Of these, /p/ and /v/ are extremely rare and found only in words of recent foreign origin. It has also been argued that additional primary emphatic consonants are found: /b̥/, /m̥/, /l̥/, /z̥/, and /r̥/. Sayed argues against treating these segments as emphatics on a number of grounds: first, they do not trigger the spread of emphasis to neighboring sounds; secondly, there are no cases of minimal pairs involving these segments and their non-emphatic counterparts, while with the primary emphatics /t̥/, /d̥/ and /ʃ̥/ such pairs are common.³⁸ To these objections I would add the fact that these emphatics are not subject to the same root

structure restrictions which affect the other emphatics (see 2.6.1). For these reasons, I will follow Sayed in postulating only three primary emphatic consonants. In almost all cases the presence of non-primary emphatics is predictable on the basis of rules of emphatic spread.

Classical /ج/ appears in Moroccan as two segments, /ž/ and /g/, and although /g/ is a rare segment, it clearly contrasts with /ž/:

(5)

gebbel	'to appear before'	žebbed	'to stretch'
gles	'to sit'	žleb	'to attract'
msegged	'straight'	nežžār	'carpenter'
sāg	'he drove'	ḥāžeb	'eyebrow'

In some dialects, /ž/ is replaced by the post-alveolar affricate /j/. In general, most Moroccan segments are derived historically from identical segments in Classical Arabic. The Classical Arabic dental fricative series /θ/ (ث), /ð/ (ذ), and /ḏ/ (ظ) appear in Moroccan as the stops /t/, /d/, and /ḏ/ respectively. The glottal stop /ʔ/ is lost in intervocalic and word final position, but is sometimes retained in word initial position.

An interesting difference between Western dialects such as Moroccan Arabic and most other dialects of Arabic is that the former have completely lost the short syllable CV. As a result, a wide range of syllable-initial consonant clusters appear in this dialect. For example, verb patterns of the shape CVCVC in Classical Arabic appear as CCVC in Moroccan (e.g. kteb 'he wrote,' kdeb 'he lied,' etc.). Further, in cases where there

occurs a sequence of two consonants, one of which is voiced and one voiceless (e.g. kdeb 'he lied'), no assimilatory voicing occurs. There is also ample evidence that, at least at the phonological level, no transition vowel is inserted between the consonants in such sequences. When first transcribing Moroccan, I tended to include such a transition vowel, but when I read my transcription back to educated informants, I was always told that I had written the form from Classical Arabic, and that in genuinely Moroccan speech, no such vowel was present.³⁹ It should be further noted that previous researchers in Moroccan have consistently transcribed these clusters without any transition vowel (e.g. Cantineau, Cleeman, Colin, Harrell, Mercier, Sayed, etc.).⁴⁰

In the case of vowels, a more abstract system of symbols will normally be employed:

- | | | |
|-----|---------------|---------|
| (6) | Long Vowels: | i, u, ā |
| | Short Vowels: | u, e |

The long vowels [ā] and [æ] occur in complementary distribution, and the symbol /ā/ will be chosen for convenience to represent both these sounds. In the case of the short vowels, the sounds [a], [æ], [I], and [ə] are all predictable variants of a single short vowel, which, following Harrell,^{41,42} will be represented as /e/. Justification for these abstractions will be provided in the following chapter.

Concerning the pronunciation of these sounds, there is little noteworthy. The short vowel [I] is pronounced much like the "i" in the English word /bit/; the short /u/ is usually

pronounced like the vowel in English /should/ ([ʊ]). But both short /u/ and long /ʊ/ show an idiosyncratic alternation with [o] and [ō], but there does not appear to be any phonological motivation for this change, and it is never linguistically significant.⁴³

The phonetic classificatory matrix for these sounds is listed in (7), with certain irrelevant features omitted. For the most part, I will follow the articulatorily-defined features of SPE. However, two changes will be made in the SPE system. First, following recent findings in the study of syllabic structure (e.g. Cairns and Feinstein⁴⁴), I will employ the feature [+vocalic] instead of the SPE feature [+syllabic]. Secondly, as Brame⁴⁵ has noted, the SPE feature matrix for emphatic consonants does not permit the formalization of the "emphatic spread" process. In the present work, I will use Brame's [+rhizo-lingual] feature to define the primary emphatics, and Broselow's⁴⁶ [+Constricted Pharynx] feature to define the natural class consisting of primary emphatics, uvulars, and pharyngeals. Phonological justification for these features will be provided in chapter 2.

(7)

	A. <u>Obstruents</u> [<u>+</u> consonantal, -sonorant]																			
	f	b	t	d	s	z	ʈ	ɖ	ʂ	ʐ	ʃ	ʒ	k	g	q	x	ɣ	ħ	ʕ	ʔ
voi.	+	-	+	-	+	-	+	-	-	+	-	+	-	-	+	-	+	-	-	-
cont.	-	+	-	-	+	+	-	-	+	+	+	-	-	-	-	+	+	+	+	-
ant.	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-
cor.	-	-	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-
high	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-
back	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	-
low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
RL	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-
CP	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	+	+	+	+	-

B. <u>Sonorants</u> : [+consonantal, +sonorant, -vocalic]	
	m n l r w y
cons.	+ + + + - -
voi.	+ + + + + +
nas.	+ + - - - -
lat.	- - + - - -
ant.	+ + + + - -
cor.	- + + + - -
high	- - - - + +
back	- - - - + -

C. <u>Vowels</u> : [+vocalic, -consonantal]	
	ā i ū e u
long	+ + + - -
high	- + + - +
back	- - + - +

Finally, note that I will employ the feature [+long] to formalize the length distinction in vowels rather than using one of the autosegmental notations which have become more common in the representation of length. The primary reason for this is one of ease in exposition, since the analysis I propose for the Moroccan data in subsequent chapters does not rely on autosegmental formalisms. However, it is not clear to me that the arguments put forth in defense of the autosegmental view of length are as convincing as has been assumed, although a thorough discussion of this interesting issue will not be attempted in this work.⁴⁷

1.5 Dialectal Variation

There is a substantial amount of dialectal variation regarding the inventory of consonants. In the southern dialects, it is common for the uvular voiceless stop /q/ to merge with /g/, so that the distinction between these segments is lost. In many northern dialects, such as that spoken in the

area around Tetuan, /q/ becomes the glottal stop /ʔ/. In many mountain dialects, such as in the area surrounding Mokrisset, there is an additional fricative series in certain environments. Thus, the segments /b/, /d/, /t/, and /k/ appear as /β/, /ð/, /θ/ and palato-velar /ç/ respectively whenever they follow a vowel (see appendix I for examples).⁴⁸ This process does not affect geminate clusters. In these same dialects, the voiced emphatic alveolar stop /ḍ/ splits, so that there is a contrast between this segment and a fricative counterpart in all environments. In other dialects, the alveolar resonant /r/ becomes voiced uvular fricative in certain environments (e.g /rdūmā/ → /yḍūmā/ 'bottle').

In addition to dialect variation such as that noted above, there also occurs a more systematic variation caused by interference from literary Arabic. This is especially the case with educated speakers, and with more recently introduced lexical items. In such cases, there is a strong tendency to "classicize" Moroccan phonology and morphology. The additional classical segments /θ/, /ð/, and /ç/ are used in all environments, and important changes are made in the syllabic structure. For many speakers there is a tendency to look down on the genuinely Moroccan way of speaking. As a result, the unwary researcher can be easily confused by a double set of data -- the genuinely Moroccan forms, and their classicized alternants.

Having noted some of the variation that occurs, I will not be concerned with it in the remainder of this work. Instead, my main concern is to explain what the speaker of this dialect

of Moroccan Arabic knows about his own language when he is speaking in an unaffected natural way.

1.6 Organization

This treatment of Moroccan phonology and morphology will be organized into three broad areas. Chapter 2 will be concerned with segmental phonology. A variety of morphophonemic alternations will be examined, and a set of rules needed to derive surface phonetic forms from underlying ones will be formulated. In addition, the underlying forms will be examined and I will argue that both root and stem levels are required. Chapter 3 will be concerned with metrical phonology. Phonotactic constraints, syllabic co-occurrence restrictions, and stress will be examined, and a set of rules for the assignment of metrical structure will be postulated. In addition, the interrelationship between metrical structure and certain phonological processes will be studied. As mentioned in 1.1, it will be argued that metrical structure can be considered an output condition on such rules. In chapter 4, morphology will be treated. The structure of roots will be discussed, and the different types of morphological processes which operate on the roots will be examined. I will attempt to demonstrate that a relatively small number of morphological operations combine to permit a large number of word formation processes. In this chapter, the distinction between derivational and inflectional morphology will also be studied. Chapter 5 will summarize findings.

NOTES

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2. Goldsmith, John 1975: Autosegmental Phonology, MIT Press, Cambridge.
3. McCarthy, John J 1979: Formal Problems in Semitic Phonology and Morphology, (Ph.D. thesis, University of Texas) reproduced by the Indiana University Linguistics Club, 1982.
4. McCarthy, John J. 1981: "A Prosodic Theory of Nonconcatenative Morphology." Linguistic Inquiry 12.3 373-418.
5. Liberman, Mark and Allan Prince 1977: "On Stress and Linguistic Rhythm." Linguistic Inquiry, 8.2 249-336.
6. Selkirk, Elisabeth 1980: "The Role of Prosodic Categories in English Word Stress." Linguistic Inquiry, 11.3 563-605.
7. Anderson, Steven 1974: The Organization of Phonology. Academic Press, New York.
8. Koutsoudas, Sanders and Noll 1974: "The Application of Phonological Rules." Language, Vol. 50.1, pp. 1-18.
9. Anderson, Steven 1982: "Where's Morphology?" Linguistic Inquiry, 13.4 571-612.
10. Aronoff, Mark 1975: Word Formation in Generative Grammar, MIT Press, Cambridge.
11. Kiparsky, Paul 1982: From Cyclic Phonology to Lexical Phonology. The Structure of Phonological Representations, Harry van der Hulst and Norval Smith, (eds.) Foris Publications.
12. Strauss, Steven L. 1982: "On the Theory of Word Formation and its Role in Phonological Analysis." Linguistic Analysis Vol. 9.3, pp. 253-276.
13. Strauss, Steven L. 1983: "Stress Assignment as Morphological Readjustment in English." Linguistic Analysis, Vol. 11.4, pp. 419-427.
14. Harrell, Richard S. 1962: A Short Reference Grammar of Moroccan Arabic, Georgetown University Press, Washington, D.C.
15. Harrell, Richard S. 1966: A Dictionary of Moroccan Arabic: Arabic-English Richard Harrell editor, compiled by Thomas Fox and Mohammed Abdu-Talib, Georgetown University Press, Washington, D.C.

16. Abboud, Peter F. 1970: Spoken Arabic. Current Trends in Linguistics, Vol. 6, pp. 439-440 Mouton, The Hague.
17. Cantineau, Jean 1936: "Geographie des parlers arabes algeriennes," Revue Africain, LXXIX, pp. 91-93.
18. Levi-Provençal, E. 1922: Textes arabes de l'ouargha dialecte des Jbala, Editions Ernest Leroux, Paris.
19. In several cases I knew of, Egyptian speakers were unable to understand basic conversation upon their arrival in Morocco. As would be expected, however, within a month's time they were able to understand virtually everything.
20. Saib, Jilali 1976b: A Phonological Study of Tamazight Berber: Dialect of the Ayt Ndhir. Doctoral Dissertation, U.C.L.A. Published by University Microfilms International, Ann Arbor, Michigan.
21. Saib, Jilali 1976a: "Schwa Insertion in Berber: Un Probleme de Choix." Afroasiatic Linguistics, Vol. 3, Issue 2. Saib argues in this work that schwas are underlying in Berber. He notes that others (e.g. Abdel-Massih⁴⁹ and Penchoen⁵⁰) have argued for a phonological conditioning for the schwa. Thus, it has been claimed that shwa is inserted between CC if the second C is sonorant; otherwise the schwa is inserted prior to the two C's. (p.3). Saib objects on the grounds that i) such rules do not account for dialectal variation and ii) Abdel-Massih's rules at times pick incorrect or questionable results.
22. Saib (1976) op. cit., p. 93
23. There are some important differences in the syllabic structure of Berber. First, Saib notes that Berber, unlike Moroccan, does not permit initial consonant clusters, "...especially in careful speech." (Saib [1976b], op. cit., p. 53). Secondly, clusters of three distinct consonants are not permitted in Berber (p. 54). Berber, like Moroccan Arabic, does permit word final consonant clusters. Saib also claims that many Berber dialects do not permit a sonorant consonant as the final member of such a cluster, and that the position of the schwa is sensitive to this fact. However, he also claims that such clusters do in fact occur at the phonetic level, as in adr, for ader 'to lower', and udm for udem 'face' (p. 46). In Moroccan, a word-final consonant cluster containing a final sonorant is not permitted at the phonetic level.
24. Brame, Michael 1970: Arabic Phonology: Implications for Phonological Theory and Historical Semitic, (Doctoral dissertation, MIT).
25. Abdel-Massih, Ernest T. 1973: An Introduction to Moroccan Arabic, University of Michigan, Ann Arbor.

26. Brunot, Louis 1950: Introduction a l'arabe marocain, Librairie Orientale et Americaine, Paris.
27. Cleeman, Elise 1954: Manuel d'arabe dialectal, M. Didier, Paris.
28. Harrell, Richard S; Mohammed Abdu-Talib; and William S. Carroll 1965: A Basic Course in Moroccan Arabic, Georgetown University Press, Washington, D.C.
29. Mercier, Henry 1946: L'arabe par image, Les Editions de la Porte, Rabat.
30. Abdel-Massih, Ernest T. 1974: Advanced Moroccan Arabic, University of Michigan, Ann Arbor.
31. Colin, George S. 1942: Recueil de textes en arabe marocain Vol. I: Contes et Anecdotes, Librairie d'Amerique et d'Orient, Paris.
32. Levi-Provençal, op. cit.
33. Sayed, Abdelrahman Ahmed 1981: The Phonology of Moroccan Arabic: A Generative Approach. (Ph.D. Thesis, University of Texas), University Microfilms International, Ann Arbor.
34. Many of these forms are from Harrell (1966), and some are uncommon in the Chaouen dialect. I follow Harrell in the use of the term "Measure," which I believe to be identical to the term "bunyan." Measure I verbs are verbs formed with only 3 radicals. Measure II verbs are formed by doubling the second radical, and have a loose causitive meaning. Measure III verbs are formed by the insertion of an /ā/ between the first and second radicals. Measure IX verbs are formed by the insertion of /ā/ between the second and third radical. Verbs of other measures are either rare in Moroccan Arabic or do not occur at all.
35. The final /a/ in Literary Arabic is not part of the stem, but rather is a marker of third person indicative.
36. In the dialects spoken in the Chaouen area, I also found one word with the voiceless dental fricative /θ/: /tāθā/ 'chamelion.'
37. Sayed, op. cit., p. 24 and pp. 134-139.
38. Sayed (op. cit., p. 138) claims that one minimal pair exists: /lā/ 'God' vs. /llā/ 'not'. The former is surely derived from /lāh/, which is normally how this word is pronounced.

39. It seems likely to me that non-native speakers actually are correct in that they note a phonetic detail -- in this case a very brief transition vowel -- which native speakers ignore because it has no phonological reality in the language. Similarly, stress in Moroccan, which is very obvious to this English speaker, generally has no more significance to a speaker of Moroccan Arabic than tone does to a speaker of English.
40. The one exception is Abdel-Massih (1973), which does not include any short vowels in the transcription.
41. Harrell (1962) and (1966), op. cit.
42. My use of this symbol will be slightly broader than Harrell's since Harrell claims independent status for /ä/ (my [æ]), which is found only in pharyngeal environments.
43. Harris⁵¹ postulates /ø/ as a phoneme, for the obvious reason that its quality is not predictable. Cantineau⁵² objects, claiming that /ø/ "...apparaît au voisinage des emphatiques, de q, x, ɣ, h, h et aussi en final absolue; elle peut apparaître aussi au voisinage des liquides et des nasales." While /ø/ and /u/ never contrast, there is not the predictability suggested by Cantineau; there are cases where /u/ occurs in the environment of uvular consonants (e.g. /qul/ "speak!"); further, in nasal environments, both /u/ and /ø/ are routinely found (e.g. /yom/ 'day', /mesmum/ 'poisoned'). Cantineau's claim that /u/ appears as /ø/ in word final position is not correct in the dialects I have studied.
44. Cairns, Charles and Mark Feinstein 1982: "Markedness and the Theory of Syllable Structure." Linguistic Inquiry 13.2, pp. 193-225.
45. Brame op. cit., pp. 22-23.
46. Broselow, Ellen I 1976: The Phonology of Egyptian Arabic. (Ph.D. Dissertation, University of Massachusetts) pp. xiii - xvi.
47. One argument put forward in support of the autosegmental view of segment length is the fact that many languages have rules which copy all aspects of a vowel except its length. It is claimed that length cannot be a segmental feature of the vowel, since otherwise one would expect its length to be copied as well. However, length is not unique in this regard. Stevens⁵³ notes that in Indonesian there is a process which results in the reduplication of morphemes, except that high vowels become low vowels and low vowels become high vowels (e.g. /gunung-ganang/ 'mountain'). If the length argument were valid, we would be obliged to claim that vowel height must also be represented at a non-segmental level.

Vago⁵⁴ and ⁵⁵ argue that a variety of phonological processes in Hungarian, as well as a number of word games in Finnish, Estonian and Bakwiri, support the "many to one" auto-segmental representation of long vowels. I know of no attempt to interpret this type of data from a metrical framework.

48. This type of process might well have been influenced by Berber. See for example Saib (1976b) op. cit., p. 98.

49. Abdel Massih, Ernest T. 1968: Tamazight Verb Structure: a generative approach. Bloomington: Indiana University Publications.

50. Penchoen, Thomas G. 1973: Tamaziyt of the Ayt Ndhir. In Afroasiatic Dialects, Vol. 1, Berber, ed. by W. Leslau and T. G. Penchoen. Undena Publications, Los Angeles.

51. Harris, Zellig 1942: The Phonemes of Moroccan Arabic. Journal of American and Oriental Studies 62 309-318.

52. Cantineau, Jean 1950: "Reflexions sur la phonologie de l'arabe marocain." Hesperis 37 193-207.

53. Stevens, Alan 1984: "Vowel-Changing Reduplication in Indonesian." CUNYForum, Vol. 10, pp. 15-23.

54. Vago, Robert M. 1984: "On the Representation of Length." To appear in Phonologica 1984 (Proceedings of the 5th International Phonology Meeting, Eisenstadt, Austria, June 1984), ed. by Wolfgang U. Dressler et al., Cambridge University Press and Adam Mickiewicz University Press.

55. Vago, Robert M. 1985: "The treatment of long vowels in word games." Phonology Yearbook 2.

Chapter 2

UNDERLYING REPRESENTATIONS

The goal of this chapter is to provide the background phonological information needed for subsequent chapters, and in particular to postulate and defend underlying representations for Moroccan Arabic. Allophonic alternations will be looked at, and a set of phonological rules to account for these will be proposed; for purposes of exposition, these rules will be stated in linear notation, although in many cases I will argue in chapter 3 that a more revealing metrical formalization is preferable. Then the structure of morphemes will be examined, and I will attempt to justify underlying forms at two levels: that of the root, and that of the stem.

2.1 Consonants

All consonants except for the glides /y/ and /w/ and the glottal stop /ʔ/ occur in all positions permitted by syllabic constraints (see Appendix II for examples). There are a relatively small number of phonological changes which affect consonants. Most of these are non-general assimilatory processes that apply only in environments created by specific morphemes.

2.1.1 Alveolar Assimilation: The Definite Article

The definite article consists of the prefix /l-/:

(1)	<u>Definite</u>	<u>Indefinite</u>	<u>Gloss</u>
a.	lbāb	bāb	'door'
b.	lfār	fār	'mouse'
c.	lgezzār	gezzār	'butcher'
d.	lyābā	yābā	'forest'

e.	lhendiya	hendiya	'type of cactus'
f.	lhebs	hebs	'prison'
g.	lkas	kas	'glass/cup'
h.	lmagana	magana	'watch'
i.	lgehwa	gehwa	'coffee'
j.	l9am	9am	'year'
k.	lwad	wad	'river'
l.	lyedd	yedd	'hand'

When the definite article is attached to a noun whose first segment is a coronal consonant, the article assimilates to that consonant:

(2)	<u>Definite</u>	<u>Indefinite</u>	<u>Gloss</u>
a.	llun	lun	'color'
b.	ddar	dar	'house'
c.	dderb	derb	'street'
d.	ssuq	suq	'market'
e.	ssaheb	sahab	'friend'
f.	zzenqa	zenqa	'street'
g.	ssibani	sibani	'old man'
h.	nnebra	nebra	'opinion'
i.	rrisa	risa	'feather'
j.	ttazer	tazer	'merchant'
k.	tterf	terf	'piece, side'

We can formalize this as follows:

$$(3) \quad \text{Rule 1}$$

$$\begin{matrix} 1 \\ (\text{def.art.}) \end{matrix} \rightarrow C_i / \text{ — } \left[\begin{matrix} C_i \\ +\text{coronal} \end{matrix} \right]$$

The segment /z/ is exceptional in that in some words it triggers assimilation of the definite article, while with other words it does not.¹

This process does not represent a general restriction against initial /l/ immediately followed by an alveolar consonant. In cases involving different morphemes, no assimilation occurs:

- (4) a. lnŋra 'to Nora'
 b. ldɪd 'delicious'
 c. lɕeq 'to stick'

2.1.2 Alveolar Assimilation: /t/ and /d/

There are a number of cases where an affix consisting of the segment /t/ triggers a process of voicing assimilation; but the environment for this change differs with each affix:

One such case is the prefix /t+/, which is used to form intransitive verb stems:

(5)

A.

<u>Base</u>	<u>Gloss</u>	<u>t-form</u>	<u>Gloss</u>
beddel	'to change'	tbeddel	'to be changed'
kellem	'to summon'	tkellem	'to talk'
qāda	'to finish'	tqāda	'to be used up'
neffes	'to make breathe'	tneffes	'to breathe'
ydaṭ	'lunch'	tyeddaṭ	'to eat lunch'
laqa	'to find'	tlaqa	'to meet'

B.

zāyed	'adding'	dzāyed	'to bid higher'
zīzen	'to make speechless'	dzīzen	'to become speechless'
zāweb	'to answer'	dzāweb	'to answer each other'
zūz	'two'	dzuwwez	'to get married'
ḍreb	'to hit'	ḍderb-	'to hit each other'
daḥes	'to jostle'	ddaḥes	'to jostle each other'

Here the intransitive suffix /t+/ assimilates in voicing when adjacent to /z/, /z/, /d/ or /ḍ/:

(6) Rule 2

$$\begin{array}{c} t \\ \text{(intr.)} \end{array} \longrightarrow [+voiced] / \left[\begin{array}{c} C \\ +coronal \\ -nasal \\ +voiced \end{array} \right]$$

The prefix /t+/ is also used as the second person marker for the Imperfect and Durative tenses. In many dialects of

Moroccan Arabic, this suffix assimilates in voicing under the same circumstances as does the intransitive suffix (see for example Harrell²). In the North, however, there is a great deal of variation concerning the environment which triggers voicing assimilation. One common possibility is represented by the following data:³

(7)	<u>Imperfect</u>	<u>Durative</u>	<u>Base</u>	<u>Gloss</u>
a.	dbāt	kāndbāt	bāt	'to spend the night'
b.	tfeyyeq	kātfeyyeq	feyyeq	'to wake (tr.)'
c.	dīr	kāddīr	dīr	'to do'
d.	ḍderbū	kāḍḍerbū	ḍreb	'to hit'
e.	tīq	kāttīq	tīq	'to trust'
f.	ṭṭīh	kāṭṭīh	ṭīh	'to fall'
g.	tselel	kātsellel	selel	'to lend'
h.	tṣuwwer	kātṣuwwer	ṣuwwer	'to photograph'
i.	dzūr	kādzūr	zūr	'to visit'
j.	tṣūf	kātṣūf	ṣūf	'to see'
k.	dżāweb	kādżāweb	żāweb	'to answer'
l.	tkūn	kātkūn	kūn	'to be'
m.	dgelles	kādgelles	gelles	'to seat'
n.	tqūl	kātqūl	qūl	'to say'
o.	txāf	kātxāf	xāf	'to fear'
p.	dyettīf	kādyettīf	yettīf	'to cover'
r.	d9īś	kād9īś	9īś	'to live'
s.	dherres	kādherres	herres	'to break'
t.	dmūt-tmūt	kādmūt-tmūt	mūt	'to die'
u.	dnūḍ	kādnūḍ	nūḍ	'to get up'
v.	dredd	kādredd	redd	'to return'
w.	dlām	kādām	lām	'to prepare'
y.	dyebbes	kādyebbes	yebbes	'to dry'

Ignoring the alternation when the verb begins with /m/, we find that the second person suffix undergoes voicing assimilation when the first segment of the verb stem is voiced:

(8) Rule 3

$$\begin{matrix} t+ \\ (2nd\ Per.) \end{matrix} \longrightarrow [+voiced] / \text{ — } \left[\begin{matrix} C \\ +voiced \end{matrix} \right]$$

Finally, the final /d/ and /ḍ/ of verb stems undergo voicing assimilation when followed by the first person singular

(/t/), second person singular (/tʃ/), or second person plural (/tʃ/), suffixes of the perfect stem, as the following examples illustrate:

(9)	Base	+Suffix	→	Der. Form	Gloss
A.	rfed	+t	→	rfett	'I carried'
	nʊd	+t	→	nuʃt	'I arose'
B.	rfed	+tʃ	→	rfettʃ	'you carried'
	nʊd	+tʃ	→	nʊʃtʃ	'you arose'
C.	rfed	+tʃ	→	rfettʃ	'you(pl.) carried'
	nʊd	+tʃ	→	nʊʃtʃ	'you arose'

This devoicing process does not effect any other segments, not even the alveolars /ʒ/ and /z/:

(10)	xreʒ	+t	→	xreʒt	'I went out'
	trez	+t	→	trezt	'I embroidered'

Hence, while voicing assimilation processes (Rules 1, 2, and 3) represent clearly similar processes, there is no way for them to be unified. Nonetheless, they do represent an important generalization, since whenever morphological processes result in 2 adjacent coronal stops, one of which is voiced and the other voiceless, some form of voicing assimilation always applies. Further, to my knowledge there are no cases of roots containing two adjacent alveolar stops, one of which is voiced and the other not. This restriction on root structure appears to be the Moroccan counterpart to a more general restriction on Semitic Roots (as in Greenberg⁴) which will be discussed in detail in 2.6.1.

2.1.3 Alveolar Assimilation: /l/ and /n/

There are two final cases of assimilation of alveolar consonants which bear mentioning. In one case, that of the preposition /men/ 'from', final /n/ becomes /l/ when preceding

a morpheme whose first segment is also /l/. And in at least two cases that I am aware of /l/ becomes /n/ when preceding a morpheme whose first segment is also /n/.

- (11) A. men + llī → mellī 'from he who,
 B. +l +nā → +nnā 'to us (ind.obj.)
 dyāl +nā → dyānnā 'of us, ours'

These processes are not general, since other morphemes do not undergo them in the same environment. In careful speech, most speakers will not make these changes. It is significant, however, that there are restrictions on the internal structure of roots which prohibit both the sequence /l-n/ and /n-l/.

2.1.4 Incontiguous Assimilation

In addition to the assimilatory processes discussed above, there also occurs in Moroccan a process in which alveolar spirants become post-alveolar whenever a voiced post-alveolar consonant follows anywhere in the morpheme. The following examples, taken from Sayed⁵, illustrate:

- (12) /seržem/ ~ /šeržem/ 'window'
 /nsež/ ~ /nšež/ 'to weave'
 /sfenž/ ~ /šfenž/ 'doughnut'
 /zellež/ ~ /žellež/ 'to tile'

As Sayed notes, this process applies optionally. However, my impression is that certain forms for a given lexical item are favored over their alternates in a particular dialect. Thus, for example, in the Northern dialect spoken in Chaouen, the form /šfenž/ 'doughnut' is almost never used. The assimilation of the voiced spirant /z/, on the other hand, is virtually automatic (e.g. /žūž 'two,' /džāž/ 'chicken,' etc.). For an

interesting discussion of the formalization and theoretical consequences of this type of process see Sayed.⁶

2.1.5 Geminate Clusters

All consonants with the exception of /ʔ/ occur as geminate clusters. At the phonetic level these occur anywhere except in final position:

- (13) A. a. bbā 'father'
 b. ddā 'he brought'
 c. ddār 'the house'
 d. ffransā 'in France'
- B. a. txebbe9 'to hide'
 b. beddel 'to change'
 c. neḍḍef 'to clean'
 d. tneffes 'to breathe'
- C. a. xeddmū 'they operated'
 b. beyytāt 'she put (s.o.) up for the night'
 c. weqqfū 'the stopped (tr.)'

Most commonly, geminate clusters in word initial position are the result of the concatenation of a prefix which is identical to the first segment of the stem (e.g. 12A.c - 12A.d); all cases of geminate clusters preceding a consonant are the result of the addition of a suffix beginning with a vowel to a stem ending in C_iC_ieC. More complete examples of geminate clusters in all environments are contained in appendix XVII.

At the phonetic level, geminate clusters do not occur word finally, but there is clear evidence that they do occur at the underlying level:

- (14)
- | | | | |
|-----------|---------|-------|-------------|
| A. a. kul | 'all' | kullū | 'all of it' |
| b. 9em | 'uncle' | 9emmī | 'my uncle' |
| c. beq | 'bugs' | beqqā | 'a bug' |
| d. fum | 'mouth' | fummī | 'my mouth' |

B. a.	hel	'he opened'	hellāt	'she opened'
b.	šem	'he smelled'	šemmāt	'she smelled'
c.	kab	'he poured'	kebbāt	'she poured'
C. a.	m̄el	'umbrella'	m̄ollā	'umbrellas'
b.	xed	'cheek'	xdd	'cheeks'
c.	xet	'line'	xṭṭ	'lines'

In each case, there exists an alternation between a single word-final consonant and geminate clusters which are not word final. This is due to the fact that geminate clusters are pronounced as single consonants when in word final position. For the present, we can formalize this as follows:

$$(15) \quad \text{Rule 4} \\ C_i C_i \rightarrow C_i / ___ \#$$

In section 6 I will argue that roots of the shape CC_iC_i are actually bi-literal at the underlying level.

Geminate clusters are exempt from application of a number of phonological processes. We have seen that the fricativization process affecting stops in many Northern dialects (see chapter 1 section 4) does not affect geminate clusters. Similarly, the glide to long vowel process does not always apply to double glides (see chapter 3 section 5). Finally, phonotactic constraints frequently treat geminate clusters differently from single consonants. These metrical characteristics of geminate clusters will be treated in chapter 3 section 7.

2.1.5 Alternation Between Glides and Vowels

The two glides /y/ and /w/ exhibit a systematic alternation with the long vowels /ī/ and /ū/ respectively. Some examples of this alternation are listed below:

(16)A.	<u>3rd Per (m.)</u>	<u>3rd Per (f.)</u>	<u>Gloss</u>
	uḡef	wegfat	'to stand up'
	uḡed	wuḡdat	'to find'
	uḡent	wuznat	'to weigh'
	ibes	yebsat	'to dry (intr.)'

B.	<u>Sing.</u>	<u>Plural</u>	<u>Gloss</u>
	luḡ	lwah	'board'
	sūq	swāq	'market'
	kūra	kwārī	'ball' (Compare these forms with those in [13C])
	bit	byūt	'room'
	sif	syūf	'sword'
	zīm	zyūm	'pocket'

C.	<u>Measure II Verb</u> ⁷	<u>Associated Word</u>
	suwweq	'to market' suq 'market'
	ṣuwwer	'to photograph' ṣūra 'photograph'
	yewwet	'to shout' yūta 'shout, cry'
	feyyeq	'to wake (tr.)' fiq 'to awake (intr.)'
	xeyyet	'to sew' xit 'thread'
	keyyef	'to smoke' kif 'marijuana'

D.	<u>/y/-/i/</u>	<u>'my'</u>
	xāy	'my brother' xti 'my sister'
	<u>/w/-/u/</u>	<u>'3rd per. Plural - perfect'</u>
	śrāw	'they bought' žebru 'they found'
	neśriw	'we buy' nketbu 'we write'

The obvious generalization is that glides appear only adjacent to vowels, while their long vowel counterparts appear whenever no vowel is present. However, such a solution tells us nothing, since it ignores the question of why one form of a morpheme contains a short vowel when another form of the same morpheme does not. Pairs such as /weld/ vs. /ulād/ illustrate this problem. In Chapter 2, section 6, I will argue that short vowels are not present at the root level, and in chapter 3, section 4 I will attempt to show that their distribution in

inflectional paradigms is predictable on the basis of metrical structure.

For this reason, and others to be discussed in chapter 3, I will assume for now that the glide forms are underlying. The glide becomes a corresponding long vowel (i) when in word final position and preceded by a consonant (e.g. 16D), (ii) when between two consonants (e.g. 16B), or (iii) when in word initial position and followed by a consonant which is in turn followed by a vowel (e.g. 16A). This can be abbreviated in linear form as follows:

$$\begin{array}{rcl}
 (17) & \text{Rule 5} & \\
 \left[\begin{array}{l} \text{-consonantal} \\ \text{-vocalic} \end{array} \right] & \longrightarrow & [+vocalic] / \begin{array}{c} \text{X C} \begin{array}{l} \{ \# \} \\ \{ \text{C} \} \end{array} \\ \# \quad \text{C V X} \end{array} \begin{array}{l} (a) \\ (b) \\ (c) \end{array}
 \end{array}$$

2.2 Long Vowels and Short Vowels

In Moroccan Arabic there exists a clear phonological contrast between long vowels and short vowels. In normal speech, however, there is little length contrast in stressed syllables. Consider the following cases:

(18)					
<u>Long Vowel</u>		<u>Gloss</u>	<u>Short Vowel</u>		<u>Gloss</u>
<u>U.R.</u>	<u>Surface</u>		<u>U.R.</u>	<u>Surface</u>	
dāq	[daq]	'to taste'	deqq	[daq]	'to knock'
9ām	[9æm]	'year'	9emm	[9æm]	'uncle'
xāl	[xal]	'mat.uncle'	xell	[xal]	'vinegar'

In cases such as (18) where long and short vowel counterparts undergo identical rules of allophony, the pronunciation of both forms is identical except in exaggeratedly careful speech.⁸

This is because long vowels in closed syllables are pronounced

short. Nonetheless, there is ample phonological evidence for a long/short vowel distinction at the underlying level.

Justification for this distinction includes the following:

1) The rules of vowel allophony are at times distinct for long and short vowels. Thus, while in the environment of uvular, pharyngeal and emphatic consonants the phonetic change is identical (as in [18]), in the unmarked environment long and short vowels undergo distinct allophonic changes. For example, in the unmarked environment /ā/ is pronounced [æ], while short /e/ is normally pronounced [ɪ]:

(19)	<u>Long Vowel</u>	<u>Gloss</u>	<u>Short Vowel</u>	<u>Gloss</u>
	[xaddæm]	'worker'	[xdɪm]	'he worked'
	[ktæb]	'book'	[ktɪb]	'he wrote'
	[kiddæb]	'liar'	[kdɪb]	'he lied'

Rules of allophony will be discussed in sections 3 and 4 of this chapter.

2) Unstressed short vowels become weakened to schwas, while unstressed long vowels do not:

(20)	<u>Long Vowel</u>	<u>Gloss</u>	<u>Short Vowel</u>	<u>Gloss</u>
	[xaddæm]	'worker'	[xaddam]	'to operate'
	[tarræf]	'shoe repairman'	[tarrəf]	'to repair'
	[kiddæb]	'liar'	[kiddəb]	'to make lie'

3) When a morphological process results in the insertion of a vowel adjacent to a long vowel, the root vowel will normally become a glide. No similar change affects short vowels:

(21)	<u>Long Vowel</u>	<u>Gloss</u>
	<u>Sing</u> <u>Plural</u>	
A.	9ām 9wām	'year/years'
	kārtā kwārtī	'card/cards'

B.	<u>Verb</u>	<u>Gloss</u>	<u>Pres.Part.</u>	<u>Gloss</u>
	kūn	'to be'	kāyen	'there is'
	xāf	'to be afraid'	xāyef	'being afraid'

C.	<u>Short</u>	<u>Vowel</u>		<u>Gloss</u>
	<u>Sing</u>	<u>Plural</u>		
	bent	bnāt		'girl/girls'
	źbel	źbāl		'mountain/mountains'

In (21A), when the broken plural infix /+ā+/ is inserted after the second radical which is itself the vowel /+ā/, the root vowel becomes /w/. And in (21B), when the present participle infix /+ā+/ is inserted immediately before a long vowel, the root vowel becomes /y/. Short vowels undergo no such change (21C), but rather appear to be deleted. In 2.6 I will argue instead that, unlike the long vowel, short vowels are not present at the root level.

4) The long vowels [ī] and [ū] exhibit a systematic alternation with the glides /y/ and /w/ (see [16] for examples). (This alternation will be treated in 3.6.) Short vowels exhibit no such alternation.

5) Short vowels are always deleted when immediately preceding a stem final consonant to which is concatenated a suffix beginning with a vowel (___C+V). Long vowels are never deleted in this environment:

(22)	a.	xeddem	'he operated'	xeddmāt	'she operated'
	b.	śāf	'he saw'	śāfet	'she saw'

This deletion is part of a broader short vowel deletion/insertion process which will be discussed in 3.4.

6) Long vowels and short vowels can occur in distinct types of syllables: short vowels can be followed by two

consonants, whereas long vowels can not. Further, short vowels can only occur in a closed syllable, while long vowels can occur in both open and closed syllables.

For these reasons, the long/short vowel distinction in Moroccan is a crucial one, and vowel length will always be indicated in my transcription.

2.2.1 Vowels in Word Final Position

At first glance vowels in word final position might seem to pose a problem for this analysis. There is never a distinction between short and long vowels in this position, and they are not normally pronounced long. Further, they undergo distinct rules of allophony: word final /ā/ is pronounced neither as [ɪ] nor as [æ], but as a low back vowel [a]. However, there is substantial evidence that word final vowels are always underlyingly long.⁹

In the first place, word final vowels can at times alternate with glides:

- (23) a. /w/ ~ /u/ '3rd person plural - perfect'
 śrāw 'they bought'
 žebrū 'they found'
- b. /y/ ~ /ɪ/ 'my'
 xāy 'my brother'
 xtɪ 'my sister'

Since, as noted above, only long vowels alternate with glides, this does constitute evidence that at least some final vowels are long. It is significant, however, that all final vowels undergo the same rules of allophony.

There is additional evidence. It was noted earlier (see [20]) that unstressed short vowels are weakened to schwas. Word final vowels, however, are never weakened to schwas:

- | | | |
|------|-----------------|-----------------|
| (24) | werrī [warri] | ‘show (imp.)’ |
| | qtelhā [qtilha] | ‘he killed her’ |
| | bābā [bāba] | ‘father’ |

There is syllabic evidence that word final vowels are always underlyingly long. It was noted earlier that short vowels are deleted when a long vowel is infixed in the following syllable (e.g. /xeddem/ ‘he operated’ vs. /xeddm̩/ ‘they operated’). Word final vowels, however, are never deleted in this environment when subsequent inflectional processes apply (e.g. /xeddm̩l̩/ [xeddem +l̩ +l̩] ‘they operated for him’). Note also that if word final vowels were considered underlyingly short, they would constitute the sole exception to the claim that short vowels do not occur in open syllables.

Finally, when a suffix containing CV(C) is added to a word final vowel, that vowel is pronounced long. Thus, for example, compare the following examples with those in (24):

- | | | | |
|------|------------|--------------|----------------------|
| (25) | werrīhā | [werrīhā] | ‘show it (fem.)’ |
| | māqtelhāśī | [māqtilhāśi] | ‘he didn’t kill her’ |
| | bābāhā | [bābāhā] | ‘her father’ |

Word final vowels, then, consistently exhibit behavior characteristic of long vowels, and have no phonological similarities with short vowels.¹⁰ Hence, I will assume here that they are underlyingly long, and my transcription will represent them as such.

2.3 Short Vowels

There has been a surprising amount of disagreement concerning the number of short vowels which constitute underlying segments in Moroccan Arabic. Harris¹¹ postulates four short vowels; Harrell¹² lists six vowels, three of which correspond to the short vowels used by other authors: /e/, /u/, and /a/. But as Harrell himself notes, the "...vowel /ā/ is almost never found anywhere except next to ع and ح ."¹³ Sayed¹⁴ postulates five (/i, a, u, ə, o/), but he does not give any examples of where these vowels are found. Cantineau¹⁵ criticizes Harris for this very reason, noting that "Si Z. S. Harris avait recherché des paires de mots ou ces oppositions constituent le seul trait différentiatif, il se serait vite aperçu qu'il n'en trouvait pas, sauf pour /u-ə/."¹⁶ In this paper, I follow Cantineau in arguing that there are only two underlying short vowels: /u/ and an underspecified vowel which I will transcribe as /e/. The reason for so much disagreement, I suspect, is twofold: first, these vowels, and especially /e/, have an unusually wide range of possible pronunciations. And second, the rules of allophony governing the segment /e/ vary slightly depending on the morphological level at which they apply.

I believe that the facts concerning the short vowels can be summarized as follows: there is a morphological process which inserts short vowels in roots, resulting in the creation of stems. These vowels assume a wide range of phonetic shapes, which except in the case of /u/ depend completely on the phono-

logical environment in which they are inserted. (The morphological aspects of this process will be discussed in 2.5.) There is also a short vowel which is inserted automatically in the course of the inflectional morphology, whose position depends on purely syllabic considerations. The quality of this vowel is completely predictable; it undergoes rules of allophony which are similar but not identical to those which govern the morphologically inserted /e/.

2.3.1 The Short Vowel /e/

In 1.3 it was noted that there is a wide range of short vowels which occur at the phonetic level: [u], [I], [ə], [æ], and [a], most of which have in addition emphaticized counterparts. In order to show that all the surface short vowels except for /u/ are variants of a single short vowel, transcribed for convenience as /e/, I will examine each relevant environment and attempt to demonstrate that there is only one variant which occurs for it. The following chart incorporates most of the relevant data:

(26) A. The [I] alternant:

glIs	'to sit'	žbId	'to pull'	ktIb	'to write'
kdIb	'to lie'	xdIm	'to work'	ŋzIn	'to weigh'
rkIl	'to kick'	ysIl	'to wash'	lbIs	'to wear'
mIn	'from'	tbIn	'straw'	yId	'hand'
žIId	'skin'	bInt	'girl'	9dIs	'lentils'
tIlž	'snow'	mIstā	'comb'	žbIl	'mountain'
hIndIyā	'cactus'				

B. The [æ] alternant:

sbæ 9	'lion'	9æmm	'uncle'	hædd	'Sunday'
lhæm	'meat'	fhæ l	'like'	dræ 9	'forearm'
šmæ 9	'wax'	qræ 9	'bottle'	l9æb	'to play'

C. The [a] alternant:

- | | | | | |
|----|------|---------------|--------|--------------|
| a. | šbā9 | 'finger' | 9aššeb | 'to stiffen' |
| | šnā9 | 'manufacture' | 9aššān | 'thirsty' |
| | bhār | 'sea' | haqq | 'truth' |
| b. | sqaf | 'roof' | qaws | 'arc' |
| | waqt | 'time' | xall | 'vinegar' |
| | | | waxxā | 'O.K.' |
| | | | xadd | 'cheek' |
| c. | žbar | 'to find' | šhar | 'month' |
| | xraž | 'to leave' | hrab | 'to flee' |
| | | | zhar | 'luck' |
| | | | šrab | 'to drink' |
| d. | qtaṇ | 'cotton' | draḅ | 'to hit' |
| | xšar | 'to fail' | ṭablā | 'table' |
| | | | ṭlaḅ | 'to request' |
| | | | mḍall | 'umbrella' |

D. The Glide /w/:

- | | | | | |
|----|-----------------|-----------------|---------|------------------|
| a. | wald | 'boy' | mwəssax | 'dirty' |
| | wella | 'or' | | |
| b. | suwwel | 'to ask' | duwwwez | 'to take (exam)' |
| | luwwel | 'first' | džuwwēž | 'to get married' |
| c. | šuwwer/šawwer | 'to photograph' | | |
| | xuwwef/xawwef | 'to frighten' | | |
| | mṭuwwer/mṭawwer | 'intelligent' | | |

E. The Glide /y/:

- | | | | | |
|----|--------|-----------------|--------|------------|
| a. | yIbsā | 'dry fem.)' | yIdd | 'hand' |
| b. | fiyyeq | 'to wake (tr.)' | siyyeb | 'to throw' |
| | miyyet | 'dead' | ziyyet | 'to oil' |
| c. | xayyet | 'to sew' | 9ayyān | 'tired' |
| | šayyed | 'to hunt' | qayyes | 'to taste' |

The allophone in the environment of pharyngeal consonants is usually a low front vowel (26B), transcribed here as [æ], unless it is also in the environment of a uvular or an emphatic consonant or an /r/, in which case it appears as a low back vowel (26C.a) [a] (or emphatic [a]). In the environment of emphatic consonants, uvular consonants, or /r/ (26C.b, c, and d), it also appears as low back vowel /a/. When following a /w/, it appears as a schwa (26D.a), while when preceding a /w/, it appears as /u/ if the preceding consonant is non-emphatic,

non-uvular and non-pharyngeal (26D.b); otherwise, both /u/ or /a/ are possible (26D.c). When following the glide /y/, it appears as a short high front vowel /I/ (26E.a). When preceding /y/, it normally appears as a high open front vowel /i/ (26E.b), unless the consonant is an emphatic, pharyngeal or uvular consonant, in which case it appears as /ā/. In all other environments (26A), it appears as a short high front vowel, represented here as /I/.

It is interesting to note then that in Moroccan there has occurred a complete neutralization of the Classical Arabic /a/ and /i/, and it is possible for words from Classical Arabic containing /i/ to show up as /a/ in Moroccan, and vice versa:

(27)

	<u>Classical Arabic</u>	<u>Gloss</u>	<u>Moroccan Arabic</u>	<u>Gloss</u>
A.	ṭifl ṣihḥa ṣibya	'child' 'health' 'dye'	ṭafl ṣaḥḥa ṣabyā	'child' 'health' 'whitewash'
B.	kataba xadama jalasa šams	'he wrote' 'he served' 'he sat' 'sun'	ktīb xdīm glīs šims	'he wrote' 'he worked' 'he sat' 'sun'

While this process is a general one, there are nonetheless a number of significant cases where it does not apply. First, it never applies to short vowels which are underlyingly long and which have been shortened by morphological processes (see chapter 2, section 4.5). There is also one case where underlying /u/ is changed to /a/ in certain morphological environments (see [32]). This vowel is also exempt from application of these rules of allophony. And finally, short vowels which are inserted by automatic insertion in association with inflectional

processes, undergo rules of allophony which differ from those discussed above in some details. While the results are the same when adjacent consonants include either emphatics, pharyngeals, or laryngeals, the short vowel appears as a schwa /ə/ in all other environments, including /r/:

(28)	ʒbar	'he found'	ʒəbrāt	'she found'
	nəʒbar	'I find'	nʒəbrŭ	'we find'
	ktIb	'he wrote'	kətbāt	'she wrote'
	nəktIb	'I write'	nkətbŭ	'we write'

It is only by recognizing a formal distinction between inflectionally inserted and derivationally inserted short vowels that it is possible to predict the quality of short vowels in all cases. (For further discussion see chapter 4, section 3.)

Since the surface realizations of this vowel include both a high front vowel and a low back vowel, it might appear that the best choice for an underlying form is the low front vowel /æ/. However, there are a number of problems with this approach. In the first place, it would make it appear that the alternant found in the environment of pharyngeal consonants is the underlying one, since it is the only one which is [+low, -back]. This problem is partially the result of inadequate feature specifications for the pharyngeals: the consonantal features [+low] does not correspond to the vowel feature [+low] in this case. More importantly, the formalization of the rule changing /a / to [I] would be prohibitively clumsy; this is because the environment for the change is essentially "elsewhere" -- in any environment which is non-emphatic, non-uvular, non-pharyngeal and not an /r/ or a /w/.

If we choose /I/ as the underlying form, we face a different set of problems. In the first place, we would have to posit the unusual change from a high front vowel to a low back vowel in the environment of emphatic consonants, /r/ and /w/ -- a change which does not occur with the long vowel /i/. Moreover, there would be no way of unifying the rules of vowel allophony which affect long /ā/ and short /e/, even though these rules are identical in many environments.

I believe the best solution is to assume that the inserted vowel is an underspecified segment, distinguished from /u/ only in that it is [-high]. We can then formalize the changes effecting all short vowels in the following fashion:

- (29)
$$\begin{array}{c} \text{v} \\ \text{Sho} \begin{bmatrix} -\text{high} \end{bmatrix} \end{array} \rightarrow \begin{bmatrix} -\text{back} \\ +\text{low} \end{bmatrix} \text{Stems} \quad (\text{Preliminary Version})$$
- a.
$$\begin{array}{c} \text{v} \\ \begin{bmatrix} -\text{high} \end{bmatrix} \end{array} \rightarrow \begin{bmatrix} -\text{back} \\ +\text{low} \end{bmatrix} / \begin{bmatrix} \text{C} \\ +\text{low} \end{bmatrix} \quad (\text{with pharyngeals})$$
- b.
$$\begin{array}{c} \text{v} \\ \begin{bmatrix} -\text{high} \end{bmatrix} \end{array} \rightarrow \begin{bmatrix} +\text{back} \\ +\text{low} \end{bmatrix} / \begin{bmatrix} \text{C} \\ +\text{CP} \\ -\text{low} \end{bmatrix} \quad (\text{with emphatics and uvulars})$$
- c.
$$\begin{array}{c} \text{v} \\ \begin{bmatrix} -\text{high} \end{bmatrix} \end{array} \rightarrow \begin{bmatrix} +\text{back} \\ +\text{low} \end{bmatrix} / \text{ } \text{ } \text{ } r$$
- d.
$$\begin{array}{c} \text{v} \\ \begin{bmatrix} -\text{high} \end{bmatrix} \end{array} \rightarrow \begin{bmatrix} \text{back} \\ +\text{high} \end{bmatrix} / \text{ } \text{ } \text{ } \begin{bmatrix} \text{Glide} \\ \text{back} \\ +\text{high} \end{bmatrix} \quad (\text{before } /w/ \text{ or } /y/)^{17}$$
- e.
$$\begin{array}{c} \text{v} \\ \begin{bmatrix} -\text{high} \end{bmatrix} \end{array} \rightarrow \begin{bmatrix} +\text{back} \\ -\text{low} \end{bmatrix} / \begin{bmatrix} \text{Glide} \\ +\text{back} \\ +\text{high} \end{bmatrix} \quad (\text{following } /w/)$$

Rule 7: Short Vowel Redundancy: Derivational

$$\begin{bmatrix} \text{v} \\ -\text{high} \\ -\text{low} \\ -\text{back} \\ -\text{long} \end{bmatrix} \rightarrow [+high]$$

Rule 8: Short Vowel Redundancy: Inflectional

$$\begin{bmatrix} \text{v} \\ -\text{high} \\ -\text{low} \\ -\text{back} \\ -\text{long} \end{bmatrix} \longrightarrow [+back]$$

This solution has a number of important advantages. First, it permits a formal statement of the facts, avoiding the cumbersome changes that underlying /æ/ would entail; and secondly, it permits, as we will see in 2.4, the collapsing of the short and long vowel rules of allophony. Note that for rule 6b to have the desired effect it is necessary to assume that all the uvulars, including /y/ and /x/, contain the feature [+CP].

There remain several theoretical problems with the features used to describe many of these changes: thus, the rule changing /e/ to [a] in the environment of uvular consonants (Rule 6b) has the effect of changing a vowel to the feature [+low] in the environment of a consonant which is [-low]. If the analysis proposed here is correct, the Moroccan data constitutes counterevidence to the assignment of this feature to uvular consonants.

2.3.2 The Short Vowel /u/

In (26.D-b) it was seen that in at least one case (when it precedes the glide /w/) the quality of the short vowel /u/ can be predicted. However, while the short /u/ is relatively rare, there are a fair number of cases where it occurs in the same environments as /e/:

(30)	nuqrā	'silver'	xubz	'bread'
	burkā	'duck'	qubb	'basket'
	nuqtā	'drop'	kull	'all'
	kudyā	'hill'	skut	'he was quiet'
	rukba	'knee'	dxul	'he entered'
	xunṣer	'spring'	sxur	'he snored'

It's interesting to note that /u/ appears almost exclusively in the environment of emphatic, pharyngeal, uvular and velar consonants. However, the short vowel [a] can also occur in these environments:

(31)	keddāb	'liar'	kudyā	'hill'
	feṣl	'season'	fuṣḥā	'classical (arabic)'
	šerba	'drink'	šurba	'soup'

Further, in one case there is a morphological distinction made purely on the basis of the short vowel:

(32)	<u>Perfect Stem</u>	<u>Imperfect Stem</u>	<u>Gloss</u>
	kabb	kubb	'to pour'
	sall	sull	'to pick out'
	daqq	duqq	'to knock'
	šamm	šumm	'to smell'

On the basis of such evidence, we can conclude that /u/ is a separate underlying segment.

2.3.3 The Position of the Short Vowel

The position of the short vowel in the Moroccan word is very limited: it never occurs in word initial or word final position, and can never begin or end a syllable. It is only found between two consonants, either of which can be part of a cluster: (C)C__C(C). Further, its precise position in the word is always predictable. When inserted in a stem, its position depends on both phonological and morphological criteria (see chapter 2, section 6.4 and 6.5), and when inserted

in the inflectional derivation, it is predictable on the basis of syllabic criteria. For this reason, its status as an underlying segment is an unusual one. In subsequent sections, I will argue that it is not present at the underlying root level, but is nonetheless available to be inserted as an infix in the course of morphological processes.

2.4 Long Vowels

Three long vowels, /ā/, [ɪ] and [ʊ], are found in Moroccan Arabic. We have already seen that two of these, [ɪ] and [ʊ], can be considered derived from underlying glides, /y/ and /w/ respectively. Long vowels occur in a wider range of syllabic environments than do short vowels. We have already seen that underlyingly long vowels occur word finally (chapter 2, section 2.1). They can also occur in word initial position:

(33)	ā	‘oh (voc.)’	ātāy	‘tea’
	āxer	‘other’	ārā	‘give (imp.)’
	ūlād	‘sons’	ūrāq	‘tickets’
	ūqef	‘he stood up’	ūzen	‘he weighed’
	īdā	‘if’	īyām	‘days’
	ībes	‘he dried’	īmen	‘right’

In southern dialect described by Harrell,¹⁸ both [ɪ] and [ʊ] are in word initial position preceding two consonants (#__CC). In northern dialects, they do not occur in this position, but instead /y/ or /w/ will be found. Long /ā/ on the other hand can be found in this position, as in /āxrā/ ‘other’, and /āllah/ ‘God’. Long vowels can be preceded by up to 2 consonants, but can be followed by no more than one. At the phonetic level, word initial vowels are preceded by a glottal stop.

2.4.1 The Vowel /ā/:

The vowel /ā/ alternates with a number of phonetic variants, much along the lines of its short vowel counterpart /e/. The following chart exhibits the possibilities:

(34) A. The [æ] alternant

a. sæb	'to revolt'	bæt	'to spend the night'
mæt	'to die'	blæd	'country'
tæb	'to repent'	sæf	'he saw'
b. kærɪ	'renting'	særut	'key'
lbæreh	'yesterday'		

B. The "Low" [æ] alternant

9æz	'ivory'	9æzeb	'amazing'
hæl	'home'	hænut	'store'
9ælem	'world'	hæft	'dull'

C. [a] alternant:

a. 9ār	'shame'	9ās	'juice'
hār	'hot, spicy'	hādīra	'city (opp. of country)'
hādī	'guarding'	9āsīmā	'capital city'
b. yādī	'going'	yābā	'forest'
dāq	'he tasted'	blayī	'Moroccan style shoes'
qāl	'he said'	xātem	'ring'
c. fār	'mouse'	kār	'bus'
rās	'head'	zīran	'neighbors'
d. šāb	'to find'	bāt	'armpit'
mātar	'airport'	blāṣa	'place'
qādī	'judge'	šāy	'to make jewelry'
e. dhāb	'gold'	sāhel	'easy'
f. šrā	'he bought'	blā	'without'
yā	'oh (voc.)'	nsā	'he forgot'
mśā	'she went'	lā	'no'

Thus, in the environment of pharyngeals there occurs a very low front vowel, (transcribed here as [æ])(34B), unless it is also adjacent to an emphatic consonant or an /r/, as in (34C.a). When adjacent to uvular consonants (34C.b), emphatic consonants (34C.d) or laryngeal /h/, the /ā/ shows up as a low back vowel transcribed here as [ā] (or emphatic [ā̤]). When word final, it

also appears as a low back vowel (34C.f). The case of /r/ is not clear; both a front vowel [æ̃] (34A.b) and a back vowel (34C.c) are possible. In all but one case where my transcription notes this distinction, I find that [æ̃] occurs in open syllables while [ã] occurs in closed syllables; while I do not have enough data to confirm this generalization, I will take it as a working hypothesis. Finally, in all non-emphatic, non-pharyngeal, non-uvular, and non-laryngeal environments, the alternant is a front vowel approximating [æ̃].¹⁹

The rules which generate the low back vowel [ã] are for the most part identical to the rule which affects short vowels, the only difference being that with long vowels the process is expanded to include laryngeals and word final vowels. However, with long vowels there is no redundancy rule raising /ã/ ([æ̃]) to a high vowel. Note, however, that with the long vowels an additional feature is required to distinguish the low front vowel found in pharyngeal environments (34.A.b) from that found in non-marked environments (34.A.a). They are phonetically quite distinct.

In other dialects of Arabic, the vowel in the environment of pharyngeals is transcribed as a back vowel.²⁰ This is not possible in Moroccan Arabic, as it entails the claim that there is no distinction to be made between the vowels in pharyngeal environments and those in emphatic environments. The distinction is extremely clear, and there are many striking contrasts involving both short and long vowels:

(35)	<u>Emphatic</u>	<u>Gloss</u>	<u>Non-emphatic</u>	<u>Gloss</u>
A.	sbā9 9āsseb ḥāḍḍāy	'finger' 'to stiffen' 'watcher'	sbā 9 9æ ssās ḥæ dd	'lion' 'guard' 'luck'
B.	ḥāḍīrā 9āṣīmā	'country' 'capital'	ḥæ fī 9æ lem	'blunt' 'world'

These facts can be accounted for by proposing, following Broselow²¹ that the feature [+CP] spreads from consonants to adjacent vowels.

There is no need to postulate an abstract segment in the case of long vowels. The simplest account is one which takes /æ/ as the underlying form, having the features [+low, -back]. Its alternants can be derived by the following rules:

(36)

Rule 9: Vowel Allophony: Second Version

- a. $\begin{bmatrix} v \\ -high \end{bmatrix} \rightarrow \begin{bmatrix} +CP \\ +low \end{bmatrix} / \begin{bmatrix} C \\ +CP \end{bmatrix}$ (in pharyngeal, uvular & emphatic environments)
- b. $\begin{bmatrix} v \\ -high \end{bmatrix} \rightarrow [+back] / \begin{bmatrix} C \\ +CP \\ -low \end{bmatrix}$ (in uvular & emphatic environments)
- c. $\begin{bmatrix} v \\ -high \end{bmatrix} \rightarrow [+back] / __ r \left\{ \begin{matrix} \# \\ C \end{matrix} \right\}$
- d. $\begin{bmatrix} v \\ -high \\ +long \end{bmatrix} \rightarrow [+back] / \begin{bmatrix} C \\ +low \\ -back \end{bmatrix}$ (in laryngeal environments)

Rules 9a, b and c will replace rules 6a, b, and c, and will apply to both long and short vowels. These rules entail the claim that long and short vowels in pharyngeal environments have identical vowel quality; this is exactly what Harrell²² states, and it supports my own impressions. Note that rule 9c will require no change to apply to short vowels, since these

only occur in closed syllables. This fact might explain why only long vowels alternate in vowel quality when immediately preceding an /r/. It is only in the case of rule 9d, which applies to vowels in laryngeal environments, where the long vowel rule does not apply to short vowels as well.²³ As has been noted, the short vowel redundancy rule raising /e/ to [i] will not apply to long vowels; nor will rules 6d and e, which assimilate short vowels to glides.

Finally, it should be noted that although I am assuming that the underlying form for the low long vowel is /æ /, for convenience I will continue to use the symbol /a/ to represent this sound.

2.4.2 The Vowels [i] and [u]:

Many of the processes which cause alternations in the segment /ā/ cause similar articulatory adjustments for the vowels [i] and [u], but the result in most cases is not one which I perceive as vowel quality.²⁴ There is a noticeable change in the pronunciation of vowels in the environment of emphatic, pharyngeal and uvular consonants:

(37)	[i]	Gloss	[u]	Gloss
A.	sbīṭer ṣīnīyā	'hospital' 'tray'	ṣūf ḍūrūs	'wool' 'lessons'
B.	qbīḥ 9īd	'bad' 'holiday'	9ūd 9ūqūbā	'wood' 'punishment'
C.	yīr lāxīyā qīs	'only' 'bleach' 'touch'	xūd qūl yūl	'take' 'say' 'ogre'

In each of these cases the vowels acquire a distinctly

"emphaticized" flavor. My impressions regarding this are supported from two sources. Harrell,²⁵ after noting that vowels acquire "special pronunciations in the neighborhood of emphatic consonants," goes on to state that vowels in the neighborhood of pharyngeal and uvular consonants are approximately the same as those in the neighborhood of emphatics. Further, in many Northern dialects, the glides /w/ and /y/ are often not changed to [ɪ] and [ʊ] in these environments:

(38)	<u>Standard</u>	<u>Some Northern Dialects</u>	<u>Gloss</u>
	ħumā	ħewmā	'neighborhood'
	sūt	sewt	'voice'
	dūw	deww	'light'
	xīl	xeyl	'horse'
	yīṣ	yeyṣ	'mud'
	ħīt	ħeyt	'since'

Here again the uvular, pharyngeal and emphatic consonants behave as a natural class, supporting the claim that they all have the feature [+CP]. The formalization of the changes affecting the vowels is a simple matter:

(39) Rule 10:

$$V \longrightarrow [+CP] \quad / \quad \left[\begin{array}{c} C \\ +CP \end{array} \right]$$

The question of the insertion or lack of insertion of a short vowel (e.g. 38) will be discussed in chapter 3, section 6.

2.4.3 Vowel-Glide Alternations

It frequently occurs that a morphological process results in the affixation of a long vowel adjacent to a long vowel already present in the stem. When this occurs, one of a variety of long vowel to glide processes will apply. These

depend on the position of the inserted vowel, the quality of the vowel in the stem, the quality of the inserted vowel, and the type of affix which is being added.

One common case is the infixation of the long vowel /ā/. Such infixes are used to form a variety of morphological stems, including noun plurals, participles, and nouns of profession and personal characteristic. When this vowel is inserted immediately before a long vowel, that vowel always becomes /y/, regardless of its quality:

(40)

A.	<u>Sing.</u>	<u>Plur.</u>	<u>Gloss</u>
	blās	blāyes	'place/places'
	zlāfa	zlāyef	'bowl/bowls'
	žrīmā	žrāyem	'crime/crimes'
	bzīm	bzāyem	'belt buckle/buckles'
	flūkā	flāyek	'boat/boats'
	rdūmā	rdāyen	'bottle/bottles'

B.	<u>Verb</u>	<u>Gloss</u>	<u>Participle</u>	<u>Gloss</u>
	bāt	'to spend night'	bāyet	'stale'
	xāf	'to be afraid'	xāyef	'being afraid'
	kūn	'to be'	kāyen	'there is/are'
	dūr	'to circle'	dāyer	'circling'
	žī	'to come'	žāy	'coming'
	fīq	'to wake up'	fāyeq	'alert'

C.				
	kdeb	'to lie'	keddāb	'liar'
	nsā	'to forget'	nessāy	'forgetful'
	kmā	'to smoke'	kemmāy	'heavy smoker'

We can formalize this process as follows:

(41)

Rule 11: [-consonantal] $\longrightarrow$ y / + ā + ____

When the vowel /ā/ is infixed immediately following another long vowel, the stem vowel will become either /y/ or /w/, depending its quality:²⁶

(42)	<u>Sing.</u>	<u>Plur.</u>	<u>Gloss</u>	<u>Sing.</u>	<u>Plur.</u>	<u>Gloss</u>
A.	xātem	xwātem	'ring'	zāme9	zwāme9	'mosque'
	kāyet	kwayet	'paper'	hānūt	hwānet	'store'
	nāqūs	nwāges	'bell'	ṭablā	twābel	'table'
	dālyā	dwālī	'vine'	māgānā	mwāgen	'clock'
B.	gītūn	gyāten	'tent'	rīh	ryāh	'wind'
	sīdī	syādī	'sir'	kīb	kyāb	'money bag'
	mīzān	myāzen	'scale'	bīr	byār	'well'
C.	lūh	lwāh	'board'	sūq	swāq	'market'
	lūn	lwān	'color'	šūr	šwār	'city wall'
	lūleb	lwāleb	'screw'	mūlā	mwālī	'owner'
	būq	bwāq	'loudspeaker'	kūra	kwārī	'ball'

When /+ā+/ is infixed immediately following an /ā/ in the stem, the stem vowel becomes /w/ (42A). When it is infixed immediately following [i] and [u] the stem vowel appears as /y/ and /w/ respectively. Since these are the underlying representations for these sounds, there is no need to postulate any change. The rule converting /ā/ to /w/ can be stated as follows:

(43) Rule 12

ā → w / _____ +ā+

When either [i] or [u] is inserted immediately following a long vowel, the stem vowel almost always becomes /w/ and /y/ respectively, regardless of its underlying quality:

(44)A.	<u>Noun</u>	<u>Diminutive</u>	<u>Gloss</u>
1.	bīrū	bwīrū	'office'
	bīdā	bwīdā	'egg'
	šīṭān	šwīṭen	'devil'
	9eyn	9wīnā	'eye'
	šīnīyā	šwīnyā	'tray'
2.	būṣā	bwīṣā	'kiss'
	ḥūṭā	ḥwīṭā	'fish'
	būḥālī	bwīḥel	'foolish'
	zuṣā	zwīṣā	'pair'

3.	bāb rāʔel ʔāfyā ṭablā	bwībā rwīʔel ʔwīfyā ṭwīblā	‘door’ ‘man’ ‘fire’ ‘table’
B.	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
1.	rās ḍār	ryūs ḍyūr	‘head’ ‘house’
2.	bīt ʔīm sīf	byūt ʔyūm syūf	‘room’ ‘pocket’ ‘sword’

Thus in (44A), we find that insertion of the diminutive infix /i/ immediately after a vowel causes that vowel to become /w/. There are very few examples of the insertion of the broken plural infix /ū/ immediately after /ā/ or [i] (e.g. [44B]); in such environments a different plural form will almost always be used. However, I know of no cases where the stem vowel does not become /y/ when the /ū/ infix is inserted.

These processes can be formalized as follows:

(45) Rule 13

$$\begin{bmatrix} -\text{cons} \\ +\text{high} \\ \alpha\text{back} \end{bmatrix} \longrightarrow [-\alpha\text{back}] / \text{ ______ } + \begin{bmatrix} +\text{cons} \\ +\text{high} \end{bmatrix} +$$

There are many cases where suffixes set up an environment similar to the structural description of (45), and it might at first seem possible to include them in the same rules:

(46) Mas.Part. Fem.Part. Gloss

A.	māʔī mrebbī māʔī	māʔyā mrebbiyā māʔyā	‘going’ ‘raising/raised’ ‘coming’
----	------------------------	----------------------------	---

B.	<u>Verb</u>	<u>Gloss</u>	<u>Verbal Noun</u>	<u>Gloss</u>
	sqī	‘to irrigate’	seqyā	‘irrigation ditch’
	fdī	‘to replace’	fedyā	‘replacement’
	tnī	‘to fold’	tenyā	‘wrinkle, fold’

However, in many other cases, a glide will be placed between the stem vowel and the suffix vowel:

(47)	<u>Mas.</u>	<u>Fem.</u>	<u>Plur.</u>	<u>Gloss</u>
	nqɪ	nqɪyā	nqɪyɪn	'clean'
	maʃɪ	maʃɪyā	maʃɪyɪn	'Egyptian'
	ɬlū	ɬlūwā	ɬlūwɪn	'sweet'
	nefsɪ	nefsɪyā	nefsɪyɪn	'self-respecting'

In the inflectional morphology, a different rule will apply; this will be examined in section 6 and in chapter 3, section 6.

Finally, note that the processes discussed in this section are not general phonological rules. They apply only in association with word-stem formation processes. They do not apply at the inflectional level, where instead automatic vocalization will apply cyclically (see chapter 3, section 4).

2.4.4 Vowel Shortening

It was noted in 2.2 that long vowels in word final position are pronounced short. This is probably part of a wider process, as there is a tendency for all non-stressed long vowels to be pronounced short. However, they remain distinct from short vowels in terms of pronunciation and morphological characteristics. There is one case, however, where long vowels appear to be shortened in a more significant way. The following examples illustrate this process:

(48) A.	<u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
	kunnās	knāneś	'notebook'
	menśār	mnāśer	'saw'
	ḥānūt	ḥwānet	'store'
	duwwār	ḏwāwer	'village'
	farrūʒ	frāreʒ	'rooster'
	qenfūd	qnāfed	'hedgehog'

B. <u>Noun</u>	<u>Diminutive</u>	<u>Gloss</u>
1. bakīt	bwīket	'package'
barrād	brīred	'teapot'
nāqūs	nwīges	'bell'
ṭāzīn	ṭwīzen	'Moroccan stew'
mūnxār	mūnīxer	'nose'
2. meknāsī	mkīnsī	'native of Meknes'
ṣīnīyā	ṣwīnyā	'tray'

Thus, the long vowel in the final syllable of each word is apparently shortened when an infix consisting of a long vowel is inserted in the preceding syllable; further, since this now places them in unstressed syllables, they are weakened to a schwa. And in certain cases (48B.2) the short vowel is deleted because it would otherwise remain in an open syllable, which we have noted is not permitted.

This process does not occur if the stem vowel is word final:

(49) A. <u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
derrī	drārī	'child'
sīdī	syādī	'sir'
metwī	mtāwī	'tobacco pouch'
B. <u>Noun</u>	<u>Diminutive</u>	<u>Gloss</u>
merrā	mrīrā	'time'
beqrā	bqīrā	'cow'
qehwā	qhīwā	'coffee'

We could formulize this process as follows:

(50)

Rule 14: V $\longrightarrow$ [-long] / + V + ____ C

This rule could be formulated in a more revealing metrical notation (see chapter 3, section 3). In chapter 4, however, I will argue that plural nouns are not derived from singular counterparts. Hence, it is also possible that vowel shortening is not

occurring in such cases, but rather that the long vowel is not part of the derivational process which forms the plural noun.

There is one case where it occurs in the inflectional morphology: the third person feminine singular suffix for the perfect stem alternates between /+āt/ and /+et/, depending on the stem to which it is attached:

- (51)
- | | | |
|----|--------|---------------|
| a. | žebrāt | 'she found' |
| | šrāt | 'she bought' |
| b. | zāret | 'she visited' |
| | šāfet | 'she saw' |

While there are no other inflectional suffixes which consist of a long vowel followed by a consonant, there are many derivational suffixes of this shape:

(52) A.	<u>Verb</u>	<u>Verbal Noun</u>	<u>Gloss</u>
	dīr	dīrān	'to do/doing'
	mīl	mīlān	'to lean/leaning'
	šūf	šūfān	'to see'
B.	<u>Adjective</u>	<u>Plural</u>	<u>Gloss</u>
	keslān	keslānīn	'lazy'
	kbīr	kbīrīn	'big'
	sxūn	sxūnīn	'hot'

This form of the vowel shortening process clearly does not apply at the derivational level.

2.4.5 Ablaut

A characteristic feature of Arabic languages is the alternation between a form containing the low vowel /a/ and another containing either /i/ or /u/ in certain morphological environments. In Moroccan Arabic, this process involves all verbs consisting of hollow roots and word final vowels, and some nouns with hollow roots:

(53) A. VERBS WITH FINAL VOWELS					
	<u>Perfect</u>	<u>Imperfect</u>	<u>Active</u>	<u>Passive</u>	<u>Gloss</u>
	<u>Stem</u>	<u>Stem</u>	<u>Part.</u>	<u>Part</u>	
1.	mśā/mśī	mśī	māśī	--	'to go'
	śrā/śrī	śrī	śārī	meśrī	'to buy'
	kmā/kmī	kmī	kāmī	mekmī	'to smoke'
2.	bqā/bqī	bqā	bāqī	--	'to remain'
	qrā/qrī	qrā	qārī	meqrī	'to read'
	bđā/bđī	bđā	bādī	mebđī	'to begin'
B. HOLLOW VERBS					
	<u>Perfect</u>	<u>Imperfect</u>	<u>Gloss</u>		
1.	qās/qīs	qīs	'to touch'		
	dār/dir	dīr	'to do'		
	zāg/zīg	zīg	'to get out of hand'		
2.	nāb/nub	nūb	'to substitute'		
	zār/zur	zūr	'to visit'		
	qām/qum	qūm	'to wake up'		
C. HOLLOW NOUNS					
	<u>Sing.</u>	<u>Plural</u>	<u>Gloss</u>	<u>Sing.</u>	<u>Plural</u> <u>Gloss</u>
	zār	zīrān	'neighbor'	kār	kīrān 'bus'
	fār	fīrān	'mouse'	yār	yīrān 'cave'
	bab	bībān	'door'	kās	bībān 'glass'

In (53A) it is possible to account for the alternations in the imperfect of (1) and (2) by assuming that the underlying vowels are /ī/ and /ā/ respectively. Note that Roots with final /w/ ([ū]) are very rare, and are conjugated irregularly. The differences in the paradigms of (53B) can be explained by assuming that (.1) contains underlying /ī/ while (.2) contains underlying /ū/. Underlying /ā/ is also a possibility, though relatively rare; it exhibits no alternation in vowel quality. High/Low vowel changes also occur occasionally with nouns consisting of hollow roots, as (53C) demonstrates. The environments for these changes are morphological; I believe that pairs such as /śāf/ vs. /śūf/ show this clearly. Brame²⁷ claims that

in Classical Arabic this apparent case of ablaut is phonologically conditioned. Noting that glides are often deleted when between two short vowels, he claims that cases such as the third person masculine of the perfect tense (e.g. /šāf/) are formed from underlying sequences of CVGLVC (/šawaf/): the glide is deleted, and the two short vowels join to form a long vowel. This approach assumes that a long vowel is composed of two short vowels. In Moroccan, this approach is not feasible, since the underlying stem shape is CCVC rather than CVCVC. Note that underlying CVCVC would pose certain difficulties for the correct derivation of inflected forms (e.g. /n + keteb/ → nek**teb** but /n + keteb + u/ → nketbu). This question will be discussed in greater detail in chapter 3.4. It also appears to me that there is a formal problem with this view, since if long vowels are sequences of short vowels, one would expect each individual short vowel to be able to constitute part of the structural description for glide deletion. Thus, the second short vowel in Classical /saayara/ 'to adapt' should contribute to the deletion of the glide /y/. The fact that it does not constitutes clear counterevidence, even in Classical Arabic, to the view that long vowels are derived from two short vowels in this manner.

Ablaut is also used in association with the plural forming infix /+ā+/, as the following examples illustrate:

(54)A. <u>Sing.</u>	<u>Plur.</u>	<u>Gloss</u>	<u>Sing.</u>	<u>Plur.</u>	<u>Gloss</u>
yersā	yrāsī	'garden'	zenqā	znāqī	'street'
tebqā	tbāqī	'floor'	ṭeblā	ṭbālī	'table'
keswā	ksāwī	'dress'	mežrā	mžārī	'drain'
xensā	xnāsī	'sack'	kudya	kdāwī	'hill'

B. sebst	sbāsa	'pipe'	kurst	krāsa	'stool'
ferdt	frāda	'pistol'	hewlt	hwāla	'sheep'
tūnst	twānsa	'Tunisian'	žeblt	žbāla	'mtn. person'
sūldt	swāda	'drunkard'	kudšt	kwadśa	'surrey'

Such morphemes will be marked for application of ablaut in the applicable morphological environment.²⁸

2.5 Emphatic Spread

The spread of emphasis from underlying emphatic consonants is a common phenomenon in the Arabic languages. It is a relatively understudied process, and there has been a great deal of disagreement concerning almost every aspect of it: its articulatory and acoustic effects, the consonants which constitute primary emphatics, the features needed to define them, and the rules needed to describe the effect they have on neighboring segments. Sayed²⁹ provides a very thorough summary of many of the claims made concerning emphatics and emphatic spread; he argues convincingly that all of them have been inadequate. His findings can be summarized as follows:

A. Emphasis "...is characterized by at least six articulatory and acoustic characteristics." 1) tongue and root retraction with lateral spreading; 2) concavity of the tongue and raising of its back; 3) pharyngeal restriction; 4) lip protrusion or rounding; 5) increased oral tension, resulting in more fortis sounds; 6) lowering of the pitch.³⁰

B. All previous attempts to describe emphatics and emphatic spread have been unsuccessful. The SPE features [+low, +back] clearly cannot be applied to neighboring vowels, as they would presumably cause /i/ and /u/ to become [a], which is not

what occurs. Brame³¹ attempts to overcome these difficulties with the feature [+rhizo-lingual], which serves to distinguish emphatic from non-emphatic consonants; but Broselow³² argues that this feature is not appropriate to be applied to the segment /q/, and that for this reason it cannot capture the fact that emphatics and /q/ have the same effect on neighboring vowels. She argues that the feature [+constricted pharynx] can serve to create a natural class consisting of the primary emphatics, the pharyngeals, and the uvular /q/. But there is an important problem with this system as well, since it makes the claim that it is the presence of the feature [+CP] which causes the spread of emphasis. But as Sayed points out, while the pharyngeals and /q/ do at times cause adjacent vowels to become emphatic in Moroccan Arabic, they never effect neighboring consonants the way primary emphatics do:

- (55) a. hīt 'wall' hīt 'since'
 b. t̤bīb 'doctor' qīs 'to touch'
 c. m̤el 'umbrella' qlīl 'a little'

Thus, in all these cases we see that the primary emphatic consonants cause spread of emphasis throughout the syllable to both vowels and consonants, while the pharyngeals and /q/ only affect adjacent vowels. Further, the vowel affected by the emphatic consonant need not be adjacent to it:

- (56) a. d̤rēb 'he hit'
 b. qbīl 'before'

Thus in (56a), the vowel is affected by a non-adjacent primary emphatic. But in (56b), the uvular /q/ has no effect on the quality of the vowel, which shows up as ([I]), the phonetic

alternant which appears in non-uvular, non-emphatic and non-pharyngeal environments. Hence, it appears that in Moroccan Arabic it is not the feature [+CP] which is triggering spread of emphasis, and another feature must be appealed to.

Sayed himself concludes from this that the admitted arbitrary feature [+emphatic] should be used, and he defines it as having all six of the phonetic characteristics mentioned above. The problem with this approach, of course, is that it does not permit an account of the effect which the emphatics, pharyngeals, and uvulars, (the [+CP] consonants), have on neighboring high vowels.

For these reasons, I believe that it is necessary to take on an additional feature, one which will enable us to distinguish primary emphatics from the other segments containing the feature [+CP]. Brame's feature [+Rhizo-lingual] is a likely candidate, since as noted earlier, it serves only to define the primary emphatics. Accordingly, the natural class of primary emphatics would be defined as [+rhizo-lingual], and the natural class of emphatics, uvulars and pharyngeals, would be defined as [+CP]. The spread of emphasis will be triggered only by the primary emphatics, having the feature [+rhizo-lingual].

The formalization of the rule of emphatic spread presents a number of difficulties. The approach taken by Sayed is partially correct: emphasizing the syllabic nature of the process, he proposes a rule which will cause spread of emphasis throughout any syllable containing a primary emphatic. His rule accounts for data of the following type:

- (57) a. $\text{d}\ddot{\text{r}}\text{e}\text{b}$ 'he hit'
 b. $\text{d}\ddot{\text{e}}\text{r}\text{b}\text{u}$ 'he hit him'

Thus, in forms such as (57a) the stem-final consonant /b/ is emphaticized, while in those in (57b) it is not emphaticized, since it belongs to a different syllable.

Sayed's examples include no cases where emphasis spreads to the left beyond the domain of the syllable containing the primary emphatic. Thus, he gives examples such as /biḏā/ 'egg', where emphasis does not seem to spread to the adjacent vowel to the left. Broselow³³ however, claims that for Egyptian Arabic emphasis does spread left in such cases, giving such cases as underlying /laṭifa/ 'kind (fem.)', which appears at the surface level as /laṭṭifa/. There is a paucity of data concerning this question, and I am forced to rely on my own judgements. It is my impression that leftward spread occurs in Moroccan as well, at least in the dialect with which I am familiar. Thus, in many Northern dialects, the word for egg would be [ḃayḏa] or [ḃayṭa]; the fact that emphasis has spread to the first syllable is clearly reflected in the fact that the vowel failed to undergo the vocalization rule (see chapter 2, section 4.2 and chapter 3, section 5.)³⁴ Similarly, Harrell's³⁵ transcription indicates that the initial /l/ in /laṭṭif/ 'kind' is emphaticized, and this accords with my own judgements. It seems then that emphasis does spread leftward beyond the syllable containing the primary emphatic in Moroccan Arabic.

Broselow claims that in Egyptian Arabic emphasis spreads leftward until it hits a word boundary, and further that it

spreads rightward until it hits a syllable containing a high vowel. I do not have the data to check these hypotheses in regards to Moroccan Arabic, and I will limit the formulation of this rule so that it accounts only for the available evidence:

(58) Rule 15: Emphatic Spread: Preliminary Version

a. $V \longrightarrow [+rhizo-lingual] / \left[\begin{array}{c} C \\ [+rhizo-lingual] \end{array} \right]$

b. $\$ (C) C \text{ } \gamma (C (C)) \$ \longrightarrow \$ (\zeta) C \text{ } \gamma (\zeta (\zeta)) \$$

Rule (15a) causes the spread of emphasis from the primary emphatic to adjacent vowels; rule (15b) continues the spread of emphasis throughout the syllable. Sayed³⁶, following Lehn³⁷, argues that this rule is best formulated as a syllabic rule, but I will not do so here, as I lack the data to determine the limits of spread in Moroccan. Rule 15 is intended only as a preliminary description of this process, and it will doubtlessly require revision when the data becomes available.

2.6 Roots and Stems

In this section the underlying representations of Moroccan words will be examined. I will argue that two separate levels of abstract representations exist in Moroccan Arabic: that of the morpheme and that of the stem. It is necessary to appeal to the underlying morpheme level for two reasons: first, there are a number of interesting co-occurrence restrictions which apply to the segments of morphemic roots; I believe that these can best be accounted for by postulating the existence of a separate morphemic level at which these constraints apply. The second reason is that, as was noted briefly in chapter 1.2, it is

commonly the case that a relatively large number of words display a formal similarity which can best be explained by assuming that they are derived from a single morphemic root.

However, appealing to this morphemic level does not suffice to account for alternations exhibited in the inflectional morphology. In order to make any predictions regarding the derivation of inflectional paradigms, it is necessary to assume that these affixes are attached to a stem which is not identical to the root. This stem is commonly formed by the infixation of a short vowel within the root. The position of this short vowel is partially phonologically conditioned, but it depends crucially on the category of the word being formed as well.

2.6.1 Co-occurrence Restrictions on Roots

Segments within Semitic roots are known to be subject to a variety of co-occurrence restrictions (as in Greenberg³⁸). The data required to confirm these restrictions in Moroccan Arabic is of a negative type: it is necessary to find the root structures which do not occur. My primary source for this information has been Harrell's³⁹ dictionary. I have limited my search to triliteral roots and to the first two radicals of other root types. My findings indicate that roots in Moroccan Arabic are subject to many of the same types of restrictions as those noted by Greenberg.

A) Voiced-Voiceless Restriction: With one exception, there are no cases where roots permit a sequence of homorganic obstruents which have the same feature specification in terms of

the feature [+continuous], which does not have the same feature specification for voicing. Thus:

(59)	*g _h	*h ₉
	*x _y	*y _x
	*k _g	*g _k
	*d _t	*t _d
	*ḍ _t	*t _ḍ
	*s _z	*z _s

The one exception is ś́. Note, however, that historically /ž/ is doubtlessly derived from either /ǰ/ or /g/. The lack of a voiced/voiceless restriction might well be a synchronic manifestation of this change.⁴⁰ It is also interesting to note that there is a root restriction on the sequence bf and fb. It has often been noted that the segment inventory of Arabic is unusual in that it contains a voiced bilabial stop /b/, but no voiceless counterpart, and it has been suggested that /f/ might have been derived from /p/. The fact that this co-occurrence restriction applies to these segments does constitute synchronic evidence for such a claim.

This voicing constraint can be formalized with the following filter:

Root Structure Filter #1:

$$* \begin{bmatrix} \text{C} \\ \alpha \text{place of articulation} \\ \beta \text{continuous} \\ \gamma \text{voiced} \end{bmatrix} \begin{bmatrix} \text{C} \\ \alpha \text{place of articulation} \\ \beta \text{continuous} \\ -\gamma \text{voiced} \end{bmatrix}$$

B. Velar-Uvular Restriction: I could find no cases where a velar consonant is adjacent to a uvular consonant:

(60)	*qk	*kq
	*qg	*gq
	*xk	*kx
	*xg	*gx
	*yk	*ky

This constraint can be formalized:

Root Structure Filter #2:

$$* \begin{bmatrix} C \\ +back \\ \alpha high \end{bmatrix} \begin{bmatrix} C \\ +back \\ - \alpha high \end{bmatrix}$$

C. Emphatic-Velar Restriction: There are no cases of an initial primary emphatic stop immediately followed by a velar consonant:

- (61) *ḏk
 *ḏg
 *ṭk
 *ṭg

One might be tempted to combine this in some way with the pharyngeal-velar filter #2. But this is not possible for several reasons. First, there are a few cases which suggest that restriction does not apply when the velar is initial:

- (62) kṭār 'hectar'
 geṭrān 'tar, pitch'
 geṭṭāyā 'tuft of hair'

Further, there is at least one case in a hollow root where an emphatic fricative /ṣ/ is immediately followed by a velar consonant: /ṣge9/ 'ill-fated'. Hence, this constraint must be kept distinct from filter #2:

Root Structure Filter #3:

$$* \begin{bmatrix} C \\ -cont. \\ +ant. \\ +CP \end{bmatrix} \begin{bmatrix} C \\ +back \\ -CP \end{bmatrix}$$

D. Alveolar Sonorant Restriction There are no cases where a root contains an initial alveolar sonorant immediately followed by a second alveolar sonorant unless the second is identical to the first. Thus, the following sequences do not occur:

- (63) *#ln *#nl
 *#nr *#rn
 *#lr *#rl

Double alveolar sonorants are rare but do occur:

- (64) llī 'who, which'
 llāreb 'a quarter to'
 nnīt 'precisely'
 rra 'giddy-up (to donkey)'

Of the sequences in (63) I believe that the combination r-n is the only one which does occur in non-initial position:⁴¹

- (65) ārneb 'hare'
 bernez 'to varnish'
 ternen 'to ring'

It appears then that we must rule out all non-geminate sequences of alveolar sonorants except for rn, and even this must be ruled out in root initial position:

Root Structure Filters #4:

- a.
- | | | | |
|---|--|---|---|
| * | $\begin{bmatrix} C \\ +alv \\ +son \\ -nas \\ \beta lat \end{bmatrix}$ | $\begin{bmatrix} C \\ +alv \\ +son \\ -nas \end{bmatrix}$ | (rules out <u>nl</u> , <u>nr</u> , <u>ln</u>
and <u>lr</u>) |
| | | $\begin{bmatrix} C \\ +alv \\ +son \\ -\beta lat \end{bmatrix}$ | |
- b.
- c.

E. Emphatic-Non-emphatic Restriction: Finally, there is a restriction against a sequence of an emphatic consonant and a non-emphatic one which has the same place of articulation features:⁴²

(66)	*ṭṭ	*ṭṭ
	*ḍḍ	*ḍḍ
	*ṣṣ	*ṣṣ
	*ṣḍ	*ṣḍ
	*ṣṣ	*ṣṣ
	*ḍṣ	*ḍṣ

This constraint is clearly related to the spread of emphasis throughout the syllable, as described in 2.5. It can be formalized as:

Root Structure Filter #5:

$$* \left[\begin{array}{c} C \\ \text{pl.of art.} \\ \text{rhizo-lingual} \end{array} \right] \left[\begin{array}{c} C \\ \text{place of art} \\ \text{rhizo-lingual} \end{array} \right]$$

These restrictions apply only to strings of segments which make up the underlying morpheme, ignoring the presence of all segments which are inserted between these root segments by later morphological processes.

2.6.2 Derivational Processes

A second reason for the necessity of appealing to a separate morphemic level of underlying representations forms is that a relatively large number of words exhibit a paradigmatic relationship with other words. As noted in chapter 1.2, such cases are far less productive than they are in Classical Arabic, and in general it is not possible to predict on the basis of phonological information alone whether a given root will have a related word of a certain morphological class. Nonetheless, it is clearly the case that a large portion of the vocabulary of Moroccan Arabic has a set of words, containing identical radicals, to which they are in some sense morphologically related. The following standard example illustrates:

(67)

a.	kṭeb	'he wrote'
b.	ṭetteb	'to make write'
c.	ṭāb	'book'
d.	ṭūbā	'books'
e.	ṭābā	'writing'
f.	ṭubī	'bookseller'
g.	mekṭābā	'library'
h.	mekṭeb	'office'

An adequate description of the grammar of this language will be one which includes an account of these relationships. One effective means of doing so is to claim that they are all derived from a single root. According to this view, all word stems such as those in (67) are derived from a single triliteral root: /ṭb/. One possible set of morpheme formation rules is the following:

Rules 16: Root Formation Rules

- a. $S \rightarrow [+feature_1, +feature_2 \dots +feature_n]$
- b. $M \rightarrow S *$
- c. $R \rightarrow \left[\begin{array}{c} S \\ \alpha_{long} \\ \alpha_{voc.} \end{array} \right] *$

Rule 16a defines a segment as a set of feature matrices, while 16b defines a morpheme as a string of segments. The formulation of the rule defining a root is difficult; here (Rule 16c) I define it as a string of segments which have the same feature specification for [long] and [vocalic]. This formulation accounts for the fact that only long vowels will appear in roots, while making the further claim that only vowels can be long. The assignment of metrical structure to geminate clusters, discussed in chapter 3 section 7, will obviate the need for the feature [long] for consonants.

It is necessary to have a distinction between morphemes which are roots and those which are affixes in order to express the fact that roots can never contain short vowels, while affixes frequently do. The theoretical complexity of the morpheme structure rules reflect the fact that Arabic (and Semitic languages in general) are exceptionally rich in this regard. It is only after derivational processes have applied to the root that the category and meaning is assigned. Thus, I follow Aronoff⁴³ in claiming that the lexicon is composed of words, not morphemes. It is the derived form which constitutes the input for inflectional processes. As noted in 2.6.1, this approach will also permit an account of root co-occurrence restrictions. The precise rules needed to derive the different morphological classes will be examined in chapter 4.

2.6.3 The Autosegmental Alternative

McCarthy^{44,45} has proposed an alternative explanation for the facts outlined (and to be developed more fully in chapter 4). McCarthy draws on autosegmental theory as a way of showing the relationship between words and morphemes, and of accounting for the constraints discussed in 2.6.1. His theory has the following features:

1. A morpheme is defined as "...an ordered string of $1 \times n$ feature matrices associated autosegmentally with a root node u ". Thus every morpheme can be isolated by rules since it will be dominated by u . Morpheme structure constraints will apply only to those segments in a word which belong to a given morpheme.

This formalism will also readily capture the morphological relationship of words derived from the same root: in each case they contain an identical morpheme.

2. Concatenative morphology in this system can be described simply as strings of morphemes. Non-concatenative processes, however, require a richer theoretical apparatus. Autosegmental theory postulates two phonological tiers: an autosegmental tier consisting of melodic elements, and a segmental tier consisting of melody-bearing elements. The former are associated with the latter one-to-one from left to right by a set of universal principles.

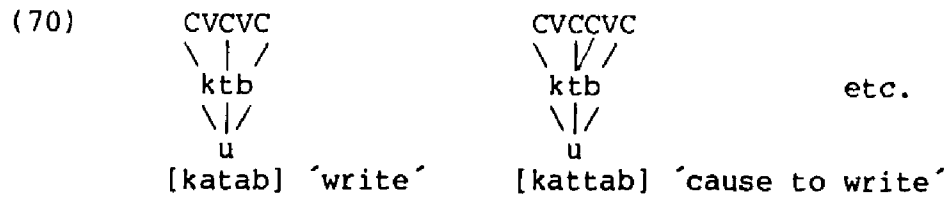
3. In Classical Arabic, the "canonical patterns" of the verbal morphology are abbreviated as follows:

- (68)
- a. $[(\{C\}_{CV}) \dot{C}V ([+seg])CVC]$
 - b. $V \rightarrow \emptyset [CVC_CVC]$

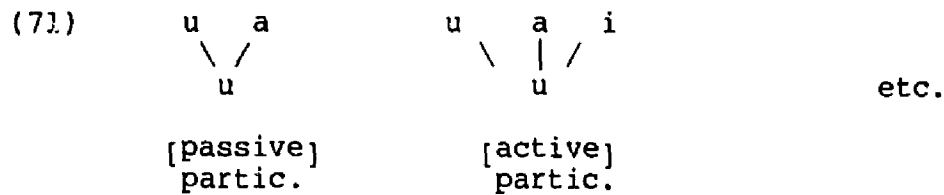
Presumably (a.) and (b.) can be considered rules generating the autosegmental tier, since McCarthy associates the output of these rules with the morphemes from Arabic. (Similar rules could be written for Moroccan Arabic.) The inventory of "prosodic patterns" for the perfect verb stem of Classical Arabic is as follows:

- | | | |
|------|----------|----------|
| (69) | CVCVC | CVCCVC |
| | CVVCVC | CVCVCCVC |
| | CVCVVCVC | CCVCVC |
| | CCVCCVC | CCVVCVC |

These "melodic elements" are then associated with the morphemes in accordance with autosegmental principles:



4. The complex vowel patterns associated with different tenses and moods in Classical Arabic can be accounted for by assuming that each pattern is a single morpheme dominated by u:



In spite of the descriptive advantages afforded by this autosegmental theory, it appears to me that there are a number of reasons, both practical and theoretical, for rejecting this approach for the type of data treated by McCarthy.

McCarthy's view that morphemes have a hierarchical structure dominated by the category u is an important step forward. Note that it is inherent in the view I have taken in section 6.2. Thus, my phrase structure Rules 16 clearly can be represented as tree structures. The only difference is that McCarthy does not distinguish between morphemes which are roots and those which are affixes. There are two objections to this: first, as noted earlier, roots contain no short vowels, neither in Classical nor Moroccan Arabic. This fact cannot be captured by any notation which treats them in the same way. Secondly, it is only the root which will undergo morphological processes resulting in the formation of sets of related words. Suffixes

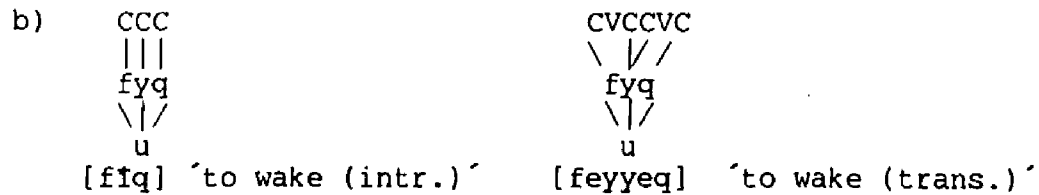
do not. Thus, the fact that the Classical Arabic suffix /kum/ ('you [acc. pl.])' can not be associated with any of the canonical forms in (69) must be considered accidental. This objection is not an overwhelming one, since presumably some version of Rules 16 could be incorporated into McCarthy's framework.

A more serious objection concerns the rules for the formation of the autosegmental tier. These "prosodic patterns" have clearly metrical characteristics, and in fact the autosegmental tier proposed by McCarthy amounts to little more than a statement of restrictions on the metrical structure. A formulation of the phonotactic constraints and syllabic co-occurrence restrictions for Moroccan Arabic (see chapter 3), for example, encompasses all canonical shapes which would also constitute this autosegmental tier. Since such prosodic facts can be accounted for by metrical structure assignment, independently needed for an adequate treatment of stress and the inflectional vowel insertion and deletion process, this duplication is in clear violation of the criterion of simplicity.

This fact is reflected when a glide is present in the root. Compare, for example, the following two sets of morphological relationships:

(72)

a)	<u>Measure I</u>	<u>Verb</u>	<u>Gloss</u>		<u>Measure II</u>	<u>Verb</u>	<u>Gloss</u>
	CCVC				CVCCVC		
	\\				\\ /		
	kdb				kdb		
	\\ /				\\ /		
	^u				^u		
	[kdeb]		'to lie'		[keddeb]		'to cause to lie'



In (72a) the relationship between Measure I and Measure II verbs can be characterized as that between CCVC and CVCCVC; but in (72b), there is no short vowel inserted in the Measure I verbs, but instead the glide /y/ will show up as [ɪ]. The reason for this alternation in root shape is purely phonological: glides show up as corresponding long vowels when there is no vowel to support the syllable (see chapter 3, section 6 for details). The lack of short vowels in such cases is not predicted by the autosegmental mechanisms.⁴⁶

When one of the radicals of a root is a vowel (e.g. Moroccan /bāt/ 'to spend the night), McCarthy's formalisms seem to run into further trouble. The association of such roots with the canonical shape CCVC (the Moroccan version of CVCVC) will clearly not work. McCarthy partially foresees this problem, and permits that the definition of certain autosegmental elements be expanded to [+segment], so that vowels be permitted to fill the autosegmental slots in some positions. But in Moroccan, at least, this analysis would have to be extended to include the first and third vowel as well, to account for such cases as /ārā/ 'to 'give' and /nsā/ 'to forget'. But a tier such as [+segment] [+segment] [+segment], necessary to account for the three possible vowel positions in Moroccan, can not in any way be considered the "canonical shape"

of roots. In fact, it amounts to nothing more than a simplified expansion of my Rule 16. While it is true that many classes of words have fixed canonical shapes in Arabic, it is also true that many do not. Further, in most cases this shape is predictable on the basis of the Word Formation Rule which forms the class together with general syllabic principles of the language. It is not the canonical shape which is the prime factor in determining morphological class.

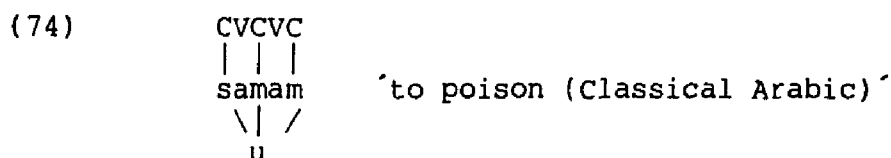
There are also a number of cases where the autosegmental view makes incorrect predictions regarding the derivation of forms. McCarthy⁴⁷ notes that autosegmental formulations have the effect of predicting that there will be no cases of roots containing initial double consonants. There is no doubt that historically Arabic has had a root structure restriction against such cases. In Moroccan, however, there are a number of roots containing initial double consonants. These include:

(73)	nnft	'precisely'
	mmŭr	'wall'
	llāreb	'a quarter to'
	llāh	'God'
	līfrā	'flute'

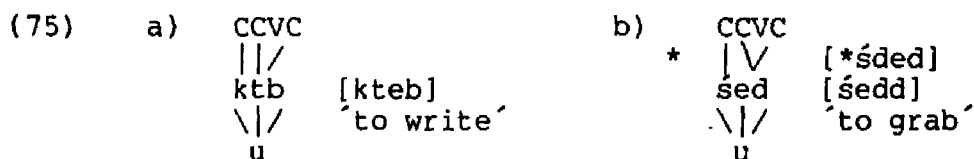
While these are relatively rare, it is nonetheless clear that the restriction against such sequences is no longer present in the language.

A more common type of problem involves tri-literal roots containing final double consonants. McCarthy argues that such roots are in fact biliteral, and that they have become associated with the canonical shape CVCVC from left to right,

resulting in the mapping of the rightmost consonant of the root to two C's on the autosegmental tier:⁴⁸



There is evidence that such roots are underlyingly biliteral in Moroccan: first, it will permit an explanation of the fact that such roots undergo distinct verb formation rules (e.g. /šedd/ 'to grab' vs. /kteb/ 'to write'); and second, there are a number of cases where roots of this type exhibit an alternation between a form containing a doubled final consonant and a form containing a single final consonant (e.g. /kuḥḥ/ 'to cough' vs. /keḥkeḥ/ 'to cough repeatedly'). But the autosegmental theory makes incorrect predictions regarding the mapping of such biliteral roots to the autosegmental tier:



Nor can appeal be made to the fact that geminate clusters are involved. Derivational processes of the type illustrated in (75) freely split geminate clusters. If it we claim that a general constraint against splitting geminate clusters is at work here, we are left with no explanation for all the other cases in the derivational morphology where they are split (e.g. broken plural formation [Appendix XXI (22),(33)]; verbal noun formation [Appendix XXI (23)]; Adjective Formation

[Appendix XXI (31)] etc.) It is only in the inflectional processes that geminate clusters are normally not split (see chapter 3 section 7).

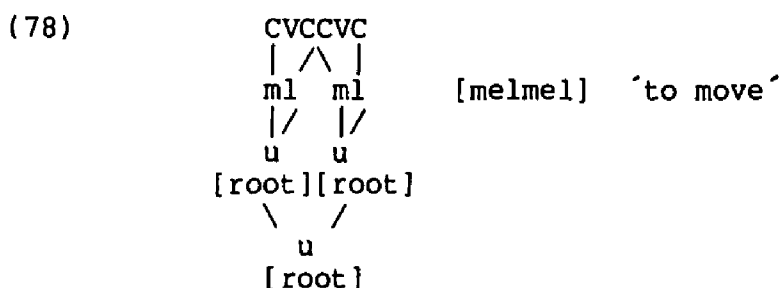
Another problem with the autosegmental view concerns reduplicated bases, fairly common in Moroccan Arabic:

(76)	melmel	'to move'	kifkif	'same'
	gemgem	'to grumble'	felfel	'pepper'
	serser	'to ring'	kerker	'to throw together'
	tenten	'to boom'	ferfer	'to flap wings repeatedly'

Clearly McCarthy cannot permit these to undergo normal association with the autosegmental tier, or incorrect results would be predicted:



Instead, he states that "...reduplication is accomplished...by mapping one root morpheme onto two morpheme positions in a separate tier. The units contained in these derivative morphemes are then mapped onto the prosodic template."⁴⁹ Thus:



It must then be stipulated that reduplicated bases be associated with two positions labeled $\begin{array}{c} \text{u} \\ | \\ [\text{root}] \end{array}$.

It should be noted that once this expansion of the definition of root is permitted, there is no formal reason for

limiting it to reduplicated bases. This expanded definition might be formalized as follows:

$$(79) \quad \begin{array}{c} u \\ \text{[root]} \end{array} \longrightarrow \begin{array}{c} u \\ \text{[root]} \end{array} \left(\begin{array}{c} u \\ \text{[root]} \end{array} \right)$$

It cannot be claimed that it is the root class which determines whether duplication will apply, since there are many roots which can form words both with duplication and without it:

(80)

<u>Reduplicated</u>		<u>Other</u>	
derder	'to powder'	derrā	'to sprinkle (powder)'
šemšem	'to sniff'	šemm	'to smell'
		šemmem	'to cause to smell'
zefzāfī	'strong wind'	zeff	'to blow (wind)'
keḥkeḥ	'to cough	kuḥḥ	'to cough'
	repeatedly'	kuḥḥā	'cough'
degdeg	'to smash'	degg	'to crush'

But why then should both the first and second elements of the rule output be identical? What is there to prohibit a root from dominating two different roots? The fact that this bi-root root must be limited only to reduplicated bases is not predicted by this formalism.

An important advantage to McCarthy's approach is that it explains the fact that many morphological processes in Semitic languages produce an output with a fixed canonical shape. But it is also true that many morphological rules do not produce a fixed canonical shape. We see this clearly in the broken plural formation and diminutive formation processes. McCarthy views these as the result of a number of "redundancy rules," which associate the canonical shape of the singular with that of the plural. In Moroccan, for example the possibilities for plurals containing /+ā/ after the second radical include the following:

(81)					
a.	CVCCV(V)C [s.]	-	CCVVCVC [pl.]	fendeq/fnādeq	'hotel'
				kunnās/knānes	'notebook'
b.	CVVCV(V)C [s.]	-	CCVVCVC [pl.]	gītūn/gyāten	'tent'
c.	CCVCC [s.]	-	CCVVCVC [pl.]	mdēll/mdāll	'umbrella'
d.	CVCCVV [s.]	-	CCVVCVC [pl.]	dērrī/drārī	'boy'
e.	VVCVVCV [s.]	-	VVCVVCVC [pl.]	āmānā/āmāyen	'something delivered in trust'
f.	CVCC [s.]	-	CCVVC [pl.]	zmel/zmal	'camel'
g.	CCVC [s.]	-	CCVVC [pl.]	bent/bnāt	'girl'
h.	CVCC [s.]	-	VVCVC [pl.]	weld/ulād	'boy'
i.	CVVC [s.]	-	CCVVC [pl.]	bīr/byār	'well'

Regardless of what abbreviatory conventions are used, there will have to be a substantial number of redundancy rules to account for this single broken plural formation infix. While it is the case that most broken VV plurals can be abbreviated in the canonical shape $CCVVC(\overset{VV}{VC})$, it is not desirable to formalize this fact at a separate level. The reasons for this shape, when it occurs, are phonological: first, short vowels can never appear in the syllable before the infixed /+ā+/, since they would be left in an open syllable (see chapter 3, section 4 for discussion); secondly, when a long vowel is infixed into a word immediately adjacent to a vowel, that vowel becomes a glide, since two vowels can never appear in a sequence (as discussed in chapter 2 section 4.3). And if we impose such a canonical shape on the plural formation rule, we are obliged to consider a number of perfectly regular cases as exceptional (e.g. [81e]).

A simpler solution would be to assume that this broken plural is formed by the infix /+ā+/ placed after the second radical. All the cases in (81) would be accounted for by a single rule. There would be no exceptions. Cases such as (81e) would undergo the following predictable phonological changes:

(82)	<u>Singular</u>	<u>Plural</u>	
	āmān +ā	ām +ā+ ān	(U.R.)
		āmāyn	(Rule 11)
		āmāyen	(Insert short vowel to support syllable)

This alternative will be explored in detail in chapter 4.

A final descriptive problem concerns the fact that in many cases phonological processes in Moroccan behave differently depending on whether they apply at the derivational or inflectional level. Thus, in the unmarked environment, the short vowel /e/ undergoes distinct allophonic rules at these two levels, the prefix /t+/ undergoes distinct rules of allophony, etc. (see chapter 4 section 3.3 for more examples). But McCarthy's analysis does not require the postulation of both stem and root levels, and hence is left with no explanation for these differences.

In addition to these descriptive problems created by McCarthy's autosegmental redundancy rules, there are, I believe, undesirable theoretical consequences. One important aspect of much of McCarthy's work is the attempt to limit the power of phonological processes to that of context sensitive rules: $X \rightarrow Y / ___ Z$. But how are his redundancy rules formally different from transformational rules? It is not clear to me that the generative power of McCarthy's redundancy rules (for Moroccan /bent/ vs. /bnāt/ 'girl/girls') is less than that of a similarly formulated transformational rule.⁵⁰

Redundancy Rule: [CVCC] sing. ~ [CCVVC] plur.

Transformational Rule: [CVCC] $\rightarrow$ [CCVVC] plur.

Further, it is unlikely to find a version of this rule in other

languages of the world, even in closely related dialects such as Moroccan. It tells us nothing about the relationship of this process to similar processes in other languages.

In chapter 4 I will propose a rather different theory, one in which all morphological operations in Moroccan are limited to the following types:

(83) S=Segment

- a. Suffixing: $S_1, S_2, \dots, S_n \rightarrow S_1, S_2, \dots, S_n X$
- b. Prefixing: $S_1, S_2, \dots, S_n \rightarrow X S_1, S_2, \dots, S_n$
- c. Infixing: $S, (S, (S)) \dots S_n \rightarrow S, (S, (S)), X \dots S_n$
- d. Doubling: $S_1, S_2, \dots, S_n \rightarrow S_1, S_2, S_2, \dots, S_n$
- e. Reduplicate: $S_1, S_2, \dots, S_n \rightarrow S_1, S_2, \dots, S_n, S_1, S_2, \dots, S_n$

These 5 informal rules account for all but a handful of the word-stem formation operations which occur in Moroccan. They have certain advantages over redundancy rules: the compositional nature of affixation processes is made explicit, and the formal similarity between morphological processes in Moroccan and those in other languages is captured. For these reasons the morphological operations of (83) are more likely candidates for the set of universal rules of morphology.⁵¹

2.6.4 The Underlying Stem

In the preceding sections I have attempted to justify an underlying root level which constitutes the input for word formation processes. The grammar would be simpler if the root were taken as the underlying form for all morphological processes, both inflectional and derivational.⁵² However, there is substantial evidence that this is not possible. The most important problem is that it is not possible to make

correct predictions concerning the inflectional paradigms unless it is assumed that it is the stem which constitutes their input. A large number of word classes, often with distinct categories, are formed from a single root. The position of the short vowel often depends on the category of the word being formed. There are many cases where the only difference between a verb and a noun, for example, is the position of the short vowel:

(84)	<u>Root</u>	<u>Derived Verb</u>	<u>Gloss</u>	<u>Derived Noun</u>	<u>Gloss</u>
	nql	ngel	'to copy'	neql	'a copy'
	wld	ŭled	'to give birth'	weld	'son'
	qbd	qbed	'to seize'	qebd	'seizing'
	şrf	şref	'to spend'	şerf	'change'

Further, when inflectional affixes are added to a verbal or nominal stem, the derivations can only be predicted if we assume that the short vowel is part of the stem:

(85)		<u>Stem+Affix</u>	<u>Inflected Word</u>	<u>Gloss</u>
a.	Noun	[weld +nā]	weldnā	'our son'
	Verb	[wled +nā]	ŭlednā	'we gave birth'
b.	Noun	[n+ neql]	nneql	'the copy'
	Verb	[n+ ngel]	nnqel	'I copy'

If the underlying form for such cases is taken to be the root (/wld/ or /nql/), however, the correct forms cannot be predicted for both verb and noun. Sayed⁵³ argues further that it is not even possible to make predictions concerning the verb conjugations using the root as the underlying form.⁵⁴

2.6.5 The Noun and Verb Stems

The formation of verb stems from roots is a fairly regular process. If the root consists of three consonants, a single vowel is inserted between the second and third:

(86)	sme9	'to hear'	xser	'to fail/lose'
	qder	'to be able'	šreb	'to drink'
	žber	'to find'	šteḥ	'to dance'
	hreb	'to flee'	l9eb	'to play'

If the second and third consonants constitute a geminate cluster, however, insertion occurs between the first and second consonants:

(87)	ḡunn	'to think'	kubb	'to pour'
	deqq	'to knock'	šedd	'to close'
	9edd	'to bite'	yešš	'to deceive'

Such roots are actually biliteral, but for convenience I will continue writing them in the traditional manner.

The position of the short vowel in nouns, on the other hand, varies a great deal, and depends for the most part on the phonological make-up of the root. If the final segment of the root is a sonorant, the vowel is inserted between the second and third radicals, regardless of what the second is:

(88) A.	byel	'mule'	ržel	'leg'
	žder	'root'	9qel	'mind'
	qsem	'division'	bšel	'onion'
	zbel	'garbage'	šher	'month'
B.	smen	'rancid butter'	qmer	'game of chance'
	nmer	'tiger'	tmer	'date'
	krem	'fig tree'	qmél	'louse'
	žmel	'camel'	ylem	'ewe'
C.	9sel	'honey'	fžel	'radish'

If the final consonant is an obstruent, the insertion will usually occur between the first and second consonants:

(89) A.	teqs	'climate'	rexš	'becoming cheap'
	nefs	'breath'	xubž	'bread'
	hebs	'prison'		
B.	wust	'middle'	left	'turnip'
	hefd	'protection'	zeft	'asphalt'
	fesx	'annulment'	bešt	'joke'

C.	sebt	'Saturday'	weqt	'time'
	qutb	'pole'	gebđ	'seizing'
	9etf	'benevolence'	tebx	'cooking'
D.	weld	'boy'	lerđ	'ground'
	šerf	'change'	šerq	'east'
	berđ	'cold'	qelb	'heart'
	šems	'sun'	telž	'snow'
E.	le9b	'game'	bu9đ	'distance'

Forms such as (89A) and (89B), where either the second or third radical is a fricative, and (89D), where the second radical is a sonorant, are quite common. Cases such as (89C), where both the second and third radical are obstruent stops, are quite rare; a different noun-formation process will normally be used for roots with these shapes. It is interesting to note that the voiced pharyngeal /9/ behaves the same as a sonorant in this regard, in that when it is in root final position insertion again occurs between the second and third consonants:

(90)	gre9	'bottle'	šme9	'wax'
	dre9	'forearm'	sbe9	'lion'

In the few examples I have of /ħ/ (e.g. /ferħ/ 'joy'), however, insertion occurs between the first and second consonants.

If the second and third consonants are geminate clusters (underlyingly biliteral roots), insertion occurs between the first and second radicals:

(91)	fumm	'mouth'	xell	'vinegar'
	yedd	'hand'	beqq	'bug'
	đeww	'light'	9emm	'paternal uncle'

In summary, then, we find that nouns of this class are formed by the insertion of a short vowel between the first and second consonants unless the final radical is either a sonorant, an /9/, or a member of geminate cluster.^{55, 56}

Ignoring biliteral roots, we see then that nouns are formed by the insertion of a short vowel between the first and second radicals unless the third is a sonorant or /9/. In chapter 3 we will see that there is a syllabic restriction prohibiting bi-consonantal Codas with a final sonorant consonant. I will assume then that insertion between the first and second radicals is the normal case for nouns. Verbs are formed by the insertion of a short vowel between the second and third radicals. Since it is these stems which form the bases for inflectional operations, these facts support the claim that distinct root and stem levels are required for an adequate description of the morphology.

It should be noted that these noun and verb stem formation processes are each one of a large number of such processes, which apply to an unpredictable class of roots. It is revealing, however, in that it makes clear the necessity for the distinction between verb stems and noun stems.

Concerning roots containing a long vowel or a glide, no short vowel is normally inserted at the phonetic level (although see chapter 3, section 6 for exceptions). It could be claimed either that the inserted short vowel is deleted in such cases, or alternately that insertion only takes place when consonants are present. I am aware of no evidence which would help choose between these alternatives.

2.7 Inflectional Processes

Inflectional processes apply to verbal, nominal and prepositional stems and result in the formation of the inflected word. I will examine each of these separately.

2.7.1 Verbal Inflections

There are three "tenses" in Moroccan Arabic: the perfect, the imperfect and the durative. The perfect tense refers to past action, the imperfect can refer to either present or future action, and the durative refers to continuous action. The durative forms are always identical to the imperfect forms except that they contain the prefix /kā/; hence I will treat these two together.

The perfect tense consists of a verb stem plus one of set of perfect suffixes, which indicate person and number:

(92)	<u>Perfect Suffixes with /kteb/</u>	<u>'to write'</u>
+t	ktebt	'I wrote'
+tī	ktebtī	'you (s.) wrote'
∅	kteb	'he wrote'
+āt	ketbāt	'she wrote'
+nā	ktebnā	'we wrote'
+tū	ktebtū	'you (pl.) wrote'
+w	ketbū	'they wrote'

If the verb stem is transitive, then direct object clitics can be added to any of the above forms. Thus, for /žber/ 'he found', the following object suffixes are possible:

(93)	+nī	žbernī	'he found me'
	+ek	žbrek	'he found you (s.)'
	+w - h	žbrū	'he found him'
	+hā	žberhā	'he found her'
	+nā	žbernā	'he found us'
	+kūm	žberkūm	'he found you (pl.)'
	+hūm	žberhūm	'he found them'

Complete conjugations of all verb types in the perfect tense are found in Appendices III through XI.

With a very small class of verbs, a set of indirect object clitics can be added as well. Thus, with the base /9tā+h/ 'he gave it (m.)'

(94)	+lī	9tāhlī	'he gave it to me'
	+lek	9tāhleḵ	'he gave it to you (s.)'
	+lū	9tāhlū	'he gave it to him'
	+lha	9tāhlha	'he gave it to her'
	+nā~nnā	9tānā	'he gave it to us'
	+lkūm	9tāhlkūm	'he gave it to you (pl.)'
	+lhūm	9tālhūm	'he gave it to them'

These cannot occur without an object clitic. The object suffixes can at times represent indirect objects (e.g. 9tānī lktāb 'he gave me the book.')

Finally, the negative /mā+....+šī/ can be added the output of any of the above processes. The prefix /mā+/ can occur with and without the suffix /+šī/. Thus:

(95)	māsuftūšī	'I didn't see him'
	9emmrī māsuftū	'I've never seen him'

I believe that the /+šī/ suffix only occurs when the negative /mā+/ is also present.⁵⁷

The imperfect tense is formed by the addition of one of a set of three prefixes to the verb stem:

(96) Imperfect Prefixes with /kteb/ 'to write'

n+	nekteb	'I write'
t+	tekteb	'you write, she writes'
y+	yekteb	'he writes'

The plural forms have in addition the suffix /+w ~ +ū/:

(97)	nketbū	'we write'	nešrīw	'we buy'
	tketbū	'you (pl.) write'	tešrīw	'you (pl.) buy'
	iketbū	'they write'	yešrīw	'they buy'

Transitive verbs in the imperfect take object clitics which are identical to those added to the perfect tense. The durative tense is formed the same way as the imperfect, except that it has the prefix /kā+/ attached immediately before the imperfect person prefixes. More complete samples are given in Appendices XIII through XVI.

2.7.2 Nominal Inflections

Nominal inflections are quite simple, and there are no remnants of the Classical Arabic case systems. We have already seen that nouns can take a definite article prefix /l+/, which assimilates completely to alveolar consonants. Indefinite nouns can take one of a set of possessive pronoun suffixes:

(98)

xā	'brother'	xāl	'maternal uncle'
xāy	'my brother'	xālī	'my uncle'
xāk	'your brother'	xālek	'your uncle'
xāh	'his brother'	xālu	'his uncle'
xāhā	'her brother'	xālhā	'her uncle'
xānā	'our brother'	xālnā	'our uncle'
xākūm	'your(pl.) brother'	xālkūm	'your(pl.) uncle'
xāhūm	'their brother'	xālhūm	'their uncle'

With the exception of the first person singular suffix /+y ~ +ī/, these suffixes are identical to the object suffixes attached to verbs. In general, these endings are reserved for certain classes of nouns (see Appendix XVII), and with most nouns the preposition /dyāl/ 'of' will be used to indicate possession.

When the possessive is added to feminine nouns ending in /+a/, this gender marker is usually replaced by /+t/:

(99)	<u>Noun</u>	<u>+my</u>	<u>Gloss</u>
	žellābā	žellābtī	'robe/my robe'
	mdīnā	mdīntī	'city/my city'
	smīyā	smīytī	'name/my name'
	sehba	shebtī	'female friend/my female friend'
	xālā	xāltī	'maternal aunt/my maternal aunt'

2.7.3 The Preposition

Pronominal clitics attached to prepositions are similar in form to those attached to verbs and nouns. The following examples illustrate:

(100)	<u>fhal</u>	<u>'like'</u>	<u>m9a</u>	<u>'with'</u>
	fhalī	'like me'	m9āyā	'with me'
	fhalēk	'like you(s.)'	m9āk	'with you(s.)'
	fhalū	'like him'	m9āh	'with him'
	fhalha	'like her'	m9āha	'with her'
	fhalnā	'like us'	m9ānā	'with us'
	fhalḵūm	'like you(pl.)'	m9ākūm	'with you(pl.)'
	fhalhūm	'like them'	m9āhūm	'with them'

The one difference between the prepositional object suffixes and those used with nouns and verbs is again in the first person; with prepositions the suffix /+ya/ is found when immediately following a vowel.

Certain prepositions, notably /f+/ 'in', /b+/ 'by', /n+/ or /l+/ 'to, for' and /d+/ 'of', behave as prefixes when preceding a noun phrase. With the preposition /f+/ 'in', the following possibilities exist:

(101)	<u>Definite</u>	<u>Indefinite</u>	<u>Gloss'</u>
a.	felbent	fbentī	'the daughter/my daughter'
b.	felbnāt	febnātī	'the daughters/my daughters'
c.	felfumm	ffummī	'the mouth/my mouth'
d.	felfmām	ffmāmā	'the mouths/our mouths'

When it is attached to a stem beginning with a single consonant, it forms part of the onset of the first syllable of the stem.

When it is attached to a stem beginning with two consonants, a short vowel is inserted, unless the initial consonant of the stem is identical to the prepositional consonant. When these prepositions occur before a nominal phrase, the preposition is prefixed to the first word of the phrase:

- (102) fśt dār 'in a house'
 fwahed dār 'in one house'
 fdik dār 'in that house'

In more formal speech, the prepositional forms include the long vowel /i/: thus /f+/ becomes /fi+/, /b+/ becomes /bi+/, etc. When these forms are used, no short vowel is inserted.

More complete examples of prepositional paradigms are contained in Appendix XIX.

2.7.4 Phonological Changes in Inflectional Morphology

In the examples given in 2.7.1 through 2.7.3, no mention was made of the phonological alternations which occurred. One of these, the glide to long vowel alternation, has already been discussed in 2.1, and will be treated further in chapter 3. There is an additional automatic inflectional process which deserves examination. There are many cases of the deletion and insertion of short vowels within the inflectional paradigms. One case involves the deletion of short vowels when they are immediately followed by a stem final consonant which in turn is followed by a suffix beginning with a vowel:

- (103)
- | | | | |
|--------|---------------|--------|-------------------|
| xeddem | 'he operated' | xeddmū | 'they operated' |
| feyyeq | 'he woke' | feyyqū | 'he woke him' |
| 9aqeb | 'he punished' | 9aqbū | 'he punished him' |

We could formalize this as:

$$V \longrightarrow \emptyset \quad / \quad ______ C + V$$

The imperfect prefixes exhibit an alternation between forms containing a short vowel and forms without:

(104)	neẓber	'I find'	n9āwen	'I help'
	nekteb	'I write'	nšūf	'I see'
	neśrī	'I buy'	nderbū	'we hit'

We could account for this by assuming that a short vowel is inserted whenever the base begins with two consonants:

$$\emptyset \longrightarrow V \quad / \quad C ______ C C$$

In many cases the short vowel in the stem appears to undergo metathesis:

(105)	kṭeb	'he wrote'	ketbāt	'she wrote'
	nekteb	'I write'	nketbū	'we write'
	ẓber	'he found'	žebrū	'he found him'
	rẓel	'leg'	rezlī	'my leg'

Thus, sequences of the form CCVC+ are changed to strings of the shape CVCC when a suffix beginning with a vowel is added. If we permit the vowel deletion rule to be ordered before the vowel insertion rules, this metathesis can be accounted for. However, these linear formulations are inadequate. The automatic processes are syllabic in nature: the short vowel is always deleted when an inflectional process leaves it in an open syllable, and inserted whenever they are needed to support a syllable. I will withhold further discussion until metrical structure has been treated in chapter 3.

It is rare that an inflectional process will leave a string of two adjacent vowels, since glides will not undergo the

vocalization rule unless they follow a consonant. Only two inflectional suffixes begin with an underlying vowel: /+ek/ 'you' and /+āt/ '3rd per. fem. - perfect.' In the case of /+ek/, it is clear that it is the suffix vowel which is always deleted:

- (106) śrā 'he bought' śrāk 'he bought you'
 žēbrū 'they found' žēbrūk 'they found you'

With the suffix /+āt/, the results are not so clear, since it is only found adjacent to another /ā/:

- (107) śrā 'he bought' śrāt 'she bought'
 byā 'he wanted' byāt 'she wanted'

I will assume here that it is the suffix vowel which is deleted, and that the deletion of both long and short vowel in suffixes can be abbreviated as follows:

- (108) Rule 18
 V → Ø / V + ____

Finally, there remains the alternation between /w/ and /h/ for the third person masculine singular pronominal suffix (for verbs, nouns and prepositions). The choice of an underlying form for this suffix is problematic:

- (109) A. śrāh 'he bought it (masc.)'
 žēbrūh 'they found it (masc.)'
 B. śrītū 'I bought it (masc.)'
 žēbrū 'he found it (masc.)'
 C. śrāweh 'they bought it (masc.)'
 neśrīweh 'we buy it (mac.)'

Thus, while /h/ follows a vowel and /w/ a consonant, we find that /eh/ follows when there is a final glide in the stem. I believe that these facts can be described best by assuming an underlying /+wh/, which undergoes the following morpheme particular rules:

(110) Rules 19:

a) $w \longrightarrow \emptyset$ / [+vocalic] + _____

b) $h \longrightarrow \emptyset$ / +w _____

This rather unusual rule captures the fact /h/ and /w/ occur in complementary distribution. It is clearly a non-general process, as there is no phonological motivation for either change. The presence of the short vowel /e/ in cases such as (109C) is the result of an automatic vowel insertion process which, as noted, will be treated in chapter 3.

NOTES

1. Thus, for example, in /l+ǰāǰīrā/ 'the island,' /l+ǰāneb/ 'the south,' and /l+ǰārīma/ 'the crime', the definite article does not assimilate, but in /ǰ+ǰeld/ 'the skin,' /ǰ+ǰīb/ 'the pocket,' and /ǰ+ǰben/ 'the cheese' it does. In other cases (e.g. /ǰāme9/ 'mosque' and /ǰār/ 'neighbor') the initial /ǰ/ undergoes assimilation to the definite article for some speakers, but does not with others.
2. Harrell 1962, op. cit.
3. All speakers with whom I dealt concerning this question recognized the fact that other patterns were also possible; even inside Chaouen there is much variation as to what class of segments undergoes this assimilatory process.
4. Greenberg, Joseph 1950: The Patterning of Root Morphemes in Semitic. Word 6, pp. 162 - 181.
5. Sayed, op. cit. pp 80 - 81.
6. Ibid. pp. 81 - 84.
7. Measure II verbs are often labeled causatives. The label does not always fit, however, and in fact both transitive and intransitive verbs can occur as M-II verbs, both with either relatively coherent semantics or without (see chapter 4, section 1.2 [16] for examples).
8. I have been told a joke in which the one of the characters uses the /9ām/ 'year', but is understood to say /9emm/ 'uncle'.
9. While Harrell's (1966) transcriptions do not differentiate between long and short vowels, they do accord with my own in all but one case. Thus, his /a/, /i/, and /u/ correspond in all cases to my long vowels /ā/, /ī/ and /ū/, and his /e/ and /o/ correspond to my /e/ and /u/. Thus, I am in a sense following Harrell in postulating only long vowels in word final position. The only case where our transcriptions differ is in that of his /a/, which as noted occurs exclusively in pharyngeal environments, and therefore should be considered a predictable variant of /e/ (see section 3 of this chapter).
10. This means that the distinction between long and short vowels in Classical Arabic has become neutralized in final position. Thus, the final vowel in classical /hīya/ 'she' or /huwa/ 'he' has merged with that of /hadā/ 'this' or /mā/ 'not'. This does not tell the whole comparative story, however, as it often occurs as well that short vowels in open syllables in Classical Arabic appear as long vowels in Moroccan, while in other cases they either merge to form /e/, or disappear.

11. Harris, Z. S. op. cit.
12. Harrell (1966), op.cit, p. xiii.
13. Ibid., p. xvii - xviii.
14. Sayed, op. cit., pp. 31 - 34.
15. Cantineau (1950), op. cit.
16. Ibid.
17. The variation exhibited concerning whether [a] or [u] is found when the segment preceding the short vowel is an emphatic, pharyngeal or uvular consonant (19D.c) can be described in terms of either rule 6d or rule 6b taking precedence, since they will both be applicable.
18. Harrell 1966, op. cit.
19. There are some exceptions, notably in words of foreign origin (e.g. /bɛnkā/ [bɛŋkal]). Sayed (op. cit) notes that this fact has lead some researchers to claim that there exist in Moroccan a number of other emphatic consonants, including /b/.
20. Harrell (1966) op. cit, states that it is somewhere between the 'a' in 'mad' and that in 'father' (p. xviii). My own impression is that it much nearer the 'a' in 'mad'.
21. Broselow, op. cit., pp. 32-47.
22. Thus, Harrell (1966, op. cit., p. xviii) states, "It is especially important to note the shortness of ă. If it is lengthened, it was be confused with a."
23. I have no explanation for the fact that long low vowels become back in the environment of /h/ while short vowels apparently do not. The segment /h/ is rare, and I have relatively few examples of short vowels adjacent to it in the unmarked environment (e.g. /hendīya/ [hIndīya] 'cactus', /hezz/ [hIzz] 'to pick up'), but all follow the same rules of allophony.
24. In some dialects, such as those spoken in the villages around Mokrisset, the "emphaticized" /ɸ/ becomes a mid vowel /ɛ/. No similar change affects the /ʊ/.
25. Harrell (1966 op. cit., pp. xvi - xvii). His description of the pronunciation of these sounds is quite different from what I perceive, but it is likely that this is due to dialectal variation.

26. There are a few cases of verbal noun formation which do not fit these patterns:

<u>Verb</u>	<u>Verbal Noun</u>	<u>Gloss</u>
ṣūm	ṣyām	'to fast/fasting'
ṣūn	ṣyān	'to protect/protection (reputation)'
9ūm	9yām	'to get up/getting up'

Since these are rare, and contrast with commonly found cases such as those in (42C), I will assume that they are exceptional.

27. Brame op. cit., pp. 28 - 87.

28. Two interesting cases where ablaut interacts with the glide/vowel sonorancy rule 13 are:

seqyā	sqāwī	'irrigation ditch/ditches'
kudyā	kāwī	'hill/hills'

Thus, after ablaut applies changing the final /ā/ to /ī/, rule 13 applies changing the /y/ to /w/.

29. Sayed, op. cit. p.. 129 - 134.

30. Ibid., p. 130.

31. Brame, op. cit., pp. 22 - 23.

32. Broselow, op. cit, pp. xiv - xvi.

33. Ibid., pp. 32 - 46.

34. In the northern dialects the /ḍ/ in /bīḍā/ becomes a /ṭ/. While this change is not common, it does occur with a few other lexical items (e.g. /mṭerrbā/ from /mḍerrbā/ 'matress.')

35. Harrell 1966, op. cit. p. 68.

36. Sayed, op. cit. pp. 143 - 147.

37. Lehn, Walter 1963: "Emphasis in Cairo Arabic." Language, pp. 29 - 39.

38. Greenberg, op. cit. Most of the gaps which occur in Moroccan are identical to those noted by Greenberg for Semitic. However, rather than claim, as Greenberg does, that homorganic (non-identical) radicals do not co-occur, I have chosen instead to state the constraint in terms of voicing. The advantage to this approach is that it simplifies the formalization of the constraint and eliminates classes of exceptions (sonorants and sibilants); a disadvantage is that it does not encompass the constraint on the co-occurrence of /m/ with other bi-labials. There is apparently no counterpart in Classical Arabic to the constraints affecting emphatic alveolar consonants in Moroccan.

Greenberg also notes that many of these constraints apply, although less rigorously, to radicals in the first and third position as well.

39. Harrell 1966, op. cit.
40. Interestingly, while the sequence /šš/ (e.g. /ššer/ 'tree,' /ššī9/ 'courage') is found, I have found no cases of the sequence /žž/. See Greenberg (op. cit.) for a discussion of restrictions on sibilants in general.
41. The fact that the sequence /r,n/ is acceptable in non-initial position suggests the possibility of a syllabic motivation for this restriction. Many of these restrictions no longer apply at the word level in Moroccan (e.g. /l+Nora/ 'to Nora').
42. I have found one exception to these generalizations: /dšer/ 'to be impertinent'.
43. Aronoff op. cit.
44. McCarthy 1979, op. cit.
45. McCarthy 1981, op. cit.
46. It might be claimed that the underlying form for the stem is in fact CCVC in such cases, and that the /e/ is deleted by a later rule. In chapter 3, however, I argue that vocalization occurs only in the environment of vowelless syllables; hence, the assumption that forms such as /fiq/ are underlyingly /fyeq/ does not allow us to provide this motivation for vocalization.
47. McCarthy 1979 (op. cit) p. 146 - 153.
48. Ibid., p. 152, 153.
49. Ibid., p. 189 - 192.
50. It should be noted that rules of the type proposed by McCarthy do fit into the Generalized Phrase Structure Grammar (GPSG) model proposed by Gazdar and Pullum⁵⁸. Thus, his redundancy rules could be viewed in terms of Gazdar and Pullum's metarules. Gazdar and Pullum argue that the generative power of their model does not exceed that of simple Phrase Structure Grammar. I have nothing to say regarding this question, and it is clear that McCarthy does not have the GPSG model in mind, as he only attempts to limit the power of his rules to that of context sensitive phrase structure rules.
51. Thus, within the approach advocated here, the broken plural insertion process will be the same for most Arabic dialects, including Moroccan and Classical Arabic: "Insert /+ā/ after the second radical." Within the framework of McCarthy, on the other hand, the plural formation in Classical Arabic might appear to be more similar to an irregular plural formation from the California language Yawelmani (from Newman⁵⁹) than to that in Moroccan:

	Sing.	~	Plural		Example
Yawelmani:	CVCVC	~	CVCV:C	lɔmit/lɔmɛt	'mountain'
Classical Arabic:	CVCVC	~	CVCV:C	jabal/jabāl	'mountain'
Moroccan Arabic:	CCVC	~	CCV:C	ʒbil/ʒbāl	'mountain'

52. In Abdel-Massih (1973), op. cit., the claim is made that the position of all short vowels is predictable on the basis of phonological environment, and he does not include short vowels in any of his transcriptions. Sayed (op. cit., 97 - 105) demonstrates that Abdel Massih's rules do not work.

53. Sayed, op. cit., 97 - 105.

54. But Sayed does not entertain the possibility of cyclic application of rules. If this is permitted, it would be possible to make predictions which would only be applicable to verbs. Thus, roots of the shape CCC will undergo vowel insertion in the environment of C__C#, which has the same effect of my stem formation rules. The trouble with this approach is that it only works for verbs.

55. In Berber, the position of the schwa might well be subject to similar constraints. Thus, while In Saib (1976a, op. cit, p. 3) it is argued that schwas are underlying in Berber, it is also noted that Abdel-Massih⁶⁰ and Penchoen⁶¹ have claimed that shwa is inserted between two consonants if the second is sonorant, and that otherwise it is inserted prior to the two consonants. Saib objects on the grounds that i) the rules proposed do not account for dialectal variation and ii) Abdel-Massih's rules at times generate incorrect or questionable forms.

56. There are very few exceptions: /dheb/ 'gold', /nɛq/ 'shuttle in weaving', tɛfl 'child.'

57. Some speakers have claimed that it is possible to form negative commands with /+sɛ/ and without /mā+/, but that it is very rude. Other informants reject this possibility.

58. Gazdar, G. and G. K. Pullum 1982: Generalized Phrase Structure Grammar: A Theoretical Synopsis. Indiana University Linguistics Club, Bloomington.

59. Newman, Stanley 1944: Yokuts Language of California. Viking Fund Publications in Anthropology, New York, pp. 205 - 207.

60. Abdel Massih, Ernest T. 1968: Tamazight Verb Structure: a generative approach. Bloomington: Indiana University Publications.

61. Penchoen, Thomas G., op. cit.

Chapter 3

METRICAL PHONOLOGY

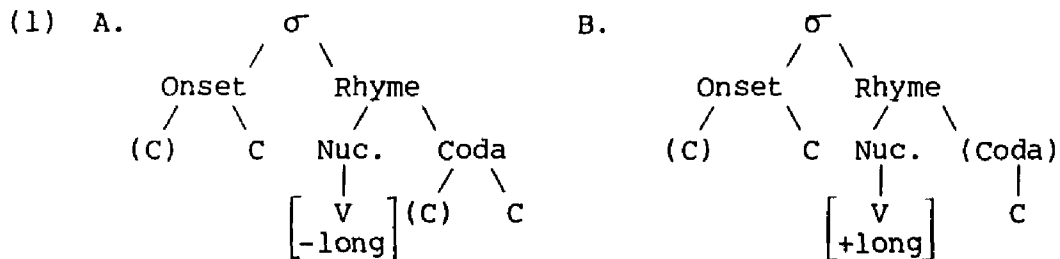
This chapter will be concerned with the metrical characteristics of Moroccan phonology. In 3.1, phonotactic constraints affecting the structure of syllables will be examined, and a set of rules for the assignment of hierarchical syllabic structure will be postulated. In 3.2, I will look at certain restrictions on the occurrence of syllables within the word, as well as the syllabic distinctions necessary to account for these. In 3.3, I will examine stress, and a set of rules for the assignment of hierarchical Foot structure will be postulated to account for both stress patterns and syllabic co-occurrence restrictions. In 3.4, the vowel insertion and deletion rules will be examined, and it will be argued that metrical structure can be viewed as a cyclic output condition on such processes. In 3.5, two alternative frameworks will be briefly examined: Brame's "cyclic" view of stress and vowel deletion, and Selkirk's version of "degenerate syllable" theory. In 3.6, the glide to long vowel process will be re-examined, as well as its interrelationship with the vowel insertion and deletion rules. And in 3.7, some final additions to the syllable template will be proposed in order to account for the seemingly exceptional behavior of geminate clusters.

3.1 Phonotactic Constraints

At the phonetic level, a number of phonotactic constraints apply to restrict the structure of syllables:

- i. words can begin with one or two consonants, but no more (except in the case of geminate clusters [see section 7]);
- ii. words can end in zero, one or two consonants;
- iii. words cannot begin with a short vowel (but again see section 7 for exceptions);
- iv. words cannot end in a long vowel followed by two consonants;
- v. there are no vowel sequences (where $\bar{V}$ is not considered a sequence of two short vowels);

These facts can be accounted for by assuming, following Selkirk¹ and others, that strings of segments are organized hierarchically into syllables. The structure of the syllables in Moroccan Arabic can be represented by the following syllable template:²



(1A) will permit syllables of the types exemplified in (2A), and (1B) will permit those exemplified in (2B):

- | | | | | | | | | | | | | | | | | | |
|--|----------------|--------|------|-----------|------|------------|-------|-----------|--|-----|----------|------|----------------|-----|-----------|----|-------|
| <p>(2) A.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>men</td><td>‘from’</td></tr> <tr><td>weld</td><td>‘boy/son’</td></tr> <tr><td>žber</td><td>‘he found’</td></tr> <tr><td>žbert</td><td>‘I found’</td></tr> </table> | men | ‘from’ | weld | ‘boy/son’ | žber | ‘he found’ | žbert | ‘I found’ | <p>B.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>šāf</td><td>‘he saw’</td></tr> <tr><td>blād</td><td>‘country/town’</td></tr> <tr><td>mšā</td><td>‘he went’</td></tr> <tr><td>mā</td><td>‘not’</td></tr> </table> | šāf | ‘he saw’ | blād | ‘country/town’ | mšā | ‘he went’ | mā | ‘not’ |
| men | ‘from’ | | | | | | | | | | | | | | | | |
| weld | ‘boy/son’ | | | | | | | | | | | | | | | | |
| žber | ‘he found’ | | | | | | | | | | | | | | | | |
| žbert | ‘I found’ | | | | | | | | | | | | | | | | |
| šāf | ‘he saw’ | | | | | | | | | | | | | | | | |
| blād | ‘country/town’ | | | | | | | | | | | | | | | | |
| mšā | ‘he went’ | | | | | | | | | | | | | | | | |
| mā | ‘not’ | | | | | | | | | | | | | | | | |

It should be noted, however, that at the underlying level, words do in fact begin with long vowels (e.g. /āw/ ‘or’). However, at the phonetic level all initial vowels must be preceded by a consonant. Words containing underlying initial

long vowels are normally pronounced with a glottal stop in careful speech. However, words beginning with underlying long vowels do at times contrast with words beginning with underlying glottal stops. Thus, in rapid speech, forms containing underlying glottal stop (e.g. /ʔemrād/ 'diseases') retain the glottal stop; but forms containing underlying word initial vowels (e.g. /ānā 'I' or /allāh/ 'God') do not, but instead will normally form syllables with the final consonant of the preceding word. We can account for these facts with the following glottal stop insertion rule:³

$$(3) \quad \begin{array}{ccc} \text{Onset} & & \text{Onset} \\ | & \longrightarrow & | \\ \emptyset & & ? \end{array}$$

With this addition, the template (1) handles all syllable types permitted in Moroccan with the exception of the cases to be treated in 3.7. There remains a problem with the formulation of this template, however, since there appears to be no way for (1A) and (1B) to be collapsed. I will return to this question in the following section.

In addition to constraints i through v, there exist a number of additional restrictions which affect the co-occurrence of consonants within the Onset or Coda:

vi. words can not end in a sequence of two consonants, the last of which is a sonorant consonant;

vii. words can not begin with a sequence of two consonants, the first of which is a glide.

Discussion of constraints which effect the occurrence of glides will be withheld until 3.7. Constraint vi can be

accounted for by the following modification of the Definition of the Coda:



This revised definition of the Coda explains the inconsistent way in which the noun formation process, discussed in chapter 2, section 6.5, inserts short vowels. Recall that this rule inserts a short vowel between the first and second radical of tri-literal roots to form nouns (e.g. /left/ 'turnip'), unless the third radical is a sonorant (e.g. /ʒbel/ 'mountain'), in which case insertion occurs between the second and third radical. Glottal Stop Insertion (3) will explain the reason for this alternation. In section 4, I will argue that the apparent metathesis in such cases can be viewed as part of a more general vowel insertion and deletion process.⁴

3.2 Syllabic Co-occurrence Restrictions

There are also a number of constraints which apply to restrict the co-occurrence of well-formed syllables within the word:

viii. medially, no more than three consonants can occur in a sequence;

ix. medially, no more than two consonants can immediately follow a long vowel.

These facts can be accounted for by assuming that the extra-heavy syllables, CVCC and CVC, only occur in word final position. In order to formalize this fact, as well as the facts

concerning stress, it is necessary to assume that syllables can be referred to on the basis of their internal structure. Cairns and Feinstein⁵ propose an interesting model in which syllables are distinguished on the basis of principles of universal markedness of their Rhyme, Nucleus and Coda. Thus, for example, a heavy syllable (CV or CVC) is one which contains a Rhyme which is marked once, either for having a long vowel in the Nucleus, or for having a Coda. The problem with this approach is that in Moroccan Arabic, the unmarked syllable in their system, CV, does not occur. I will propose instead that syllables be considered a bundle of features.⁶ The features which will adequately characterize necessary syllable distinctions in Moroccan must be able to perform the following functions:

1) permit a simple representation of the syllable template. We have already noted that the characterization given in (1) is cumbersome, in that it does permit the two sub-templates to be collapsed.

2) differentiate the four types of syllables which occur:

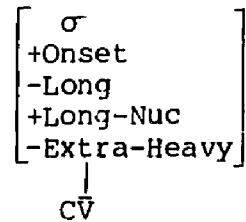
(5)

- i. Open Syllable: CV
- ii. Closed Short Syllable: CVC
- iii. Closed Long Syllable: CV̄C
- iv. Extra-Closed Syllable: CVCC

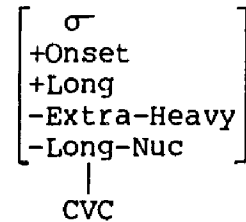
3) define natural classes of syllables in the simplest possible manner.

One set of possible features is the following:⁷

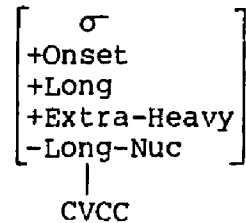
(6) a. Open Syllable



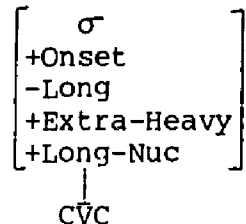
b. Closed Short Syllables



c. Closed Long Syllables



d. Closed Long Syllables



The feature [+Onset] is redundant in Moroccan, since all syllables will contain it. The features [+Long], [+Extra-Heavy], and [+Long-Nuc] differentiate syllable types, and also permit a simple characterization of the syllable template:

$$(7) \quad \sigma \rightarrow \left[\begin{array}{c} +\text{Onset} \\ \alpha\text{Long} \\ -\alpha\text{Long-Nuc} \\ +\text{Extra-Heavy} \end{array} \right]$$

Accordingly, the fact that the extra short syllable CV and the extra-long syllable (C)CVCC are not permitted is accounted for in (7) by the requirement that syllables have the opposite feature specification for [+Long] as they have for [+Long-Nuc].

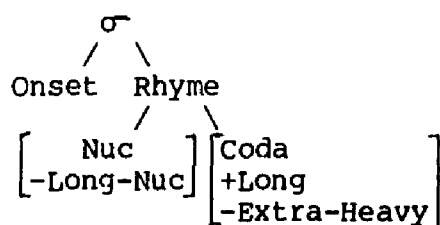
(7) will also permit a simple explanation of syllabic co-occurrence restrictions (viii) and (ix) noted above: we can claim that Extra-Heavy syllables are built into the prosodic category Word only in final position.

Note that I am assuming here that syllabic features will "percolate" between the category Syllable and its sub-categories (Nucleus, Rhyme, Coda, etc.). A set of Phrase Structure rules can ensure the correct results:

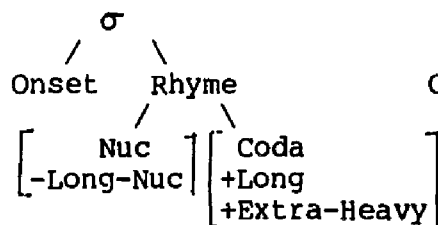
- (8) a. $\left[\begin{array}{c} \sigma \\ +\text{Onset} \\ (\alpha\text{Feat}) \end{array} \right] \longrightarrow \text{Onset} \left[\begin{array}{c} \text{Rhyme} \\ (\alpha\text{Feat}) \end{array} \right]$
- b. $\left[\begin{array}{c} \text{Rhyme} \\ \alpha\text{Long-Nuc} \\ -\alpha\text{Long} \\ +\text{Extra-Heavy} \end{array} \right] \longrightarrow \left[\begin{array}{c} \text{Nucleus} \\ \alpha\text{Long-Nuc} \end{array} \right] \left[\begin{array}{c} \text{Coda} \\ \alpha\text{Long} \\ +\text{Extra-Heavy} \end{array} \right]$

The possible expansions of these rules are:

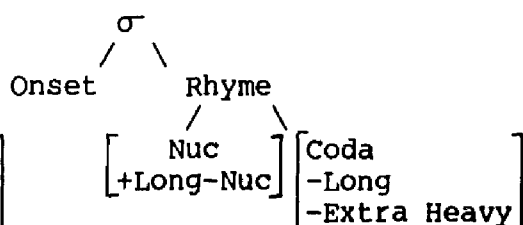
(9) a. CVC



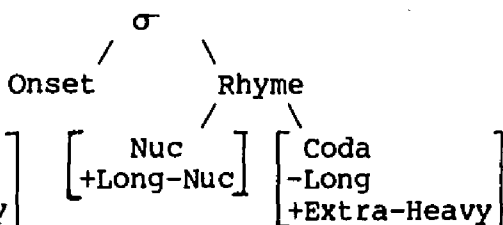
c. CVCC



c. CV



d. CV̄C



Note also that it is necessary to claim that a syllable at times contains an empty Coda (that specified [-Long,-Extra-Heavy], but that a syllable without a Coda is not possible.

3.3 Stress

Stress patterns in Moroccan Arabic suggest that restrictions exist on the co-occurrence of syllables other than that mentioned in the previous section. The core facts of Moroccan stress can be seen in the following examples:

- (10) a. $\overset{\cdot}{\text{CVC}}\text{-}\overset{\cdot}{\text{C}\bar{\text{V}}}$ Gloss
 $\dot{\text{zennā}}$ 'paradise'
 melhā 'salt'
 zebḏā 'butter'
- b. $\overset{\cdot}{\text{CVC}}\text{-}\overset{\cdot}{\text{CVC}}$ Gloss
 serḏem 'window'
 beddel 'to change'
 senduq 'box'
- c. $\overset{\cdot}{\text{C}\bar{\text{V}}}\text{-}\overset{\cdot}{\text{C}\bar{\text{V}}}$ Gloss
 mūrā 'paradise'
 bālī 'old'
 hrīrā 'type of soup'
- d. $\overset{\cdot}{\text{C}\bar{\text{V}}}\text{-}\overset{\cdot}{\text{CVC}}$ Gloss
 bāsel 'onion'
 9āwen 'to help'
 ḏāme9 'mosque'
- e. $\overset{\cdot}{\text{CVC}}\text{-}\overset{\cdot}{\text{CCVC}}$ Gloss
 $\dot{\text{zbertnā}}$ 'we found'
 mḏuwḏā 'married(f.)'
 kenḏber 'I find'
- f. $\overset{\cdot}{\text{C}\bar{\text{V}}}\text{-}\overset{\cdot}{\text{CCVC}}$ Gloss
 $\dot{\text{sāfnī}}$ 'he saw me'
 wāxxā 'O.K.'
 rāḏlek 'your husband'
- g. $\text{CVC}\text{-}\overset{\cdot}{\text{CVCC}}$ Gloss
 xeddemt 'I operated'
 suwert 'I photographed'
 feyyeqt 'I woke (tr.)'
- h. $\text{CVC}\text{-}\overset{\cdot}{\text{CVC}}$ Gloss
 mezyān 'good'
 meskin 'poor'
 tes9ūd 'nine'

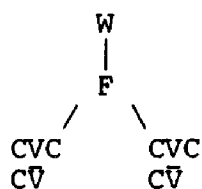
In these cases, stress is on the final syllable if it is extra-heavy (as in [10g] and [10h]); otherwise, stress is penultimate. One way of accounting for these stress patterns, as well as for the syllabic co-occurrence restrictions discussed in 3.2, is to organize syllables into Feet (following Selkirk⁸). For Moroccan, I propose the following Foot Assignment Rules:

(11) Metrical Structure Assignment

- A. $F \longrightarrow \left[\begin{array}{c} \sigma \\ \text{-Extra-Heavy} \end{array} \right] \left[\begin{array}{c} \sigma \\ \text{-Extra-Heavy} \end{array} \right]$
- B. $F' \longrightarrow \left[\begin{array}{c} \sigma \\ \text{+Extra-Heavy} \end{array} \right]$
- C. $W \longrightarrow \left\{ \begin{array}{c} (F)^* \quad F' \\ F^* \end{array} \right\}$

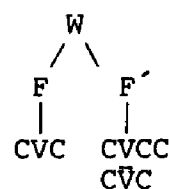
Metrical Structure Assignment Rules apply from right to left maximally in Moroccan Arabic, where "maximally" is interpreted as the maximal expansion of Phrase Structure Rules unless this results in an ungrammatical (i.e. metrically ill-formed) derivation. Rules (11) assign the following metrical structures to the forms in (10):

(12) a.



(e.g. 10a.b,c,d,e,f)

b.



(e.g. 10g,h)

Stress can be accounted for by means of the following stress assignment rules:

- (13) a) the rightmost F receives stress;
 b) the leftmost σ in bi-syllabic Feet₉ receives stress;
 c) σ dominated by F' receives stress.

Words containing three or more syllables for the most part confirm the proposed rules:

(14)

a. Three Syllables

feyyeqtek	'I woke you'
suwertek	'I photographed you'
žbernāhā	'we found her'

b. Four Syllables

tqādālekšī	'you didn't run out'
werrītūnī	'you(pl.) showed me'
šifetnāhā	'we sent her'

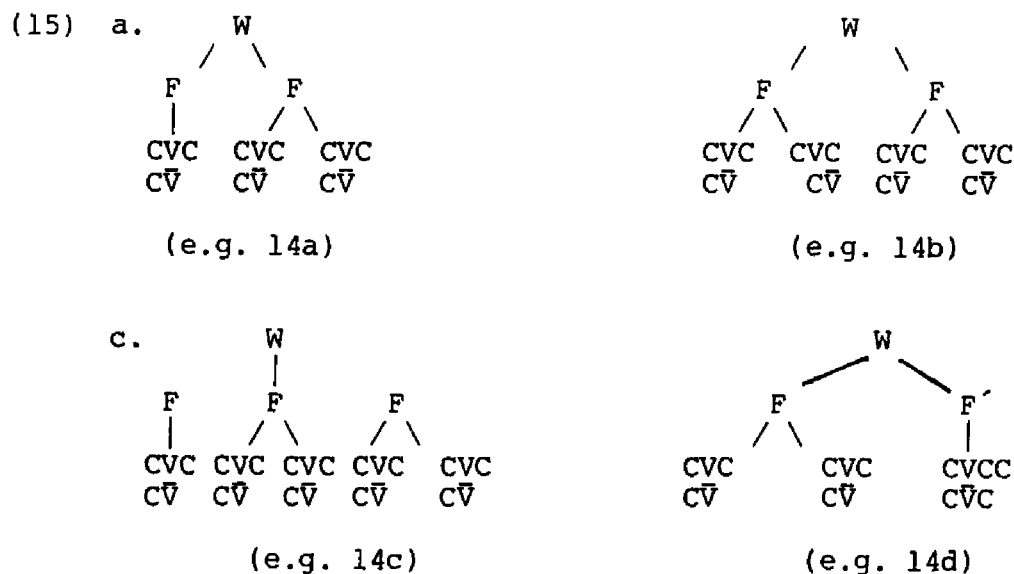
c. Five Syllables

kānteržemhālek	'I am translating it for you'
šifetnāhūmlū	'we sent them to him'
werrītūhālek	'you(pl.) showed it to you'

d. Extra-heavy Final Syllables

mākenkmīś	‘I don’t smoke’ ¹⁰
māzbertūś	‘I didn’t find him’
māśafūś	‘they didn’t see’

Rules (11) will assign the following metrical structures to the cases in (14):¹¹



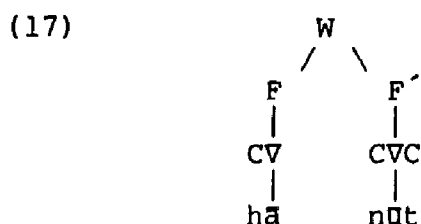
There remain, however, a number stress patterns which are not yet accounted for. The following examples illustrate:

(16)	A.	C [̄] V-C [̄] V	B.	C [̄] V-CVCC
		hānūt 'store'		9āqebt 'I punished'
		nīśān 'exactly'		9āwent 'I helped'
		kīrān 'buses'		žāwebt 'I answered'
	C.	C [̄] V-CVC-C [̄] V		
		C [̄] V-CVC-C [̄] V		
		9āqebtū 'I punished him'		
		žāwebnā 'he answered us'		
		kānežber 'I find'		

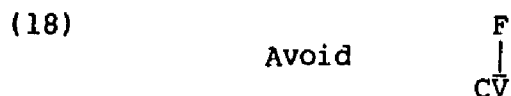
In (16A) and (16B), we find that words containing a final extra-heavy syllable have penultimate stress when the penultimate is an open syllable C[̄]V. In (16C), trisyllabic words containing C[̄]V

in the antepenultimate syllable and CVC in the penultimate receive antipenultimate stress rather than the expected penultimate stress.

It is possible that a partial explanation for such exceptions can be found by comparing these forms with certain examples in (14). Thus, cases such as /hānūt/ (16A) and /mašāfuš/ (14d) both end in the syllabic sequence CV-CVC, yet only the former pulls stress from the extra-heavy final syllable. Note that the metrical structure assignment rules (11) would leave the initial open syllable of /hānūt/ as the sole constituent of the Foot which dominates it:¹²

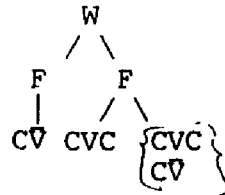


Note also that penultimate CVC immediately preceding an extra-heavy syllable (e.g. [10g] and [10h]) does not have this effect. We might propose then that Moroccan avoids whenever possible the following structure:



Support for this view is found in cases such as (16C). In comparing these examples, (e.g. /ʔaqebtū/ 'I punished him') with certain cases in (14b) (e.g. /tqadalekst/ 'you didn't run out of'), we find that whereas both end in the syllabic sequence CV-CVC-CV, it is only the trisyllabic word which pulls stress from the penultimate. The affected metrical structure is:

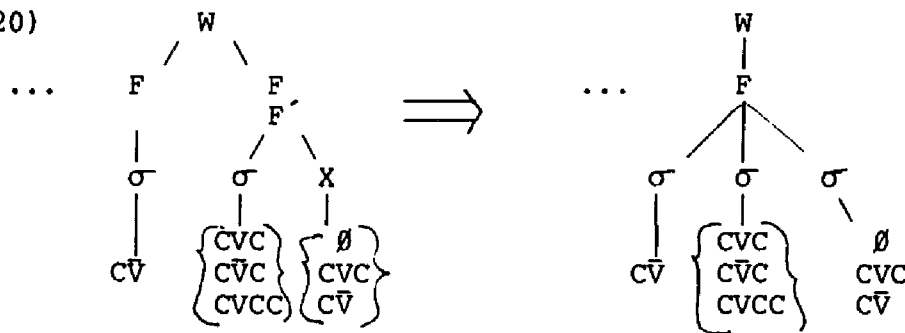
(19)



Again, this structure would leave the open syllable as the sole constituent of the Foot which dominates it.

We can account for these cases by means of the following metrical restructuring rule:

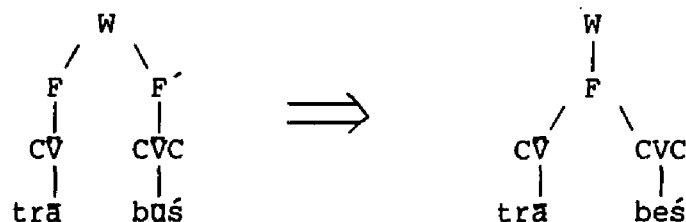
(20)



Stress Assignment (13) will apply after this metrical restructuring

This process can be related in a certain way to the vowel shortening process discussed in chapter 2, section 4.5. Recall that long vowels are shortened when a long vowel infixed in the immediately preceding syllable: e.g. /terbūs/ 'hat' vs. /trābeś/ 'hats.' Note that the structural description for this change is contained within Metrical Restructuring (20):

(21)



The same is true with the shortening process affecting the third

person feminine-perfect suffix, /+āt/ (e.g. /zebrāt/ 'she found' vs. /šāfet/ 'she saw').¹³ The difference, however, is that in these cases not only is the expected stress pattern not found, but the vowel of the second syllable is shortened. Rule (21) then should be taken as a less general rule, applicable only to the specific morphemes noted in chapter 2, section 4.5.

Finally, there is a class of exceptions to the postulated stress rules which need be noted:

(22)	,	
	CVC-CVC	
	meśmās	'apricot'
	duwār	'village'
	qenfūd	'hedgehog'
	9unwān	'address'
	letsīn	'orange'
	terrāf	'shoe repairman'

Note that the syllabic structure of these is identical to those forms listed in (10h), but in (22) stress is usually penultimate. It should be noted, however, that whereas with those cases in (10h) the stress pattern is invariable, final stress for cases such as (22) is acceptable in deliberate speech, although extremely rare. Penultimate stress also occurs in inflected words ending in /+kūm/ 'you (acc. pl.)' and /+hūm/ 'them.'¹⁴ I suspect that a partial explanation for this variation is to be found in the fact that long vowels are usually pronounced short when in a closed syllable:

(23)	<u>Shortening Rule</u>	
	$\left[\begin{array}{c} \sigma \\ +\text{Extra-Heavy} \\ +\text{Long-Nuc.} \end{array} \right] \rightarrow \left[\begin{array}{c} \sigma \\ -\text{Extra-Heavy} \end{array} \right]$	
	$\begin{array}{c} \\ \text{CVC} \end{array} \qquad \qquad \qquad \begin{array}{c} \\ \text{CVC} \end{array}$	

I have no explanation for the fact that the shortening rule results in metrical readjustment in some cases but not in others.

3.4. Short Vowel Insertion and Deletion

As noted in chapter 2, section 7.4, there are a large number of cases where morphemes alternate between a form containing a short vowel and one in which the short vowel does not occur. Examples are repeated below for convenience:

(24) **3rd person plural - perfect: +u**

xeddem	'he operated'	xeddmu	'they operated'
feyyeq	'he woke (tr.)'	feyyqu	'they woke'
9aqeb	'he punished'	9aqbu	'they punished'

(25) **Imperfect Prefix: /n+/**

neźber	'I find'	nźebru	'we find'
nedxul	'I enter'	ndexlu	'we enter'
neqrī	'I study'	nqerrī	'I teach'

(26) **2nd Person Sing. Object Suffix: /+ek/**

źber	'he found'	źbrek	'he found you(s.)'
šten	'he bothered'	šetnek	'he bothered you(s.)'
qtel	'he killed'	qetlek	'he killed you'

In (24) the short vowel is deleted when immediately followed by a consonant which is immediately followed by a suffix beginning with a vowel: /C__C + V/. In (25) a short vowel is apparently inserted when a prefix consisting of a single consonant immediately precedes a stem beginning with two consonants: /C__CC/. In (26), these deletion and insertion rules combine to create what appears to be metathesis whenever a suffix beginning with a vowel is added to a stem of the shaped CVCC. These insertion and deletion processes are completely automatic and

without exception throughout the inflectional morphology. They can be stated in linear notation as follows:

- (27) a. $\begin{bmatrix} V \\ \text{-long} \end{bmatrix} \longrightarrow \emptyset / C_C + V$
 b. $\emptyset \longrightarrow e / C_CC$

Rules of this type, however, are undesirable from a theoretical point of view. In the first place, they require extrinsic rule ordering: deletion (27a) must precede insertion (27b) for the desired results to be obtained for cases of metathesis (26). In addition, there exists a problem noted by Kisseberth¹⁵ in his treatment of Yawelmani: it is frequently the case that languages contain processes which have a clear functional similarity, but which are nonetheless formally distinct. This is certainly the case with (27a) and (27b): they have the obvious role of regularizing the syllabic structure, but they have formally dissimilar structural descriptions.

Kisseberth,¹⁶ as a way of formalizing this functional similarity of such rules, suggested that the notion of "derivational constraint" be incorporated into the theory of phonology, serving as an output constraint on phonological rules. McCarthy¹⁷ improved on this notion by proposing that, instead of establishing a separate formal entity for this purpose, the syllabic structure itself constitute this constraint. This might be formalized as follows:¹⁸

- (28) Structureless Constituent Constraint (SSC):
 Any form which contains a segment which cannot be assigned to a syllabic structure is ungrammatical.

This is a weak claim, one that merely reflects the fact that

languages have a certain specifiable syllabic structure. Using it, vowel insertion and deletion rules can be limited to the most theoretically desirable rule type: unordered context free rules:¹⁹

$$(29) \quad A. \quad \left| \begin{array}{c} V \\ \text{-long} \end{array} \right| \quad \text{---} \quad \emptyset \quad B. \quad \emptyset \quad \text{----} \quad e$$

Rules (29) permit the free insertion and deletion of short vowels anywhere in the inflectional derivation. Clearly, rules of this type will overgenerate. In fact, the derivations will form a set of possibilities which might be viewed as a Candidate Set along the lines of Cairns and Feinstein.²⁰ The following exemplifies:

(30)	<u>Gloss</u>	<u>U.R.</u>	<u>(Rules 29)</u>	<u>Candidate Set</u>
	'we found'	žber + nā	----	a) žbrnā *
				žbrenā *
				b) žebernā *
				žeberenā *
				c) ežbrnā *
				ežbernā *
				d) žeebrnā *
				žeeebnā *
				žeeeebrnā *
				etc.
				e) žebrnā *
				žbernā G

Candidates (30a) will be ruled out by the Structureless Constituent Constraint (29) because they contain unpermissible consonant clusters, which cannot be assigned to any Onset in (1). Cases such as (30b) will be ruled out because they contain a short vowel in an open syllable, and hence cannot be assigned syllabic structure in accordance with (1). Cases such as (30c) will be eliminated because they contain a short vowel, not permitted in (1).²¹ The possibilities illustrated in (30d)

are all ruled out because there is no way for a sequence of short vowels to be assigned to a syllabic structure. This leaves only the candidates (30e).

Here, however, it is not possible for general syllabic principles to choose between the candidates, since both are syllabically well-formed. Instead, it is the principle of the cycle which chooses among a number of well-formed candidates:

- (31) Principle of Cyclic Structure Preservation:
Choose the derivation which preserves the structure of the preceding cycle unless this results in an ungrammatical form.

In (30e), /žbernā/ preserves the structure of the preceding cycle (in this case the U.R.), while /žebrnā/ does not:

U.R.	[[žber] + nā]	[[žber] + nā]
	[žbernā] G	[žebrnā] *

The interaction between the "cycle" and the SSC (28) can be seen in the following examples:

(32)	<u>Gloss</u>	<u>U.R.</u>	<u>(Rules 29)</u>	<u>Candidate Set</u>
A.	'I found'	[[žber] + t]	→	a) žebret * b) žbert G
B.	'I find'	[n + [žber]]	→	a) nžebr * b) nežber G
C.	'she found'	[[žber] + āt]	→	a) žberāt * b) žebrāt G
D.	'daughters'	[bent] + Infix [+ā+] after 2nd radical	→	a) benāt * b) bnāt G

Thus, in (32A), and (32B), the cycle ensures the choice of (b) in each case, since it is this form which preserves the structure of the preceding cycle. But in (32C) and (32D), the cycle is overruled by the SSC, since if the derivation which

preserves the structure of the preceding cycle is chosen, the form cannot be assigned syllabic structure. Hence, (b) is the only possible derivation.

There remains, however, one problem that suggests that these general principles require an additional constraint. This can be seen in contrasts such as /žber/ 'he found' vs. /žebrek/ 'he found you'. Note that if the general deletion rule is permitted to apply to the vowel of the inflectional affix /ek/ 'you(s.)', the correct derivation would be /žberk*/, since it best preserves the structure of the preceding cycle. Hence, it is necessary to add the following constraint:²²

- (33) Outermost Morpheme Constraint
Automatic vowel deletion does not affect vowels of the outermost morpheme.

With this addition, the framework discussed here is able to account for all short vowel alternations found in the language with a minimum of theoretical apparatus.

A final remark is in order concerning the underlying form of the verb stems. On the basis of discussion in chapter 2, section 6.5, I have assumed here that verbs formed from triliteral sound roots have the stem shape CCVC. It should be pointed out that no other stem shape will permit this straightforward account of inflectional changes. Reasons for not using the root, CCC, as the underlying form for inflectional processes have already been noted in chapter 2, section 6. If either CVCVC or CVCC are taken as the underlying stem shape, the results would be as follows:

(34) A. CVCVC (Rules 26)

1. [n+ [keteb]] → a) nketb *
b) nekteb 'I write'
2. [[keteb] +t] → a) ketbet *
b) ktebt 'I wrote'

B. CVCC

1. [n+ [ketb]] → nketb *
2. [[ketb] +t] → ketbet *

With the most likely possibility, CVCVC, we find that in many cases there is no criterion for choosing between two syllabically well-formed derivations (e.g. 34A.1 and 34A.2). And with the stem shape CVCC (34B), we find that the form which would preserve the structure of the stem is ungrammatical.

3.5 Theoretical Excursus: Alternative Approaches

The metrical framework developed in the previous sections contains the following features, which will apply in the following order:

1. Free vowel insertion and deletion applies, constrained cyclically by the Moroccan metrical structure and by certain presumably universal principles;
2. Metrical structure is assigned maximally to strings of segments in accordance with the syllable template (1) and Foot structure assignment rules (11);
3. Metrical Readjustment rules (3) and (20) apply;
4. Lastly, the stress is assigned by means of the stress assignment algorithm (13).

This framework differs substantially from previous analyses

of different Arabic dialects (e.g. Brame²³, Kenstowicz,²⁴ McCarthy,²⁵ Selkirk²⁶ and Broselow²⁷). Since many of the features of the framework I propose here are of a universal nature, particularly the ordering of vowel insertion/deletion, metrical structure assignment and stress assignment, it is crucial to the analysis that at least these features be applicable in the description of other languages. In this section, then, I will examine two alternative proposals: the Brame-Kenstowicz "cyclic" analysis, and Selkirk's version of the "degenerate syllable" theory. I will attempt to demonstrate briefly that the facts they discuss might well be handled in a more elegant fashion within the framework I propose here.

3.5.1 The Brame-Kenstowicz "Cyclic Analysis"

One important aspect of the framework I propose is that stress assignment occur after vowel insertion and deletion. This is incompatible with a theory of vowel deletion, such as that of Brame and Kenstowicz, which views the feature [+stress] as part of the structural description for the vowel deletion process. Their theory, however, relies on a specific view of the principle of the cycle. It is motivated by certain descriptive problems which arise in Palestinian Arabic, but not in Moroccan. The following examples illustrate:²⁸

- | | | | | |
|--------|---------|--------------------|--------|------------------|
| (35)A. | simi9 | 'he heard' | sim9it | 'she heard' |
| | fihim | 'he understood' | fihmit | 'she understood' |
| B. | simi9na | 'he heard us' | smi9na | 'we heard' |
| | fihimna | 'he understood us' | fhimna | 'we understood' |

In (35A), the fact that stems of the shape CVCVC appear as CVCC

when suffixes beginning with a vowel are added are accounted for by the following deletion rule:

$$(36) \quad \begin{bmatrix} \text{v} \\ +\text{high} \\ -\text{stress} \end{bmatrix} \longrightarrow \emptyset / \quad _ \text{CV}$$

Certain cases in 35B, however, appear to create problems for this analysis. Thus, we see that /fihimna/ 'he understood us' does not undergo deletion rule (36), while /fhimna/ 'we understood' does. Brame accounts for these facts by claiming that they contain distinct underlying representations:

- (37) A. [fihim + na] 'we understood'
 B. [[fihim] +na] 'he understood us'

Forms such as (37A) undergo deletion; but those such as (37B) undergo cyclic stress assignment; hence, the initial syllable of [fihim] will receive stress on the first cycle, and therefore it will not be in the environment of vowel deletion (36). A later rule will destress the first syllable.

Kenstowicz²⁹ supports Brame's conclusions, claiming that it also permits an account of a number of other facts:

1. Vowel shortening effects the stem-final syllable in forms such as /stašarna/ 'we consulted' but not in /stašaarna/ 'he consulted us'.

2. In the Levantine dialects, nouns containing enclitic possessive suffixes do not undergo deletion: thus in [[birak]na] 'our pools', the vowel in the first syllable is not deleted because it has received stress in the first cycle.

3. The vowel reduction rule (a--- i) common in Levantine dialects, which explains alternations such as /kallam/ 'he

spoke' vs. /killamna/ 'we spoke' does not apply when cyclic stress has applied: thus /9illamna/ 'we taught' contrasts with /9allamna/ 'he taught us.'

There are, however, a number of important problems with this approach. In the first place, it depends crucially on the feature [+stress]; this segmental view has since been shown to miss the relational nature of stress prominence (c.f. Selkirk).³⁰ It also relies upon extrinsically ordered rules, since it is necessary that stress assignment precede vowel deletion:

(38)		A	B
		[fihim +na]	[[fihim] +na]
I	Stress	fihimna	[fihim] +na
	V-Deletion	fhimna	---
II	Stress	---	fihimna
	V-Deletion		---

Clearly stress assignment must precede short vowel deletion for the correct forms to be derived. It is also necessary to claim both that secondary stress remains on the first syllable of (38B) in the second cycle and that an additional rule will apply deleting this secondary stress at some later point in the derivation.

Finally, this theory predicts that forms containing subject clitics will behave differently from those containing object clitics. But as Brame himself notes,³¹ this is not always borne out:

(39)	a.	[[ni + [ktib]] + u]	'I write him'
		[[niktib] u]	
		[niktbu]	(deletion)
		[nikitbu]	(epenthesis)
		nikitbu	'I write it(m.)'

- b. [ni + [[ktib + u]] 'we write'
 [ni + [ktibu]] (stress)
 [niktibu] * (expected form)
 nikitbu (actual form)

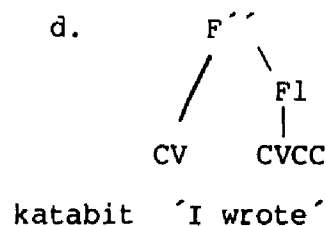
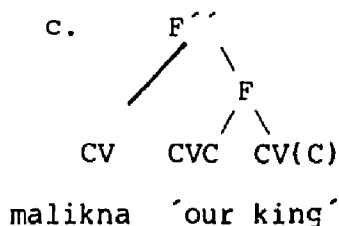
The fact that these forms are identical despite their presumably distinct underlying structure must be viewed as counterevidence to this view of the cycle.

As noted above, this analysis depends crucially on the feature [[+stress]] as the environment which determines whether a given vowel will be deleted or not. I believe that a simpler explanation is possible, one in which stress assignment is viewed as the result of metrical structure assignment. Deletion then cannot depend on stress, since stress assignment follows metrical structure assignment, which is itself a constraint upon deletion. The core facts of Palestinian (only the examples from Brame) could be accounted for by the following rules:

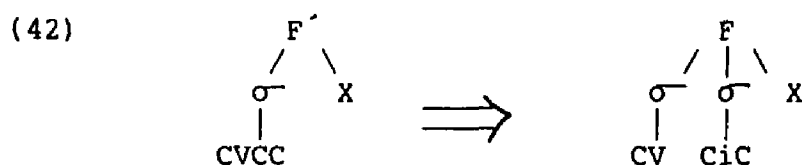
$$\begin{array}{lll}
 (40) & F & \rightarrow \left\{ \begin{array}{l} CV-CV \\ CVC \\ C\bar{V} \end{array} \right\} \left\{ \begin{array}{l} CVC \\ C\bar{V} \\ CV \end{array} \right\} \\
 & F' & \rightarrow CVCC \left\{ \begin{array}{l} CVC \\ CV(C) \end{array} \right\} \\
 & F'' & \rightarrow (CV) \left\{ \begin{array}{l} F \\ F' \end{array} \right\}
 \end{array}$$

The derivations of these rules will include the following underlying metrical structures:

- (41) a. $\begin{array}{c} F \\ / \quad \backslash \\ CV \quad CV \quad CVC \end{array}$
 katabit 'she wrote'
- b. $\begin{array}{c} F' \\ / \quad \backslash \\ CVCC \quad CVC \\ \quad \quad CV \end{array}$
 fihimna 'he understood us'



The presence of the short /i/ in (b) and (d) can be accounted for, following Brame (although stated in metrical notation), by the following insertion rule:

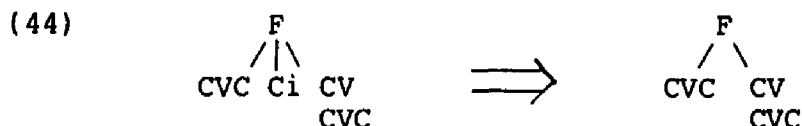


Stress Assignment is identical to that in Moroccan: the rightmost foot and leftmost syllable in a foot receive stress. The fact that /katabit/ 'she wrote' (41a) receives initial stress while /katabit/ (41c) 'I wrote' receives penultimate stress is explained by the fact that they have distinct metrical structures.³²

Vowel deletion processes are actually of two distinct types. First, there is an exceptionless, automatic deletion process which accounts for the following types of cases:

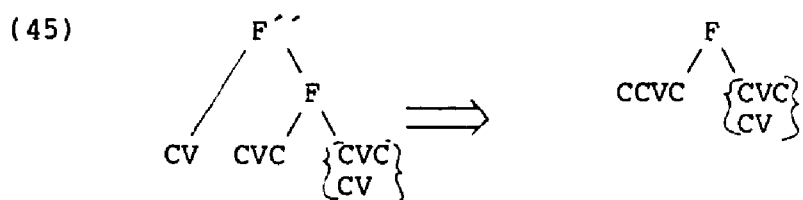
- (43) fihim 'he understood' fihmit 'she understood'
 ḡarabik 'he hit you' fihmik 'he understood you'

These can be accounted for by the following rule:



The second deletion process is required to account for the problematic /fhimna/ 'we understood' vs. /fihimna/ 'he

understood us' contrast. The structural change which occurs is the following:



The question which needs to be answered, of course, is why it applies in some cases but not in others. I believe that the notion level of morphology can be appealed to as a way of explaining this type of fact. Kiparsky³³ argues that a wide variety of phonological problems can be explained by claiming that there are different levels at which morphological rules apply. In chapter 4, I will provide independent motivation for at least two such levels: derivation and inflection. These levels are required, both in Moroccan and Palestinian, to permit the correct derivation of inflectional forms (see chapter 2 section 6), and to account for the distinct mode of application of certain phonological processes (see chapter 4 section 3). If we assume that rule (45) is a non-general rule associated with these derivational processes, then the fact that it does not apply at the inflectional level is not at all surprising.

This approach will require the complication of the grammar of Palestinian in that we will need to postulate distinct underlying representations for the different perfect stems. This disadvantage is outweighed by the fact that we no longer require the use of the boundary '+.' Following Kiparsky³⁴ and Mohanan and Mohanan³⁵, all boundaries will be erased after each

similar CiCVC ~ CCVC alternation between nouns; this is to be expected, since there are no noun stem formation processes which set up application of (45). This approach also permits a simple explanation of the fact that vowel reduction occurs in /9illamna/ 'we taught' but not in /9allamna/ 'he taught us,' since vowel shortening, like vowel deletion, is a process associated with stem formation, and does not apply at the inflectional level. The same approach can be taken in the description of the vowel reduction process (/stašarna/ 'we consulted' vs. /stašaarna/ 'he consulted us.')

There are other advantages to this proposal. It does away with the need to appeal to extrinsic rule ordering, and at the same time treats stress prominence without reference to the feature [stress]. It might be objected that this proposal precludes a unified treatment of the /i/ deletion process; but this is actually desirable, as the deletion process described by (44) is completely automatic and without exception, while that described by (45) applies only in association with the formation of specific classes of word stems. The separation of these two processes is therefore a descriptive improvement. Note further that the fact that /tikitbu/ 'you(s.) write it' and /tikitbu/ 'you(pl.) write' have the same structure is predicted, since

- i) both are formed from the same stem, the imperfect stem, and
- ii) all inflectional morphemes, be they subject affixes or object affixes, will undergo the same phonological rules.

For these reasons I believe we are justified in rejecting the Brame-Kenstowicz alternative, as the analysis proposed here

accounts for the same data in a simpler and theoretically more constrained fashion. Note also that the ordering remains the same as for Moroccan: 1) metrical structure is assigned; 2) metrical restructuring rules apply; 3) stress assignment occurs. Palestinian differs from Moroccan in that it does not appear to have a general vowel deletion/insertion rule.³⁶

3.5.2 The "Degenerate Syllable" Alternative

A rather different alternative is one in which "degenerate" or vowel-less syllables are permitted at the underlying level; these are converted by rule to the permitted surface syllable types. Selkirk³⁷ argues for a certain version of this theory for Egyptian Arabic; her theory has the following features:

1. The underlying syllabic types in Egyptian are CV, CVC, CVV, CVVC, but not CVCC, although all are permitted at the surface level;

2. Syllables CV and CVC have corresponding degenerate syllables, in which there is no vowel at the underlying level. The vowel /i/ is inserted whenever it is needed to fill a dummy nucleus position in prosodic structure. This will account for the following types of cases:

(50)	A		B		C
a.	ma + katab + t + ś	→	(ma)(ka)(tab)(t_ś)	→	makatabtiś
b.	katab + t + l + u	→	(ka)(tab)(t_)(lū)	→	katabtilu
c.	katab + t + l + ha	→	(ka)(tab)(t_l)(ha)	→	katabtilha

Selkirk argues that the syllabification found in (50B) is formed on the basis a principle of "minimize the occurrence of dummy elements," and that the syllabification /C_/ is less marked, and therefore to be favored over /_C/.

3. A separate rule is required for cases where which end in CVCC at the phonetic level. Thus /katabt/ is assigned the underlying structure (ka)(tab)(t_). The fact that no vowel is inserted is taken care of by a separate rule of syllable incorporation.

Selkirk claims that this approach has certain advantages over the view that CVCC is a separate syllabic type. First, it permits a unified treatment of all /i/ insertion, even initial insertion (e.g. /iktab/ 'write (imperative)'). (The fact that the structure in this case is /(_k)(tab)/ rather than (k_)(tab) is handled by a separate "Onset Switch" rule.)³⁸ It permits a relatively simple description of phrasal syllabic patterns, such as the resyllabification of final "degenerate" syllables with Onset-less syllables which immediately follow. Finally, her framework implies a highly constrained view of the relationship between the underlying and surface syllables, one in which all underlying segments are syllabified.

In many ways "degenerate syllable" theory is similar to the framework put forth in this paper. In both theories, insertion is accounted for by general rules constrained by certain theoretical principles. The principal difference between these theories is in the way in which these rules will be constrained. I believe that the use of metrical structure as a cyclic constraint has a number of advantages over the proposal made by Selkirk. In first place, the principle of syllabification, "minimize dummy elements," will not always have the result that Selkirk intends it to. Thus, in the case of

(50b) /katab + t + l + u/, it is not clear why (ka)(tab)(t_)(lu) is chosen over (ka)(ta)(b_t)(lu), since both have the same number of dummy elements. In the theory proposed in the previous sections, on the other hand, the insertion of the vowel /i/ will be cyclically constrained by the metrical structure of Egyptian -- a structure which will include CVCC -- so that there is only one grammatical derivation:

- (51) U.R. [[ma+[katab]+t]+ś] 'I didn't write
 Cycle I [ma+[katabt]+ś]
 Cycle II [ma+[katabtiś]
 Cycle III [makatabtiś]
- (52) U.R. [[[[[katab]+t]+l]+u] 'I wrote to him'
 Cycle I [[[[katabt]+l]+u]
 Cycle II [[katabtil]+u]
 Cycle III [katabtilu]

In (51), the vowel /i/ must be inserted in the second cycle, since otherwise the form would be /katabtś/, which can not be assigned to a syllabic structure. And similarly, in (52), the vowel must be inserted in the second cycle to avoid the structure /katabtl*/. The fact that /makatabiś*/ in (51) and /katabitl*/ in (52) do not occur is predicted by the principle of the cycle, since /makatabtiś/ and /katabtil/ preserve the structure of the preceding cycle (/katabt/ in both cases), while /makatabiś/ and /katabitl*/ do not.³⁹

A second advantage to the framework proposed here is that it will account for both insertion and deletion processes, as we have seen in the case of Moroccan. Selkirk's theory simply cannot be applied to the Moroccan data in many cases. Thus, for example, the Moroccan contrast /źber/ 'he found' vs. /žebrāt/

3.6 The Vocalization Process

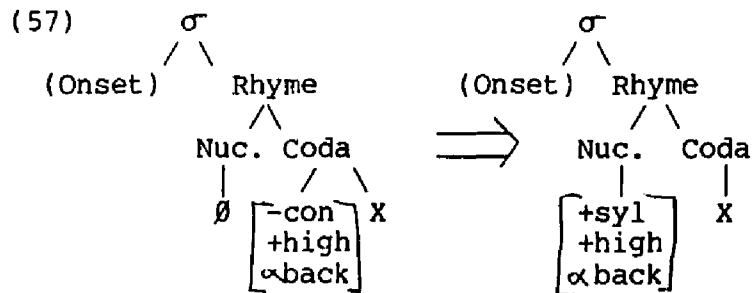
(53)

- (54) nžebrŭ 'we find' nešrī-w 'we buy (imp. pl.)'
 žebr-ŭ 'they found' šrā-w 'they found'
 xt-ī 'my sister' xā-y 'my brother'

- (56) Vocalization

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This rule can be abbreviated further, but I will not do so here, as it is subject to the same objections as is the linear version of the insertion and deletion rule. A more revealing syllabic formulation of this rule eliminates these problems:



There are, however, two areas which still require explanation. In the first place, given the fact that there is no vowel present in the structural description of rule (57), there appears to be no way of knowing whether a given glide should be assigned to the onset position or to the coda position. Secondly, rule (57) ignores the fact that the short vowel insertion rule can usually apply instead, thereby destroying the environment for the vocalization process.

The first of these problems can be easily resolved: the assignment of syllabic structure to strings of segments is, in the case of Moroccan Arabic, completely predictable. One algorithm which will have the desired effect is identical to the one used for the assignment of Foot Structure (see section 2):

Structure Assignment: Assign metrical structure from right to left maximally.

The term "maximally," again, will be interpreted as meaning the maximal expansion of the Phrase Structure rules needed to derive the Moroccan Arabic syllable template (1), unless an

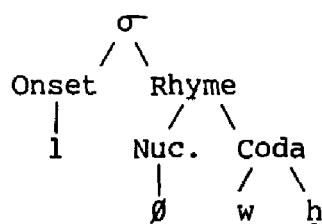
ungrammatical (i.e. metrically ill-formed) structure will result. In addition, it is also necessary to incorporate into the syllable template (1) certain phonotactic constraints, mentioned briefly in 3.1, on the structure of Onsets and Codas:

- (58) * Onset * Coda
 / \ / \
 [-cons] [+cons] [+cons] [-cons]

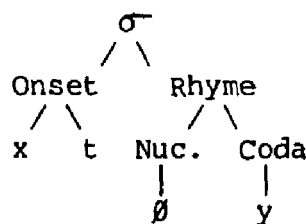
These restrictions state that the first member of an Onset containing two consonants cannot be a glide, and that the second member of a Coda cannot be a glide. Cairns and Feinstein⁴⁰ note that this constraint might well be a universal one, in which case they will be part of a universal theory of syllable structure.

On the basis of the Structure Assignment Algorithm, the glide will be assigned to the left-most position of the Coda in the three cases where the glide to long vowel process can occur:

- (59) A. C__C (e.g. 55) B. C__# (e.g. 54)

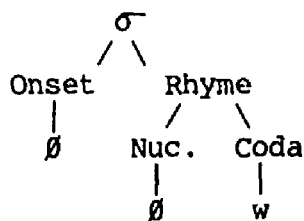


(1)wɪ 'wood')

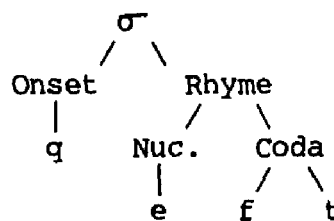


(x)tɪ 'my sister')

- C. # __ C V (e.g. 53)



(ɪ)ŋeɪft 'I got up')



Thus, in (59A), the first two segments on the right are assigned to the Coda, leaving /l/ in the Onset, and setting up the structural description for the glide to long vowel rule. In (59B), only the /y/ can be assigned to the Coda position, since if the /t/ were also included, it would leave the glide in violation of phonotactic constraint (58B). And in (59C), after the /q/ is assigned to the Cnset position, the /w/ cannot precede it in the Onset position, since it would be in violation of phonotactic constraint (58A). Hence, it is assigned to the Coda position of the preceding syllable, setting up application of the vocalization rule once again.⁴¹

The second problem is that there seems to be no way of predicting whether the vocalization process or the short vowel insertion process will take precedence. In fact, there is a fair amount of dialect variation concerning this question:

(60)

A. C ____ C

<u>Standard</u>	<u>Some Northern Dialects</u>	<u>Gloss</u>
ḥūmā	ḥewmā	'neighborhood'
ṣūṭ	ṣewṭ	'voice'
qūw	qeww	'light'
xīl	xeyl	'horse'
yīṣ	yeyṣ	'mud'
ḥīt	ḥeyt	'since'

B. tūb	tewb	'cloth'
mūzā	mewzā	'wave'
zīs	zeyṣ	'army'

C. # ____ CC

ībsāt	yebṣāt	'she dried'
ībzā	yebzā	'pepper'
ūqfāt	weqfāt	'she stopped'

applies is the only possible grammatical form that preserves the structure of the preceding cycle.

In the case of (61B), on other hand, there is no reason for the vocalization process to take precedence; this fact must be viewed as an idiosyncrasy of Moroccan Arabic within the framework outlined here.⁴³

One important advantage of the syllabic formulation of the glide to long vowel process over the linear version is that in cases where two glides occur in succession, the linear rule will often be able to apply ambiguously, whereas the syllabic formulation will not:

(63)

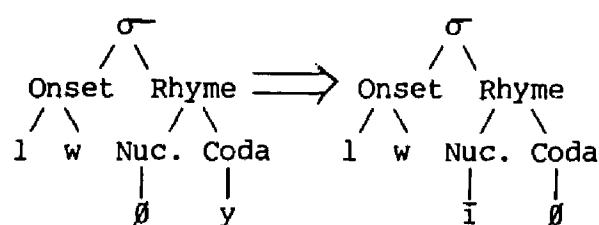
Linear Rule

A. C ____C or C ____#

lūy* or lwī

/lwy/ 'to turn 'intr')

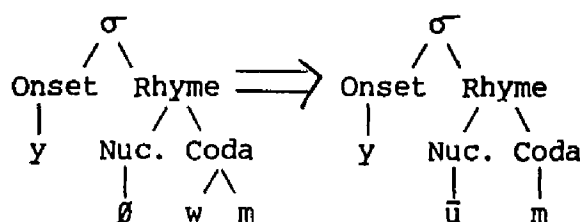
Syllabic Rule



B. C ____C or # ____C

yūm or īwem*

/yūm/ 'day'



Thus, in (63) there is no principled way of knowing which part of the linear rule should apply. But in the syllabic formulation, the correct glide will be assigned to the first position of the coda in all cases.⁴⁴

Certain morphologically complex cases might at first seem to constitute counterexamples to the syllabic formulation of the vocalization process. Thus, in /nešrɪw/ 'we buy', the results are the exact opposite of those in cases such as /lwɪ/ 'to turn'. Here, however, we can appeal again to the principle of the cycle:

(64)	[n + [[šry] + w]]	
	CYCLE I	šrɪ
	CYCLE II	šrɪw
	CYCLE III	nešrɪw

While this will have the desired effect with all productive forms of the inflectional morphology, there still remain a substantial number of apparent exceptions, as exemplified by the following:

(65)	<u>Sing.</u>	<u>Plur.</u>	<u>Gloss</u>
	dɪn	dyɪn	'religion'
	bɪt	byɪt	'room'
	bɪr	byɪr	'well'

If rules were applying cyclically in these cases the results would be different:

(66)	UR	[dyn] + infix [+w+] after second radical:
	CYCLE I	dɪn
	CYCLE II	dɪwen*

Note, however, that all such cases involve unproductive classes of affixes. In chapter 4, it will be argued that these are formed directly from roots by means of Word Formation processes, and therefore, following Halle,⁴⁵ they are not subject to cyclic rule application.

The proposed theoretical framework is a relatively simple one, and is able to make predictions concerning possible

syllabic structures in the various Moroccan dialects. The rules needed to derive the correct phonological results in any given dialect, however, will be necessarily complex, especially in cases where an alternative derivation is also syllabically well-formed. Thus, for example, in many Northern dialects, the rules will have to incorporate the following facts:

1. Vocalization will normally take precedence over vowel insertion when the Glide is in a syllable between two consonants (e.g. [55]); however, there are exceptions (e.g. [60B]).

2. Vowel insertion will normally take precedence over vocalization in a syllable containing a [+CP] consonant (e.g. [60A]); there are many exceptions (e.g. /qūl/ 'to talk', /yīr/ 'only', etc.).

3. Vowel Insertion will take precedence over vocalization in word initial position **unless** the results would not be grammatical (as [60C]).

I am not certain of the best way to incorporate these facts into the grammar of these dialects. One possibility would be to claim that there is a set of dialect-particular principles which provide the criteria for making the choice in such cases:

- (67)
- A) In syllables containing no [+CP] consonants, /CṼ(C)/ is preferred over /CeGl(C)/.
 - B) In syllables containing [+CP] consonants, /CeGl(C)/ is preferred over /CṼC/.
 - C) Syllables of the shape /GleC/ are preferred over syllables of the shape /Ṽ/.

Different principles will be needed to handle Southern dialects, and exceptions will have to be marked in the lexicon.

3.7 Geminate Clusters and the Definite Article

While the syllable template (1) is valid for the majority of Moroccan words, there are several classes of cases which suggest that further amplification is required. There is, however, an important dialectal separation regarding this question. For convenience in exposition, I will treat the two dialects separately.

3.7.1 Northern Dialects

In many Northern dialects, the facts concerning geminate clusters are as follows:

i. A geminate cluster can be followed by zero or one consonant in initial or in post-vocalic position:

(68)	ssūq	‘market’	ssel	‘the bucket’
	llūn	‘color’	llwān	‘the colors’
	ffāz	‘in Fez’	ffrānsā	‘in France’

ii. A geminate cluster in initial position can not be followed by a third consonant which is identical to the members of the cluster: /*#C_iC_iC_i/. Thus:

(69)	a.	d+drārī	→	ddrārī	‘the children’
	b.	f+frānsā	→	ffrānsā	‘in France’
	c.	d+ddār	→	ḍeddār	‘of the house’

Thus, in (69a) and (69b) the prefix joins with stem consonant to form a geminate cluster, but in (69c) it does not, as this would result in three identical consonants in word initial position.

iii. Three identical consonants can (very rarely) occur in medial position: e.g. /xefffū/ ‘they made it light.’ Two adjacent geminate clusters cannot occur, nor can four identical consonants.

Clearly it is necessary to expand our definition of the Onset to account for these facts. Cairns and Feinstein⁴⁶ argue convincingly that markedness facts concerning the make-up of the Onset can be best captured by assuming that it is composed of labeled internal constituents:

$$(70) \quad \text{Onset} \longrightarrow \text{Margin (Adjunct)}$$

This approach permits a simple statement of the above facts:

$$(71) \quad \begin{array}{lcl} \text{Margin} & \longrightarrow & (C_i) \ C_i \\ \text{Adjunct} & \longrightarrow & C_j \end{array}$$

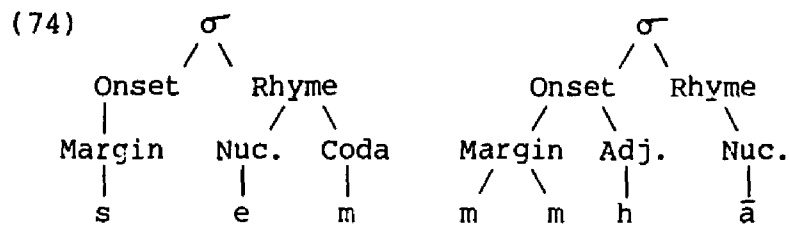
Accordingly, the possible structures of Onsets containing geminate clusters can be seen below:

$$(72) \quad \begin{array}{ll} \text{a.} & \begin{array}{c} \text{Onset} \\ | \\ \text{Margin} \\ / \quad \backslash \\ C_i \quad C_i \end{array} & \text{b.} & \begin{array}{c} \text{Onset} \\ / \quad \backslash \\ \text{Margin} \quad \text{Adjunct} \\ / \quad \backslash \quad | \\ C_i \quad C_i \quad C_j \end{array} \end{array}$$

The fact that three identical consonants can occur in medial position is compatible with these rules, since they include no restrictions on the presence of identical consonants in the coda. The fact that four identical consonants never occur in a sequence can be accounted for in two ways. First, Foot structure assignment rules do not permit an extra-heavy syllable containing such a coda in non-final position. And at the syllabic level, this fact can be related to the fact that geminate clusters never occur word finally (e.g. [kul] 'all' vs. [kullū] 'all of it'). A syllabic version of the degemination rule (chapter 2's Rule 4) would be:

$$(73) \quad \begin{array}{c} \text{Coda} \\ / \quad \backslash \\ C_i \quad C_i \end{array} \Longrightarrow \begin{array}{c} \text{Coda} \\ | \\ C_i \end{array}$$

This rule predicts that forms of the shape CVC_iC_iCVC (e.g. /xeddmāt/ 'she operated') will always be syllabified CVC-CCVC (e.g. /xed-dmāt/), and this prediction is borne out in all such cases. Note, however, that a sequence of three identical consonants followed by a fourth distinct consonant $/C_iC_iC_iC_j/$ would be permitted by these rules. Harrell claims that this does indeed occur, although extremely rarely. Thus, he gives the example /semmmhā/ 'he poisoned her,' which contrasts with /semmhā/ 'her poison/. This will have the following structure:⁴⁷

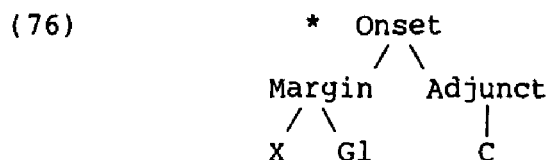


Finally, this approach permits a simple explanation of an apparent exception to the vocalization rule described in 3.6:

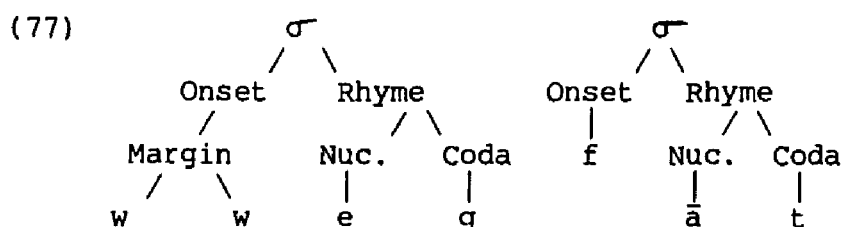
- (75) ūqef 'he stood' wūqef 'and he stood'
 weqfāt 'she stood' wweqfāt 'and she stood'

Recall that in cases such as /ūqef/, the initial underlying /w/ is not assigned to the first position of the Onset, since this would violate the universal constraint against Glides in this position. In /wweqfāt/, however, we see that the first member of the Onset does not undergo vocalization as would be expected, seemingly in violation of this universal filter. Clearly glides which are members of a geminate cluster are at times exempt from this constraint. The assumption that geminate clusters pertain

to a separate Margin constituent make the formation of this fact a simple matter, and the Onset Glide Filter (58A) can be rewritten as follows:



Accordingly, /wweqfāt/ will not be ruled out by (76), as it will have the following structure:



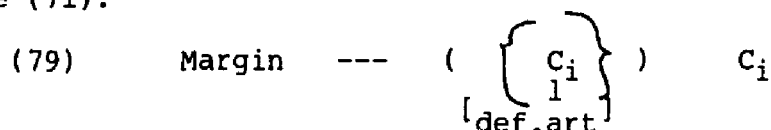
Since there is no Adjunct, there is no violation of Filter (76).

In addition to geminate clusters, there is a single morpheme, the definite article /l+/, which can also occur immediately before two other consonants in word initial position:

(78)	lktāb	‘the book’
	lhlīb	‘the milk’
	lblād	‘the countryside’

It is only this morpheme which behaves as part of a geminate cluster; even the preposition /l+/ ‘to, for,’ identical in form to the definite article, cannot be the initial member of triconsonantal Onset: /ləmdīnā/ ‘to a city,’ but /*lmdīnā/.

This unusual fact can be easily captured by a slight revision of Rule (71).



3.7.2 Southern Dialects

In the Southern dialects, such as that described by Harrell⁴⁸, the facts concerning geminate clusters differ slightly. The principal difference is that when the definite article /l+/ precedes a stem beginning with two consonants, a short vowel is inserted between the article and the stem:⁴⁹

- (80) lbāb 'the door'
lwād 'the river'

- (81) lebwāb 'the doors'
lektāb 'the book'

These facts can be accounted for by assuming a different definition of the Margin for the Southern dialect different rules for the Southern dialects:

- (82) Margin $\rightarrow$ C_i C_i

This rule differs from the Northern dialects' Rule (71) in that it does not permit the definite article /l+/ as the first member of a bi-consonantal Margin. No additional rules are needed to account for the alternations in (81), since the automatic short vowel insertion/deletion process, constrained by the metrical structure, will guarantee the correct form:

(83)

- l + ktāb $\rightarrow$ a) lktāb * (SCC - Onset not in [71a])
b) elktāb * (SCC - contains underlying VC)
c) lketāb * (SCC - contains CV)
d) lektāb G

Thus in (83a, b, c,) the derived structures cannot be assigned to a syllabic structure in accordance with the rules for the generation of the syllabic template. (83d) is the only grammatical possibility.

3.7.3 Alternate Approaches

3.7.3.1 Guersel's Adjacency-Identify Constraint

Guersel^{50,51} examines the geminate cluster question from an essentially linear viewpoint. He notes that the data (from Berber, Moroccan Arabic, and Algerian Arabic) seems to demand that geminate clusters be treated both as a single segment and as two distinct segments. He proposes that they always be considered a sequence of two consonants, and he accounts for their seemingly exceptional behavior by a number of principles. The most important of these is the Adjacency-Identity Constraint. He defines first the notions of Adjacency and Identity:

Adjacency: 2 Consonants are adjacent if no other segment, #, or + intervenes between them.

Identity: 2 consonants are identical if they have the same feature specifications;

His constraint can then be stated as follows:

- (84) Adjacency/Identify Constraint: (AIC)
Given 2 segments, A1,A2, where A1=A2, a phonological rule can alter the adjacency of A1,A2 if and only if it alters the identity of A1,A2.

Guersel notes that this principle alone will not have the desired results in Moroccan. Since he claims that the definite article assimilation rule applies prior to epenthesis, there is an apparent problem for cases such as the following:

- (85) $l+sma \rightarrow ssma \rightarrow *sesma$ 'the sky'
 $l+dfal \rightarrow ddfal \rightarrow *dedfal$ 'the saliva'

The problem is that the morpheme boundary + separates the definite article from the noun, with the result that they are not "adjacent" according to his definition.

Guersel solves this by appeal to an additional principle:

- (86) Given feature changing rule of the form
 $X \rightarrow Y/Z$, if the focus X takes on all or some of the
features of the determinant Z, then any boundary
which intervenes between Y and Z in the output is
deleted by convention.

In cases such as (85), then, the the boundary between the
definite article and the noun stem will be deleted, and the AIC
will apply, blocking epenthesis. Further, in cases where the
definite article assimilation does not occur (e.g. /l+lhem/ 'the
meat'), Guersel claims that assimilation applies vacuously, so
that the boundary + can be deleted and the AIC will apply.

A final problem arises when Moroccan forms are compared
with Algerian forms:

- (87) Algerian: tedreb 'you hit'
Moroccan: ddreb 'you hit'

Here Guersel appeals to extrinsic rule ordering: he claims that
in Moroccan Assimilation precedes Epenthesis, while in Algerian
the reverse order occurs.

There are a number of problems for the theory which Guersel
proposes. First of all, while extrinsic rule ordering was a
crucial aspect of the SPE framework in which he was working, it
has since been rejected, as it permits too powerful a class of
grammars. More importantly, there are cases where his framework
predicts incorrect forms for Moroccan. First, in cases where a
preposition precedes an indefinite nouns phrase, his theory
predicts that epenthesis will occur:

- (88) a. l+dar $\rightarrow$ dar 'the house'
b. d+dar+i $\rightarrow$ ddari 'of my house' *dedari
c. d+d+dar $\rightarrow$ deddar 'of the house'

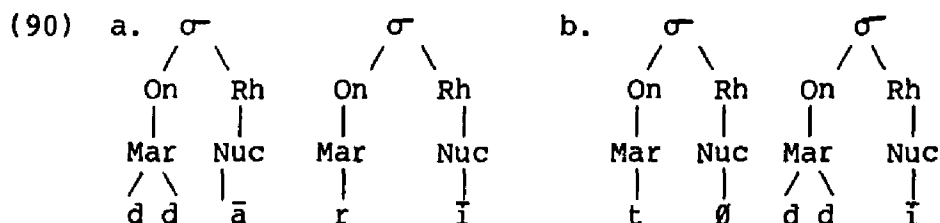
(88c) presents no problem for his theory: he can claim that since no assimilation rule is applying, the boundary + is not deleted, and hence the first and second segments are not "adjacent." The AIC will not apply. But in (88b) the same is also true -- and yet the short vowel is not inserted.

In other cases his theory predicts that epenthesis will not occur, but it does. Thus:

- (89) a. $t+dfn \rightarrow ddfen$ 'you (s.) bury'
 b. $t+dfn+u \rightarrow ddefnu$ 'you (pl.) bury'
 c. $t+ddi \rightarrow teddi$ 'you carry'

His theory makes the correct predictions for (89a) and (89b). But in (89c), Guersel's theory predicts that assimilation (see chapter 2, section 1.2) will precede epenthesis, that the boundary + will be deleted, and that epenthesis will not occur. Such cases are additional counterevidence to his theory.

Within the framework advocated here, no such problems exist. The metrical structure for (88b) and (89c) will be as follows:



In (90a), the failure of epenthesis to apply is predicted, since the geminate cluster can be assigned to the Margin of the first syllable. And in (90b), epenthesis does apply, since there is no way it can be assigned to the Margin of the second syllable, regardless of whether it assimilates to the /d/ of the stem. Finally, while I do not propose to conduct an analysis of

Algerian syllable structure, cases such as /tedreb/ 'you hit' suggest that in Algerian Onsets do not permit geminate clusters immediately before a consonant. No appeal to extrinsic rule ordering is required.

3.7.3.2 Leben's "Metrical" Alternative

Leben⁵² proposes a hierarchical analysis of length in which geminate clusters are differentiated from single consonants not in that are composed of two consonants, but rather in that they are single consonants with a distinct metrical structure. Thus:

(91)	w=weak	s=strong
a. Short Consonants:	[+cons] w	b. Long Consonants: $\begin{array}{cc} [+cons] & \\ / & \backslash \\ w & w \end{array}$
c. Short Vowels:	[-cons] s	d. Long Vowels: $\begin{array}{cc} [-cons] & \\ / & \backslash \\ s & w \end{array}$

These formalisms at times permit a more revealing description of the phonological behavior of geminate clusters and segment length in general than does a purely segmental analysis in which the principal difference between long and short segments is viewed in terms of the feature [±long]. And much of the apparently exceptional behavior of geminate clusters could be handled by this framework. Thus, in Northern dialects, the fact that three word initial consonants can occur in a sequence only when the first two are geminate clusters could be captured simply by stating that only 2 consonants are possible in syllable initial position, and that the first can be dominated either by one or two weak nodes.

There are cases, however, where Leben's theory would necessarily involve complications of the grammar. In the first place, many word formation rules split geminate clusters. The following plural formation rule illustrates:

(93)	<u>Sing.</u>	<u>Plural</u>	<u>Gloss</u>
	xedd	xdūd	'cheek/cheeks'
	xett	xtūt	'line/lines'
	semm	smūm	'poison/poisons'

Leben deals with this question in his treatment of Biblical Hebrew. He views this type of process as a metrical rule, applying not to segments, but rather to weak and strong nodes. His rule could be formulated for Moroccan cases as follows:

(94) wsww $\rightarrow$ w(s)wsw where (s) is deleted
 in the plural form.

Thus, the insertion rule is seen as inserting a vowel in the metrical structure rather than between two consonants. An additional convention is needed to account for the fact that we now have two long consonants instead of one long one:

(95) Convention: When x and y are broken up in an expression of the form $\begin{array}{c} x \quad y \\ \quad \vee \end{array}$, they are re-expressed as $\begin{array}{cc} x & y \\ | & | \\ u & u \end{array}$.

There are two important problems with this view. First, rule (94) does not account for many cases where vowels are present in the root. Thus, for example, in cases such as /āmānā/ vs. /āmāyen/, a distinct rule will be required (/swsww(sw)/ $\rightarrow$ /swswswsw/, while cases such as /weld/ vs. /ūlād/ will require still another (/wsww/ $\rightarrow$ /swswsww/). Clearly a generalization is being missed, since all of these broken plurals formation

rules can be abbreviated as a single rule: infix $\bar{V}$ after the second radical.

A second problem is that in allowing geminate clusters to be split by such rules, we are left with no explanation of why geminate clusters are often not split by rules. Claiming that the metrical structure of geminate clusters is distinct cannot explain this, since degemination is also permitted. One of the advantages of the proposal made here is that it permits an explanation of the fact that geminate clusters are at times split and at times not. It was argued in the previous section, for independent reasons, that broken plural formation (e.g. [93]) is a derivational process. In chapter 4, I will further argue that derivational processes in Moroccan apply to roots which have no syllable structure. The fact that derivational processes freely split geminate clusters is not surprising then, identical consonants do not belong to any syllabic constituent:

(96)	<u>Root</u> ⁵³	<u>Adj.</u>	<u>Gloss</u>
A.	kbr rqq	kb̄r rq̄q	'big' 'thin'
B.	<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
	ktb dkk	ktāb dkāk	'book' 'deliverance'

Inflectional processes, on the other hand, will only split geminate clusters when they cannot be assigned to a well-formed syllable structure (as in /deddār/ 'of the house').

There are other cases where I believe Leben's approach to length runs into descriptive difficulties. First, it will be recalled that in Northern dialects the definite article /l+/ can

occur word initially as part of a tri-consonantal Onset. This fact can be captured easily in the framework proposed here (Rule [72]), as there is nothing about the category Margin which is limited to geminate clusters. But this fact cannot be easily handled in Leben's framework, since /l/ is clearly not a member of a geminate cluster.

A second case involves the problem, noted above, that geminate clusters which are glides do not necessarily undergo the vocalization rule (e.g. /wweqfāt/ 'and she stood' vs. /wūqef/ 'and he stood'). The fact that the initial /w/ in /wweqfāt/ does not undergo vocalization might be explained within Leben's theory by claiming that the rule only applies to single consonants (those dominated by a single weak node):

$$(97) \quad \begin{array}{ccc} [-\text{cons}] & & [-\text{cons}] \\ | & \rightarrow & | \\ w & & s \end{array}$$

But in /wūqef/ (underlyingly /w+wqef/) vocalization does apply. Some additional apparatus will be required to account for this fact. Within the theory proposed here, on the other hand, the correct derivation is predicted as follows:

$$(98) \quad [w+ [wqef]] \rightarrow \begin{array}{l} \text{a) } wweqef * (\text{SSC}) \\ \text{b) } \text{ū}wqef * (\text{Cycle})^{54} \\ \text{c) } w\text{ū}qef \text{ G} \end{array}$$

We can conclude, then, that Cairns and Feinstein's labeled nodes Margin and Adjunct permit a more elegant statement of the phonological facts regarding geminate clusters and the definite article than does Leben's "metrical" analysis. It has the additional benefit of relating these facts to a general theory of consonant clusters.

NOTES

1. Selkirk, Elisabeth, op. cit.
2. I am following the Cairns and Feinstein (op. cit.) syllabic framework, accepting their arguments that labeled nodes dominating the internal constituents of syllables are necessary for the adequate treatment of markedness as well as for the formalization of a number of phonological processes.
3. The idea of making the Onset obligatory even for long vowels, and inserting the glottal stop by rule was suggested to me by Ellen Broselow.
4. The idea of incorporating this type of metathesis with the more general vowel insertion and deletion of section 4, rather than using a restructuring rule as I originally proposed, was suggested to me by Ellen Broselow.
5. Cairns and Feinstein, op. cit.
6. This idea is implicit in Cairns and Feinstein, op. cit., pp. 200-205.
7. These rules are intended as only a preliminary version of a feature system for syllables. An important problem with them is that they do not permit a single feature definition of the natural classes heavy and extra-heavy syllables, as does the Cairns and Feinstein system. Interestingly, it does permit a simple statement of the distinction between open syllables /CV/ and all others, as required by rule (20).
8. Selkirk, op. cit., p. 563-571.
9. Selkirk, op. cit., proposed that the syllable in a monosyllabic Foot always receives stress. If my rules for Foot Structure assignment are correct, the Moroccan data constitutes counterevidence to this view, since such cases as /xeddem/ 'I operated' will have the structure F F', but will not have secondary stress on the first syllable.
10. Note the alternation involving two morphemes:
 kā+n ~ ke+n 'durative prefix - 1st person'
 śt ~ ś 'negative suffix'
The vowel in /kān/ retains its quality when shortened.
11. The proposed stress rules make specific predictions regarding secondary stress, but I do not trust my own ability to record secondary stress, and there is no data available.

12. I have found no cases of forms the shape /CV^{CV}-CVC/ (those where stress retraction does not occur) that did not include the negative morpheme /mā/.
13. Harrell (1962), op. cit. p. 19, notes that some speakers double the final consonant of /šāfet/ 'she saw' when a suffix with a vowel follows, while others delete the short vowel. The goal in both cases is the same: to avoid leaving the short vowel in an open syllable.
14. Note that Harrell (ibid., p. 134), claims that the vowel in these suffixes is his /o/ (my short /u/). However, when I listened to these vowels they seemed to me to have the quality of long vowels, and I have left them as I originally transcribed them. Note that if Harrell turns out to be right, it is better for the theory I propose, since non-final stress would be predicted.
15. Kisseberth, Charles 1970: "On the Functional Unity of Phonological Rules." Linguistic Inquiry, 1.3 291-306.
16. Ibid. pp. 302-306.
17. McCarthy, op. cit. p. 13.
18. In Keegan⁵⁵ I argue that appeal to syllabic structure alone is not sufficient to account for insertion/deletion processes in Yawelmani, but rather that it is the metrical structure which constrains these rules in many cases. The SSC, then, is actually a constituent of a broader principle: any form containing a segment which cannot be assigned to a metrical structure is ungrammatical. A similar proposal was made by Broselow (see footnote 27).
19. The idea of using rules of this type together with "candidate sets" was suggested to me by C.E. Cairns as a way of dealing with similar phenomena in Yawelmani.
20. Cairns and Feinstein, op. cit., pp. 207-216.
21. There are certain surface exceptions to the claim that the syllable /VC/ does not occur in Moroccan Arabic. Specifically, in Southern dialects it occurs sometimes when immediately before geminate clusters, and in all dialects, the form /el+/ exists as the classicized alternant to /l+/, the definite article. These questions will be treated in section 7 of this chapter.
22. Note that it is necessary to claim that this constraint overrules the "cycle," and hence the prediction is made that the cycle will not overrule the Outermost Morpheme Constraint.

23. Brame, Michael 1973: "On Stress Assignment in Two Arabic Dialects." in Festschrifte for Morris Halle, S. Anderson and P. Kiparsky, eds., Holt, Rinehart and Winston, New York.
24. Kenstowicz, Michael 1981: "A Note on Cyclic Stress in Levantine Arabic." in MIT Working Papers in Linguistics, Vol. 3, Theoretical Issues in the Grammar of Semitic Languages, ed. by Hagit Borer and Youssef Aoun, pp. 21-31.
25. McCarthy, John 1979b: "On Stress and Syllabification." Linguistic Inquiry 10.3 443-465.
26. Selkirk, Elisabeth 1981: "Epenthesis and Degenerate Syllables in Cairene Arabic." in MIT Working Papers in Linguistics, Vol. 3, Theoretical Issues in the Grammar of Semitic Languages, ed. by Hagit Borer and Youssef Aoun, pp. 209-232.
27. Broselow, Ellen 1982: "On Predicting Interaction of Stress and Epenthesis," Glossa 16:2 115-132.
28. I follow Brame here in postulating stems of the shape CVCVC for Palestinian.
29. Kenstowicz, op. cit.
30. Selkirk (1980) op. cit., p. 571-575.
31. Brame (1973), op. cit., p. 25.
32. Kiparsky, Paul 1982: "From Cyclic Phonology to Lexical Phonology." The structure of phonological representations (Part 1), Harry van der Hulst, Norval Smith (eds.), Foris Publications, Cinnaminson, pp. 131 - 175.
33. My proposal is similar to Kiparsky's in many respects. Kiparsky claims that less general rules (my rules of stem formation) will apply at a level previous to more general rules. However, Kiparsky also claims that all of these rules apply cyclically and within the lexicon. It appears to me that Moroccan cases such as /bit/ vs. /byʔt/ 'room/ rooms' constitute counterevidence to such claims.
34. Mohanan and Mohanan, K. P. and Tara Mohanan 1984: "Lexical Phonology of the Consonantal System of Malayalam." Linguistic Inquiry 15.4, pp. 575 - 602.
35. It seems possible that the general vowel insertion or deletion rules might tend to occur in languages which have certain similarities in metrical characteristics.

36. Selkirk (1982), op. cit.

37. Selkirk (ibid.) claims that an important advantage of her framework is that "... it is not treated as mere coincidence that all instances of epenthesis happen to insert the front high vowel *i*. All such instances of epenthesis are united as one." (p. 218) But this is not at all the case. Thus, the first person imperfective form is /a+/ (e.g. /aktib/ 'I write'). It might be claimed (as I believe it should) that this is not epenthesis, but rather a prefix. But why can't the same be said about the imperative? The fact that this prefix only appears before stems beginning with two consonants does not constitute counterevidence to this view; the same is true in Moroccan Arabic (see Appendix XII), but here it clearly cannot be considered epenthesis, as the epenthesis rule inserts /e/, and the imperative suffix is always /ā+/.

38. Broselow⁵⁶ modifies Selkirk's theory in a way that will guarantee the correct results for Egyptian Arabic. Rather than appealing to a "minimize dummy slots" condition, she argues that consonants should be grouped into syllables around existing vowels without creating clusters in the Onset or Coda. Further, any single consonant which cannot be grouped with an existing vowel will serve as the Coda of a new syllable, while any two leftover consonants will serve as the Onset and Coda respectively of a new syllable. While this works for Egyptian, it does not relate this process to the functionally similar process in Moroccan (e.g. /težber/ 'she finds' vs. /žebrāt/ 'she found').

39. I believe the facts concerning stress in Cairene can be captured by appeal to the assignment of metrical structure. These facts can be stated (following Langendoen⁵⁷) as follows:

- a. Stress a superheavy final syllable.
- b. Otherwise stress a heavy penult.
- c. Otherwise stress the penult or antepenult, whichever is separated by an even number of syllables from the rightmost nonfinal heavy syllable, or, if there is no nonfinal heavy syllable, from the left boundary of the word.

The following rules would account for most cases:

$$F^0 \rightarrow \left\{ \begin{array}{l} \text{CV-CV} \\ \text{CV} \\ \text{CVC} \end{array} \right\} \left(\left\{ \begin{array}{l} \text{CV} \\ \text{CVC} \end{array} \right\} \right)$$

$$F^1 \rightarrow \left\{ \begin{array}{l} \text{CVCC} \\ \text{CVC} \end{array} \right\} \left\{ \begin{array}{l} \text{CV} \\ \text{CVC} \end{array} \right\}$$

$$F^2 \rightarrow \text{CV } F^1$$

Expansions of these rules include the following (with data taken from Broselow [1976]) op. cit. and McCarthy [1979b] op. cit.):

F ⁰ →	CV-CV	(sana 'year')
F ⁰ →	CV-CV-CV	(darabu 'he beat him')
F ⁰ →	CV-CVC	(darab 'he beat')
F ⁰ →	CV-CV-CVC	(darabak 'he beat you')
F ⁰ →	CVC-CV	(yibni 'he builds')
F ⁰ →	CVC-CVC	(niktib 'we write')
F ⁰ →	CV-CV	(safu 'they saw')
F ⁰ →	CV-CVC	(ragil 'man')
F ¹ →	CVCC	(xuft 'I feared')
F ¹ →	CVCC-CV	(xuftna 'you feared us') ?
F ¹ →	CVCC-CVC	(xuftkum 'I feared you(pl.)') ?
F ¹ →	CVC	(xaf 'he feared')
F ¹ →	CVC-CV	(xafna 'he feared us') ?
F ¹ →	CVC-CVC	(xafkum 'he feared you [pl.]') ?
F ² →	CV-CVCC	(katabt 'I wrote')
F ² →	CV-CVC	(banet 'I built')
F ² →	CV-CVCC-CV	(darabtna 'you hit us') ?
F ² →	CV-CVC-CV	(darabtkum 'I hit you [pl.]')

Note that the Foot structure assignment rules will choose [CV-CV][CV-CV] over [CV][CV-CV-CV] since the latter generates a monosyllabic Foot containing the short syllable CV, a structure which cannot be assigned to a well formed metrical structure. This explains the fact that penultimate stress occurs with forms like /fa9alatun/ 'deed', since the same stress prominence rules which apply for Moroccan and Palestinian (stress rightmost Foot and leftmost syllable) apply for Egyptian.

Some forms involving larger words, including interesting cases of Cairene pronunciation of Classical Arabic, are:

F ⁰ F ⁰ →	[CVC] [CV-CV]	(martaba 'mattress')
F ⁰ F ⁰ →	[CVC] [CV-CV-CV]	(muxtalifa 'different (f.)')
F ⁰ F ⁰ F ⁰ →	[CVC] [CV-CV] [CV-CV-CV]	(?adwiyatuhumaa 'their [du.] drugs [nom.]')
F ⁰ F ⁰ →	[CV-CV] [CV-CV-CV]	(sajaratuhu 'his tree [nom.]')

Finally, following Broselow (op.cit: 12-14), certain morphemes will have to be marked in the lexicon for exceptional stress assignment.

40. Cairns and Feinstein, op. cit. 204-205, and referring to work by Mohanan⁵⁸.

41. The manner in which Harrell's (1966, op. cit.) dictionary enters beginning with /w/ might seem to suggest a pattern of exceptions to Filter 51. Thus, he list /wqef/ 'to stop/stand', /wzen/ 'to weigh', etc. I suspect that this is not intended to imply that these words are actually pronounced this way, but rather he is listing them according to their roots. This

suspicion is supported by the fact that he does not even list /ʔqef/ and /uzen/ as alternatives, for this work is generally thorough in listing dialectal variation. With /y/ vs. [ɪ], however, he is less consistent, listing /ɪbes/ 'to dry (intr.)' under 'I' but /yebbes/ 'to dry (tr.)' under 'Y.'

42. It is worth noting in this regard that dialectal variation at /#_CC/ occurs most frequently in words which are morphologically complex (e.g. 53C) but seldom in words which are morphologically simple.

43. It is possible that a broader study into the operation of such vocalization processes in various languages might provide some theoretical explanation in terms of markedness.

44. Note that while roots of the shape /Cwy#/ are found commonly in Moroccan Arabic, forms of the shape /Cyw#/ are not found at all in Harrell's (1966, op. cit) dictionary. Clearly some redundancy rules is operating to prevent roots of this shape from appearing. In general, morpheme final /w/ is uncommon: some examples /ħbʊ/ 'to crawl', /ħlʊ/ 'sweet', /dlʊ/ 'leather bucket for drawing water.' Stem final /w/ often behaves irregularly when suffixes are added: thus, /ħbʊ/ 'crawl (imp.s.)' but /ħbiw/ 'crawl (imp. pl.).'

45. Halle, Morris 1979: "Formal versus Functional Considerations in Phonology." Linguistics in the Seventies. ed. by B. Kachru, Urbana, IL: University of Illinois Department of Linguistics.

46. Cairns and Feinstein, op. cit.

47. Sayed (op. cit., p. 30) notes that some dialects will instead permit /semmemhā/. This form is actually what is predicted by cyclic rule application, since, although /semmmhā/ can be assigned to a well formed syllabic structure, it would have to pass first through /semmm/, which cannot.

48. Harrell (1962b), op. cit., pp. 146 - 147.

49. It is difficult to get consistent data regarding geminate clusters in the Southern dialects. Abdel-Massih (1973, op. cit., pp. 28), makes different claims about this question than do Harrell (ibid.) and Said (op. cit.). First, when the definite article is prefixed to a stem beginning with CV, Abdel-Massih states that a short vowel is placed before the article:

edderri	'the boy'	ellil	'the night'
elbāb	'the door'	elbent	'the girl'

These forms also exist as alternants in the Northern dialects, but I believe that they represent the classicized version of the definite article. Neither Harrell nor Said include include them.

When the stem begins with two consonants, and the definite article does not undergo assimilation, Abdel-Massih's forms are identical to Harrell's. He gives no examples where the article assimilates to a stem beginning with two consonants, although his rule (p. 28, #2) suggests that a short vowel would be inserted between the first and second stem vowels (e.g. /ssebīṭar/ ? 'the hospital'). However, I do not believe this is what he intends, and when such examples do occur (e.g. p. 43), he omits the phonetic transcription containing the short vowels.

In this work I have not examined phrasal syllable structure, and it should be noted that a short vowel is at times inserted prior to the definite article in a larger phrase. The following sample from Colin (op. cit., p. 17) illustrate:

s-sā9a mā-ddā-šāy u-zād-9lēḥom ej-jellāba u-le-ḥmār.
 'Then he didn't get anything and he added (to it) his
 jallaba and his donkey.'

In general, Colin's forms suggest that epenthesis occurs when a geminate cluster or /l+ / are preceded by a word ending in a consonant (e.g. ...ḥom ej-jellāba), but not when following a word ending in a vowel (e.g. ...mā-ddā-šāy) or in phrase initial position (e.g. s-sā9a). However, he is not consistent in this: thus on page 19, line 1, we find both /ṭ-ṭenjēṛ/ and /eṭ-ṭenjēṛ/ in phrase initial position.

50. Guerssel, Mohamed 1977: "Constraints on Phonological Rules." Linguistic Analysis 3, pp. 267-305.

51. Guerssel, Mohamed, 1978: "A Condition on Assimilation Rules." Linguistic Analysis 4, pp. 225-254.

52. Leben, William 1980: "A Metrical Analysis of Length." Linguistic Inquiry, 11.3 497-510.

53. In chapter 4 I will argue, following McCarthy (1979), op. cit., that these roots are actually bi-literal, but this fact has no bearing on the discussion, since prior to the application of the infixing rule, a geminate cluster will have been formed by the doubling of the second radical.

54. It is interesting that Harrell's (1966, op. cit.) dictionary lists the form /iybes/ as the third person singular of the imperfect of /ṭbes/ 'to dry (intr.)'. This form is clearly in violation of the cycle:

U.R. [y+ [ybes]]
 Cycle I [y+ [ṭbes]]
 Cycle II [yṭbes]

In dialects which permit Harrell's /iybes/, we would expect also to find /ṭwqef/ 'and he stood/stopped.' Note, however, that even in such dialects, the first and second person of the imperfect is the same:

nibes	'I dry'
tibes	'you dry'
iybes	'he dries'

Hence, we seem justified in claiming that /ɪybes/ is derived from underlying /yɪbes/ by means of a dialect-particular rule.

55. Keegan, John M. 1984 "Metrical Structure in Yawelmani and Its Role in Vowel Insertion and Deletion Processes." ms., CUNY.

56. Broselow, Ellen 1982: "On Predicting the Interaction of Stress and Epenthesis." Glossa 16:2, pp. 115 - 132.

57. Langendoen, D.T. 1968: The London School of Linguistics, MIT Press, Cambridge.

58. Mohanan, K.P. 1979: "On Syllabicity." MIT Working Papers in Linguistics 1, K. Safir (ed.), Cambridge, Massachusetts.

Chapter 4

MORPHOLOGY

In this chapter morphological processes in Moroccan will be examined. First, a set of rules will be postulated to account for morphological processes in Moroccan Arabic, and it will be argued that morphological operations can be reduced to five basic types. The theoretical impact of these facts on current models of morphology will be examined, especially in two areas. First, I will present evidence that in Moroccan, derivational (word-stem formation) processes are morpheme based rather than word based as has been traditionally assumed. Second, the distinction between inflection and derivation will be examined in the light of Moroccan morphological data, and I will attempt to establish a firm basis for this necessary division of morphological rules. Finally, the relationship between morphology and syntax will be briefly examined.

4.1 Moroccan Word Stem Formation Processes

4.1.1 Simple Morphological Operations

Appendices XXI and XXII list examples of the different types of derivational (word-stem formation) operations which occur in Moroccan. Following Aronoff¹, Anderson², and others, I will assume for the moment that there exists a well motivated distinction between derivational (word-stem formation) processes and inflectional processes, although I will return to examine this question in 4.3. The non-complex operations (Appendix XXI) are listed below, together with the word classes that they can form:

(1)

A. SUFFIXES

1. **/+ā/**
 - (1) Collective Singular
 - (2) Feminine Marker
 - (3) Verbal Noun Formation
2. **/+ī/**
 - (4) Nisbas of Origin or Habitual Activity
 - (5) Nisba Adjectives³
3. **/+at/**
 - (6) Plural Formation
4. **/+ān/**
 - (7) Plural Formation
 - (8) Verbal Noun Formation
 - (9) Adjective Formation
5. **/+īn/**
 - (10) Plural Formation
6. **/+ānī/**
 - (11) Adjective Formation
7. **/+ayn/**
 - (12) Dual Formation

B. DOUBLING OF SECOND RADICAL

- (13) Measure II (Transitive) Verb Formation
- (14) Noun Formation

C. INFIXES

1. **/+e+/ after Second Segment**
 - (15) Adjective Formation
 - (16) Verb Formation
2. **/+e+/ after First Segment**
 - (17) Noun Formation
 - (18) Verb Formation (Biliteral roots)
3. **/+u+/ after Second Segment**
 - (19) Verb Formation
4. **/+u+/ after First Segment**
 - (20) Noun Formation
 - (21) Verb Formation (Biliteral roots)
5. **/+ā+/ after Second Segment**
 - (22) "Broken" Plural Formation
 - (23) Noun Formation
 - (24) Measure IX Verb Formation⁴
 - (25) Adjective Plural Formation
6. **/+ā+/ after First Segment**
 - (26) Participle/Adjective Formation
 - (27) Verb Formation (Measure III)
 - (28) Noun Formation
7. **/+ā+/ after Third Segment**
 - (29) Nouns of Habitual Activity
8. **/+ī+/ after Second Segment**
 - (30) Verbal Noun Formation
 - (31) Adjective Formation

9. /+u+/
 (32) Verbal Noun Formation
 (33) "Broken" Plural Formation
10. /+u+/
 (34) Plural Formation - Adjectives
 of Color and Defect
11. /+yy+/
 (35) Diminutive Formation
12. /+ay+/
 (36) Plural Formation

D. PREFIXES

1. /m+/
 (37) Noun Formation
 (38) Past Participle/Adjective Formation
2. /t+/
 (39) Intransitive Verb Formation

E. REDUPLICATION

1. (40) Verb Formation
2. (41) Noun, Adjective Formation

It is interesting to note that the form of these simple operations is a limited one. Doubling is limited to the second radical; infixes can follow the first, second or third radical, and always consist of an vowel with optional glide /y/:

$$(2) \quad \text{Infix} \rightarrow [-\text{consonantal}] \quad (y)$$

All word-stem formation suffixes have an initial vowel, always [i] or /a/. Further, if the suffix is composed of two segments, the second will normally be /t/ or /n/. We can abbreviate the possibilities for suffixes as follows:⁵

$$(3) \quad \text{Suffix} \rightarrow \left\{ \begin{matrix} a \\ i \end{matrix} \right\} (y) \left\{ \begin{matrix} t \\ n \end{matrix} \right\}$$

Word-stem formation prefixes are small in number, and always consist of a consonant (/t+/, /m+/, or /?+/) or a consonant followed by a vowel, always /a/ or /e/:

$$(4) \quad \text{Prefix} \rightarrow C (V)$$

Affixes, then, utilize only a small subset of Moroccan segments,

and are, with the exception of /?/, composed of vowels, glides, and unmarked consonants.

These simple morphological operations, applied alone or in combination with other simple operations, are used to form a very large number of word classes. The five (suffixation, prefixation, infixation, doubling, and reduplications) can be informally stated as follows:

(5) **MORPHOLOGICAL OPERATIONS**

- A. Suffixing: Stem $\rightarrow$ S₁ S₂ S_n Suffix
- B. Prefixing: Stem $\rightarrow$ Prefix S₁ S₂ S_n
- C. Infixing: Stem $\rightarrow$ S₁ (S₂ (S₃)) Infix S_n
- D. Doubling: Stem $\rightarrow$ S₁ S₂ S₂ S_n
- E. Redup: Stem $\rightarrow$ S₁ S₂ S_n, S₁ S₂ S_n

These morphological operations, and especially Infixing, Doubling, and Reduplication, resist simple incorporation as Phrase Structure Rules. Gazdar and Pullum⁶ note that Phrase Structure rules actually specify two distinct relations: immediate dominance relations, and linear precedence relations among sisters. They propose stating these two aspects of Phrase Structure Rules separately, as i) rules of Immediate Dominance (ID) and ii) rules of linear precedence (LP). The following examples illustrate:

(6) A. Phrase Structure Rules

A $\rightarrow$ B C D

B $\rightarrow$ A C D

C $\rightarrow$ A B D

D $\rightarrow$ A B C

B. Generalized Phrase Structure Rules

1. ID Rules:

A. $A \rightarrow B, C, D$

$B \rightarrow A, C, D$

$C \rightarrow A, B, D$

$D \rightarrow A, B, C$

2. LP Rules

" $A < B < C < D$

Thus, rules of the form in (6B1) formalize the dominance relationship, while rules (6B2) formalize that of linear order. Gazdar and Pullum define a grammar as a pair consisting of a set of ID statements and a set of LP statements. They argue that a grammar of this type (Generalized Phrase Structure Grammar [GPSG]) can capture certain generalizations which are missed by a Phrase Structure Grammar. In (6), for example, the generalization expressed in (6B2) concerning the ordering of constituents is not expressed in Phrase Structure Rule (6A).

Langendoen (personal communication) has pointed out that the GPSG formalisms can be used to elegantly describe the Moroccan morphological operations stated in (5):

(7) A. Root Formation:

S=Stem R=Root A=Affix s=segment

1. $R \rightarrow s_1, s_2, \dots s_n$

2. $PL_1: s_1 < s_2$

$\vdots$

$PL_m: s_2 < \dots s_n$

B. Stem Formation

1. Suffixation: $S \rightarrow R, A$
 $R < A$
2. Prefixation: $S \rightarrow R, A$
 $A < R$
3. Infixation: $S \rightarrow R, A$
 $A < s_i$ (where $i = 2, 3, \text{or } 4$)
4. Doubling: $S \rightarrow R$
 $PL_2: s_2 < s_2$
 $PL_{i+1} = PL_i$ (where $i > 2$)
5. Reduplication: $S \rightarrow R$
 $PL_2: s_2 < s_1$
 $PL_3: s_1 < s_2$

The addition of LP statement $s_i < s_i$ (7B4) will be interpreted as making a copy of s_i , and the addition of PL_2 and PL_3 to (7B5) will be interpreted as copying the first and second segments.⁷

The GPSG notation expresses the fact that stems formed by affixation are bi-morphemic (composed of a Root and an Affix), while stems formed by Doubling and Reduplication are not. Unlike the autosegmental notation proposed by McCarthy (see chapter 2, section 6) the fact that doubling only affects the second segment is also expressed. It also permits a straightforward account of the relationships between stems, roots, affixes and segments within a grammatical framework that is both weakly and strongly equivalent to a Context Free Phrase Structure Grammar.⁸

4.1.2 Complex Morphological Operations

It commonly occurs in Moroccan Arabic that the simple morphological operations abbreviated in (6) combine to create a complex processes in the formation of a particular class of words (see Appendix XXII). Almost any combination of simple operations

is possible, except that doubling and reduplication do not co-occur in a single Word Stem Formation Rule (WFR). Some examples:

- (8) a) Prefix + Infix: Root Past Participle
- | | | |
|-----|--------|---------------|
| qlb | meqlūb | 'turned over' |
| rbt | merbūt | 'tied' |
- b) Prefix + Doubling: Root Intransitive Verb
- | | | |
|-----|---------|------------------|
| żwż | dżuwweż | 'to get married' |
| 9lm | t9ellem | 'to learn' |
- c) Prefix + Doubling
+ Infix + Suffix: Root Abstract Noun Gloss
- | | | |
|-----|------------|------------|
| bny | tābennāyet | 'masonry' |
| wkl | tāwekkālet | 'gluttony' |

In these complex Word Stem Formation Rules, the ordering of the component simple operations is frequently a crucial factor in the correct derivation of forms. Thus, for example, in a case such as (8c) the ordering of the various component operations must be as follows:

- (9)
- | | |
|---|------------|
| Root: | bny |
| a. Double second radical, infix /ā/ after third segment | bnnāy |
| b. Prefix, Suffix: | tābnnāyet |
| c. Automatic Vowel Insertion: | tābennāyet |

Neither the relative ordering of prefixing and suffixing nor the ordering of doubling and infixing rule is significant⁹. However, it is necessary that both doubling and infixing precede prefixing, since otherwise the infix and doubling would not occur at the correct place.

It is desirable that phonological theory provide an intrinsic account of the ordering in such cases. In Moroccan Arabic, the relative ordering of component morphological

operations can almost always be interpreted as follows:

- (10) 1) Doubling or Reduplication
 2) Infixation
 3) Prefixes and Suffixes (no ordering statement necessary)

Concerning the relative ordering of Doubling and Infixing, there are a number of cases where doubling must precede:

- (11) /ḥmamer/ 'mule drivers'

- | | |
|-----------------|----------------|
| a. Root: ḥmr | b. Root: ḥmr |
| 2-Infix: ḥmār | Double: ḥmmr |
| Double: ḥmmār | 2-Infix: ḥmāmr |
| V-Ins: ḥemmār * | -- ḥmāmer G |

Thus, in the derivation of /ḥmāmer/ 'mule drivers,' the correct form is arrived at only if Doubling precedes Infixing. In other cases, it might appear that either ordering is possible:

- (12) /hemmār/ 'mule driver'

- | | |
|---------------|----------------|
| a. Root: ḥmr | b. Root: ḥmr |
| 2-Infix: ḥmār | Double: ḥmmr |
| Double: ḥmmār | 3-Infix: ḥmmār |
| V-Ins: ḥemmār | V-Ins: ḥemmār |

There is reason, however, for believing that (12b) is the correct derivation in this type of case, and hence that Doubling does in fact precede Infixing. The word class formed by the rule illustrated in (12) is that of the so-called "Nouns of Professional or Habitual Activity." This class of words can be formed from roots of any shape. When they apply to quadriliteral roots, the Infix occurs after the third radical, not the second:

- | (13) | <u>Root</u> | <u>Noun of Prof/Hab Activity</u> | <u>Gloss</u> |
|------|-------------|----------------------------------|--|
| | krfs | kerfās | 'one who does thing in a slipshod fashion' |
| | hrwl | herwāl | 'ambler' |
| | zrzy | zerzāy | 'porter' |

If it is assumed that doubling precedes infixing for trilateral

roots (as in [12]), it is possible to unify the rule for the formation of this word class for all roots as follows:

(14) Noun of "Professional/Habitual Activity" Formation

- a) Reduplicate Base (with certain biliteral roots)
 Double Second Radical (2X) (with certain biliteral roots)
 Double Second Radical (with certain trilateral roots)
 (No first operation for quadrilateral roots)
- b) Insert /+ā+/ after third segment.

The operations in (14a) will apply disjunctively to certain root types, while (14b) will operate on all roots. This rule will account for the four ways that this word class can be formed:

(15)	<u>Root</u>	<u>Noun of Prof/Hab Activity</u>	<u>Gloss</u>
	nf	nefnāf	'one who speaks with nasal twang'
	xṭ	xetṭāṭ	'calligrapher'
	xbz	xebbāz	'baker'
	hrwl	herwāl	'ambler'

This type of case suggests that reduplication must precede infixation as well.

Concerning the relative ordering of infixing and prefixes and suffixes, in general it is the case either that infixing must precede (as in [9]), or that no ordering statement is needed. There exists one word class, however, where it might appear that the prefix should be attached prior to the infix:

(16)	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
	medxel	mdāxel	'entrance/entrances'
	meftāḥ	mfāteḥ	'key/keys'
	mekteb	mkateb	'office/offices'

While it could be claimed that the infixing of /+ā+/ after the first radical precedes the prefixing of /m+/ in the plural formation. The trouble with this approach is that it does not permit us to combine this noun plural formation rule with the

common "infix /+ā+/ after the second radical" plural formation rule, nor with any existing rule of plural formation. There are two possible solutions: one is to claim, in view of the fact that "broken plural" formation rules are quite varied both in the quality and the position of the infix, that this a distinct plural formation rule, and that the infixation does indeed precede other affixes. A second possibility would be to claim that Infixation preceding Prefixation is the normal case, but that the marked alternate order can also occur.¹⁰

4.1.3 Non-Phonological Aspects of Word Stem Formation Rules

The operations in (5), together with the language particular makeup of affixes noted in (2), (3), and (4), describe the phonological aspects of WFR's. Other elements of WFR's will include at least the following: syntactic function (e.g. noun formation, verb formation, plural formation, etc.), semantic function (e.g. "habitual/professional action," causative, etc.), and root selection restrictions, by which a WFR is able to identify roots to which it can apply. However, the relation between the phonological aspects of WFR's and these other aspects is not at all predictable. A brief examination of the cases in (2) makes this abundantly clear. First, a given operation can have a variety of distinct syntactic and semantic effects. Thus the rule "Infix /+ā+/ after the second radical" is used to form nouns, verbs, the plural of adjectives, and the plural of nouns. Further, a given syntactic or semantic function is not necessarily tied to a single phonological operation. We find,

for example, that verbal nouns are formed by means of a variety of different operations (Infix /+a+/, suffix /+a/, infix /+i+/, and the possibilities for verb and noun formation in general are even more varied. Finally, there is nothing in the shape of the root which allows us to know which morphological operation it will undergo. Some trilateral roots can only be formed into nouns, some only into verbs, some can be formed into both, and others into neither. The idiosyncratic aspects of WFR's, then, is the association of a given morphological operation with certain syntactic and semantic functions and with a set of roots selection restrictions. The following example illustrates:

(17) Adjective Word Stem Formation

1. Selection Restrictions: Apply to roots /kbr/, /syr/, /rqg/, etc.
2. Phonological Operation: Infix /+i+ after the second radical of the root.
3. Syntactic Function: Assign the category of Adjective ([+noun,+verb]) to the word formed.
4. Semantic Function: none.

(Derives a large class of adjectives, such as /kbir/ 'big,' /syir/ 'small', /rqiq/ 'thin,' etc.

One way of formalizing the facts concerning root selection restrictions is to claim that the Root Formation Rule (chapter 2, rule 14) has the additional role of assigning selection features to roots, which will permit WFR's to identify the roots to which they will apply. Thus, for example, each root which will undergo Adjective Formation rule (17) will be assigned the feature [+Adj. Form.₁]. Further aspects of these Root Selection Features will be discussed in section 2.4 below.

The rigidity of the syntactic and semantic functions of WFR's in Moroccan is easy to exaggerate. The one syntactic

feature which all WFR's assign to words is that of major category (noun, verb, etc.) Other syntactic elements which are at times assigned by WFR's include both subcategorization features (e.g. intransitive to verbs), and grammatical markers (e.g. number and gender to nouns). In many cases the syntactic function of a given WFR differs from root class to root class. Thus, for example, Measure II verbs, commonly called "causatives," actually include a number of distinct syntactic and semantic classes:

- (18) a) *šemmem* 'to cause to smell'
 ketteb 'to cause to write'
 xeddem 'to operate'
- b) *šuwweḥ* 'to get moldy'
 šekkež 'to get jammed'
 bellet 'to get drunk'
- c) *šuwwer* 'to photograph'
 šetteb 'to sweep'
 sellef 'to lend'
- d) *šetteq* 'to applaud'
 šeyyek 'to dress up (intr.)'
 reyyeh 'to take a rest'

Thus, while the verbs in (18a) and (18c) are transitive, those in (18b) and (18d) are intransitive. While the verbs in (18a) and (18b) have relatively stable semantics, those in (18c) and (18d) do not. In other classes of words, such as Measure I and Measure III verbs, there is no pattern of syntactic feature assignment other than that of category. In still other cases, however, a non-categorial syntactic feature is clearly associated with a given WFR:

- (19)

<u>Verb</u>	<u>Gloss</u>	<u>Measure -a</u>	<u>Gloss</u>
<i>9ellem</i>	'to teach'	<i>t9ellem</i>	'to learn'
<i>fekk</i>	'to untie'	<i>tfekk</i>	'to get loose'
<i>suwweb</i>	'to repair'	<i>tsuwweb</i>	'to be repaired'

Thus, the Measure-a verb class includes only intransitive verbs. It appears then that certain syntactic features, such as the subcategorization features for verbs, are at times a function of the WFR which forms the word, and at times not.

4.1.4 Metrical Aspects of WFR's

Perhaps the prime motivation for McCarthy's autosegmental account of Semitic morphology is the fact that many word classes seem to have a fixed canonical shape. In Moroccan, there is far less rigidity in canonical shape than appears in Classical or Modern Standard Arabic. There are actually several possibilities concerning the relationship between WFR's and canonical shape. And in most cases, there is no need for any mechanism other than that of automatic metrical structure assignment discussed in chapter 3. With many word classes, there is no fixed metrical shape produced by the WFR's:

(20) a) Measure-a Verbs

tfekk	'to get loose'	tmennā	'to hope'
tsuwweb	'to be repaired'	tnāseb	'to become related'

b) Broken Plurals

bnāt	'girls'	frādā	'pistols'
knāneś	'notebooks'	āmāyen	'that (pl.) delivered in trust'

c) Diminutives

bwīket	'little package'	bwība	'little door'
xbeyyez	'little bread'	bleyyasā	'little place'
brīqtqa	'little plum'		

Thus, in cases such as (20), substantial variation in canonical shape is allowed, restricted only by general principles of metrical structure.

In other cases, word classes do have a relatively fixed canonical shape, but this shape is predictable on the basis of the WFR which forms it and general metrical principles. Thus, for example, Measure I verbs formed from trilateral roots generally have the shape CCVC, and Measure III verbs the shape CVCVC. But in these cases there is no need to appeal to any mechanism other than the WFR and the general principles of metrical structure assignment discussed in chapter 3.

But there are some cases where the canonical shape of a derived word is regular, regardless of the shape of the root. One of the clearest examples of this is again the nominal class of "professional or habitual activity:"

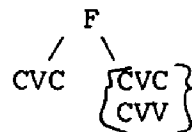
(21) A.	<u>Biliteral</u>	<u>Gloss</u>
a.	hekkāk ʕeḏḏāḏ	‘masseur’ ‘given to biting’
b.	gemgām nefnāf	‘one who grumbles’ ‘one who speaks with nasal twang’
B.	<u>Trilateral</u>	<u>Gloss</u>
	xeddām nessāy	‘worker’ ‘forgetful’
C.	<u>Quadrilateral</u>	<u>Gloss</u>
	hernān semsār herwāl	‘one who grumbles’ ‘real estate broker’ ‘one who ambles’

The biliteral and trilateral forms undergo morphological operations which quadrilateral roots do not. The reason for this is clear: this word class is associated with the canonical shape CVCCVC. But in rejecting the autosegmental account, we appear to be left with no explanation for this regularity.

A solution to this problem is to claim that certain WFR's (e.g. noun of habitual/professional action formation, Measure II formation, certain classes of past participles) are associated with a specific metrical structure. In this view, such rules are marked in that, instead of merely permitting the automatic assignment of metrical structure, they require that their output conform to a specific metrical shape. The WFR forming Measure II verbs, for example, will include the following elements:

(22) Measure II Verb Formation

- i. Apply to roots containing feature [+M-II]
- ii. a) double 2nd segment (2x) [with biliteral roots]
 b) double 2nd segment (1x) [with trilateral roots]
- iii. a) assign [+Verb, -trans] [with certain roots]
 b) assign [+Verb, +trans] [with certain roots]
- iv. Associate Output with



Accordingly, metrical structure will be considered a lexical characteristic of certain Moroccan word classes.

There are two advantages which this proposal has over an autosegmental account: 1) by associating the output with a well-motivated metrical level rather than with an otherwise unnecessary autosegmental tier, we eliminate the redundancy (see chapter 2, section 6) of accounting for the same type of facts at two different levels; 2) this system contains an explanation for the fact that both /CVCCVC/ (e.g. /xeddem/ 'to operate') and CVCCV̄ (e.g. /luwwī/ 'to wrap') are permitted: they are both expansions of a single type of Foot.

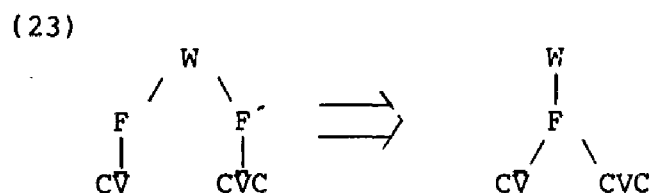
Most Moroccan WFR's (Measure I Verb formation, plural formation, diminutive formation and all WFR's formed solely by prefixes and suffixes) will undergo predictable metrical structure assignment which need not conform to any such idiosyncratic constraints.

4.1.5 WFR's and Metrical Structure Assignment

In chapter 3 it was argued that the assignment of metrical structure in Moroccan Arabic is predictable, and further, it was assumed that the first level at which structure assignment occurs is the word-stem level, after WFR's have applied. It is conceivable, of course, that alternately metrical structure be assigned at an earlier level, to morphemes (root and suffixes) rather than to word-stems. In Moroccan¹¹, however, the assumption that metrical structure is assigned at the the root level leads to unnecessary complication of the grammar, as it would not be possible to provide any motivation for the choice of syllable structure for many Moroccan roots. For example, for roots such as /brd/, should the syllable structure be CCVC (as in /bred/ 'to become cold') or CVCC (as in /berd/ 'cold')? And if one of these were arbitrarily picked, it would also be necessary to complicate word formation rules to change the underlying syllable structure of each morpheme to the derived syllable structure of the word-stem. For these reasons, I will continue assuming that Metrical Structure Assignment occurs after WFR's.

There does exist some evidence that metrical structure assignment occurs prior to the application of phonological change

associated with WFR's. In section 2.4.5, it was seen that long vowels are shortened when in a closed syllable and when preceded by an infixed long vowel in the preceding syllable (e.g. /terbuś/ 'hat' vs. /trābeś/ 'hats'). And in 3.3 I argued that a more revealing metrical formulation of this rule is possible:



Rule (23), however, is not a general phonological rule, but rather only occurs in association with word formation infixes. This fact suggests that word formation processes will at times require access to the metrical structure of newly formed words. One way to permit this would be to propose that metrical structure is assigned to word-stems in association with WFR's, but prior to the application of phonological rules. However, more data of this type needs to be examined for firmer conclusions to be reached.¹²

4.2 Word-based vs. Morpheme-based WFR's

In the previous section a theory of morphology has been outlined for Moroccan Arabic, in which words stems are viewed as derived directly from morphemes (and in the case of Moroccan, a specific subset of morphemes, the roots). This view is not compatible with many currently accepted generative theories of Morphology, such as those contained in Aronoff¹³, Strauss¹⁴, and Anderson¹⁵, in which the word rather than the morpheme is viewed as the basis for derivational processes. In this section I will

attempt a comparison of the word-based and morpheme-based views, and I will attempt to show that while both have advantages and disadvantages, the premise that the morpheme constitutes the base for derivational processes in Moroccan Arabic results in a far simpler linguistic account of that language.

4.2.1 Word-Based Word Formation

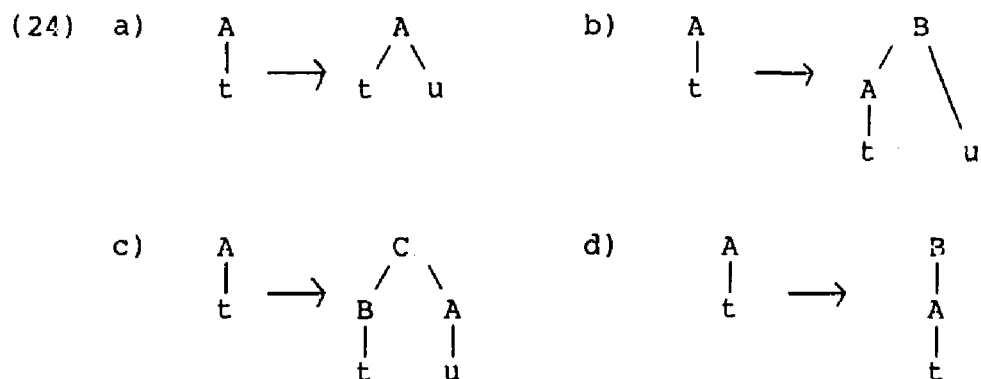
The word-based view of morphology is stated by Aronoff as follows:

Hypothesis: All regular word-formation processes are word-based. A new word is formed by applying a regular rule to a single already existing word. Both the new word and the existing word are members of major lexical categories.¹⁶

The arguments in favor of this view include the following. First, many morphemes don't have meaning (e.g. /cran/ in /cranberry/, latinate morphemes, in English). Hence, there is no way to derive the meaning of words from morphemes which don't have any meaning. Secondly, there are cases where two words having distinct phonological and semantic make-up are derived from identical morphemes, (e.g. /prohibition/ [proIbÍsIn] "a law against drinking" vs. /prohibition/ [prohIbÍsIn] "the act of prohibiting"). These differences can be accounted for by assuming that the former exists as a unit in the lexicon, while the latter is derived from the verb /prohibit/. Further, the word-based view of morphology will also permit an account of "back formation," cases where a new word is formed from a false-complex form (e.g. /peddle/ from /peddler/).¹⁷

Strauss¹⁸ clarifies further the formal aspects that morpho-

logical rules can have within this theory. He notes that the concatenation of terminals and non-terminals can include only four possibilities:



(where nonterminals include A, B, C,
and terminals include t,u.)

(24a) characterize inflectional processes, since these permit no categorial change, which is, according to Strauss, the "chief characteristic" of inflectional morphology.¹⁹ (24b) characterizes derivational morphology, where the attachment of the terminal u can change the category of the word. (24c) characterizes compounding; and (24d) characterizes zero-derivation: category change without affixation (e.g. the English verb "book" from the noun "book").

It is useful to examine the characteristics of a word formation theory of the type proposed by Aronoff and Strauss. It will include the following features:

1. Words in the lexicon can either be simple or derived; while simple words are mono-morphemic, derived words (in English, those composed of latinate suffixes, those whose structure is not semantically or syntactically predictable, etc.) are composed by the concatenation of meaningless morphemes. Thus, the word base

theory presupposes the existence of a set of lexicon-internal word formation rules which will generate these morphologically complex base words.

2. Derived words are formed by WFR's from base words in the lexicon. The WFR's must be able to do the following:

- a) generate a predictable semantic change in the base;
- b) generate a predictable phonological change in the base word (in English, through the addition of an affix);
- c) generate a predictable syntactic change in the base word (e.g. change of category, case and gender marking, etc.).

3. But how are we to know if a given process is lexicon-internal or a genuine WFR? Aronoff claims that WFR's are "regular" processes; first, they produce a predictable semantic and syntactic relationship between the base and the derived form, and second, they are productive except when "blocked" by the application of an alternate WFR.

4.2.2 Problems for the Word-Based Theory

The notion that certain classes of words are derived from other classes has been a fairly accepted one in the description of Moroccan and Semitic languages in general. Harrell,²⁰ for example, consistently explains the relationship between words containing the same roots as one in which one form is derived from another, usually the more complex from the simpler one. Thus, Measure II Verbs are seen as derived from Measure I Verbs, Measure-a Verbs are derived from Measure I, II, and III verbs, verbal nouns are derived from verbs, plural nouns from singular

ones, etc. This view is also implicit in the redundancy rules used by McCarthy to account the relationships between a Noun and its plurals or its diminutive (see chapter 2, section 6).

There are certain advantages to this approach. First, it incorporates an explanation of the semantic relationship which exists between two related words. Thus, by claiming that Measure II Verbs are derived from Measure I Verbs (e.g. /feyyeq/ 'to wake [tr.]' from /ffiq/ 'to wake up [intr.]'), the semantic relationship between these forms is captured: Measure II Verbs create causative verbs from Measure I Verbs. This semantic relationship is clearer in some cases than in others; thus the relationship between a noun and its broken plurals (e.g. /bnāt/ 'girls' from /bent/ 'girl'), is more straightforward than that between a Measure I verb and a Measure III verb (e.g. /rže9/ 'to return' vs. /rāže9/ 'to review.' A second advantage is that this approach permits a formalization of the systematic phonological relationship between such pairs. The fact that all Measure III Verbs have the shape CVCVC is explained by means of the WFR which relates this verb class to its base, Measure I verbs.

There are, however, a number of important problems created by this view. First, in many cases, the assumption that one word stem is derived from another will result in unnecessary complication of the morphological rules. The following cases illustrate:

(25)A. <u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
dalya	dwalī	'vine'
maṭīṣā	mwāṭeś	'tomato'
sāqya	swāqī	'irrigation ditch'
hedra	hdūr	'conversation, chat'

B. rāʔel	rʔāl	ʔmanʔ
māṭer	mṭār	ʔrainʔ
ṣāḥeb	ṣḥāb	ʔfriendʔ
ṣāḥed	ṣḥūd	ʔwitnessʔ

C. <u>Verb</u>	<u>Gloss</u>	<u>Verbal Noun</u>	<u>Gloss</u>
kemmel	ʔto finishʔ	tekmāl	ʔcompletionʔ
lebbes	ʔto dressʔ	telbās	ʔdressing (tr.)ʔ
kesset	ʔto robʔ	teksāt	ʔrobberyʔ

D. <u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
qāyed	quyyād	ʔchiefʔ	sāʔel	soyyāl	ʔbeggarʔ
rāyes	ruyyās	ʔchiefʔ	ḥāzeb	ḥuẓẓāb	ʔstewardʔ
kāteb	kuttāb	ʔsecretaryʔ	ḡāmel	ḡummāl	ʔgovernorʔ
ḥākem	ḥukkām	ʔrefereeʔ	šābb	šubbān	ʔyoung manʔ

In each case, a new type of morphological operation will be required. In (25A) the plural formation rule will have to delete the stem final /ā/ of the singular. In (25B) and (25D), it will have to delete the long vowel /ā/ in second position of the singular, and in (25C), the verbal noun formation rule have to degeminate the middle radical. What makes these additional operations even more objectionable is that their only effect is to "undo" the operation by which the base was formed from the root.

If we assume instead that all derived word-stems are formed directly from the root, no such complications are required, and we can limit all morphological operations to those discussed in section 1.1. In (25A), for example, the WFR forming the singular noun includes the operation "suffix /+ā/" while the WFR for the formation of the plural does not, so that no additional "delete /+ā/" operation is needed.²¹

In other cases, the base word class to which a given WFR must presumably apply is not predictable. The "nisbas of professional or habitual activity" demonstrate this clearly:

(26) A.	rʕel	‘foot’	reʕlī	‘foot soldier’
	bher	‘sea’	behri	‘sailor’
	mūsiqā	‘music’	mūsiqi	‘musician’
B.	bnāder	‘tamborines’	bnādiri	‘tamborine maker’
	kwāret	‘cards’	kwārti	‘card player’
	fnādeq	‘hotels’	fnādi	‘hotel keeper’
C.	meštā	‘comb’	mšāyiti	‘comb maker’
	qubb	‘bucket’	qbāybi	‘bucket maker’
	džāž	‘chicken’	džāyži	‘fowl merchant’

Thus, in (26A) the nisba noun are formed from the singular noun base, and in (26B) from the plural noun base; but in (26C), they are formed from a base (CCāyC) that does not have an independent existence as a base word class. These facts cannot be simply explained within a word-based view of derivational morphology. Within the morpheme-based theory outlined in 4.1.1, no such problem arises, and the phonological aspects of this Nisba formation process (26) can be abbreviated as follows:

(27) Nisba of Prof. or Habit. Activity Formation

- a. Infix /ā/ after 2 (for some roots [24B])
Infix /āy/ after 2 (for certain roots [24C])
No operation (for certain roots [24A])
- b. Suffix /+i/

Even more problematic for a word-based theory of morphology are those cases where gaps exist in the class of base words. Aronoff²² notes that such cases, if found, would constitute clear counterexamples to the word-based theory. Such counterexamples do exist in Moroccan Arabic:

(28) A.	<u>Measure I</u>	<u>Gloss</u>	<u>Measure II</u>	<u>Gloss</u>
	fīq	‘to awake’	feyyeq	‘to wake (tr.)’
	xʕer	‘to lose’	xexʕer	‘to destroy’
	---	---	fežžez	‘to take for a walk’
	---	---	suwweq	‘to shop’

B.	<u>Verb</u>	<u>Gloss</u>	<u>Noun</u>	<u>Gloss</u>
	xbez	'to make bread'	xebbāz	'baker'
	n̄zer	'to plane'	nežžār	'carpenter'
	kdeb	'to lie'	keddāb	'liar'
	---	---	beqqār	'cattle raiser'
	---	---	heddād	'blacksmith'
	---	---	beqqāl	'greengrocer'

Thus in cases such as (28A), there are no Measure I Verb from which to derive corresponding Measure II Verbs, while in (28B), it frequently occurs that there is no Measure I verb which corresponds to a Noun of Habitual Action. In many such cases, it is still possible to find a related word which might instead serve as a base. Thus, /suwweq/ 'to shop' can be derived from the noun /sūq/ 'market', and /heddād/ 'ironsmith' can be derived from the noun /ḥdīd/ 'iron.' But even this weakened version will not work in many cases: for cases such as /fežžēž/ 'to take for a walk' and /beqqāl/ 'greengrocer', there is neither a corresponding noun nor verb from which it can be derived. The word based theory seems obliged to claim that some Nouns of "Professional/ Habitual Activity" are derived from Measure I verbs, some from nouns, and others directly from roots.

A final problem with the view that certain word-stems are derived from others is that it makes clear predictions concerning the semantics of the derived word. If word X is derived from word Y, the difference in meaning must be predictable. But this is frequently not the case:

(29) A.	<u>Base</u>	<u>Gloss</u>	<u>M-II Verb</u>	<u>Gloss</u>
	sūq	'market'	suwweq	'to shop'
	xrež	'to go out'	xerrež	'to develop'
	yṭā	'lid'	yettā	'to cover'
	xṣer	'to lose'	xexṣer	'to destroy'

B.	<u>Base</u>	<u>Gloss</u>	<u>M-a Verb</u>	<u>Gloss</u>
	žūž	'two'	džuwwež	'to get married'
	lāqā	'to find'	tlāqā	'to meet'
	9ellem	'to teach'	t9ellem	'to learn'

C.	<u>Base</u>	<u>Gloss</u>	<u>Pres. Part.</u>	<u>Gloss</u>
	rkeb	'to ride'	rākeb	'riding'
	n9es	'to sleep'	nā9es	'sleeping'
	zīd	'to add'	zāyed	'unnecessary'
	bqā	'to stay'	bāqī	'still'

In fact, an examination of the examples in Appendix XXI and XXII makes it clear that while it is usually clear how the derived word might have gotten its meaning, it is rare that it is completely predictable on the basis of the meaning of the base.²³

In addition to these problems with the word-based view of derivational morphology in the description of Moroccan, there also exists, I believe, a more general theoretical problem. An important though neglected aspect of the word-based theory is the distinction between "regular" WFR's, which apply to words to form new words, and lexicon-internal WFR's which apply to meaningless morphemes to form words in the lexicon. The importance of this distinction can be seen in the following English examples:

(30)	<u>Xion</u>	<u>Xive</u>	<u>Xor</u>	<u>X*</u>
	incision	incisive	incisor	*incise
	locomotion	locomotive	locomotor	*locomote
	emulsion	emulsive	--	*emulse

Aronoff argues that the Xive and Xor forms are derived not from the non-existent base /X/, but rather from the /Xion/ form. But clearly the Xion forms are themselves composed of more than one morpheme. We must conclude then that this base is itself formed by a non-regular, lexicon-internal WFR, similar in nature to those applying to /cran/ morphs.

If morphological processes are to be divided in this way, it is important that adequate criteria exist for the distinction. Aronoff argues that the notion of "regularity" is tied up to the directly related notions of productivity and semantic coherence: the greater the productivity, the greater the semantic coherence. But in Moroccan Arabic the productivity of WFR's varies greatly -- from extremely unproductive to fairly productive. I know of no processes which are completely general, applying without exception to a given class of bases. Nor is the notion of semantic coherence more helpful in this regard. Some of the most semantically coherent WFR's, such as many of the plural formation rules, are among the least productive processes in Moroccan. Thus, for example, the formation of plurals by infixing /+ā+/ after the second radical and prefixing /ʔ/ (e.g. /škel/ vs. /ʔeškāl/ 'type/types') is limited in application to perhaps a dozen nouns. Far more productive, though less semantically coherent, is the formation of Measure II verbs from Measure I Verbs (e.g. [16]). We are left, then, with no adequate criterion for distinguishing the two types of WFR's required by the word-based theory of morphology.

There is some evidence that native speakers do not divide morphological processes into those which are lexicon-internal, and those which are regular. The following examples illustrate:

- (31) A. do redo reredo(?)
 tell retell reretell(?)
 read reread rereread(?)
- B. return reread(?)
 relieve rerelieve(?)
 regard reregard(?)

- (32) A. happy happily
 sudden suddenly
 hopeless hopelessly
- B. sickly sicklily*
 homely homelily*
 manly manlily*
 weakly weaklily*

In (31A) we see that the productive prefix /re+/ "to do again" can apply to virtually any verb except one that already contains the prefix /re+/, even those which are formed by a clearly lexicon-internal rule (31B). (It is interesting to note that a phonologically distinct form of the prefix /re+/, one which carries greater emphasis and higher tone, can apply to any verb containing the suffix /re+/ [e.g. /réredo/ and /réreturn/.]) Similarly, in (32) we find that the productive /+ly/ suffix can not apply to adjectives which already contain the /+ly/ suffix. The word-based theory does not predict these gaps.

4.2.3 Morpheme-based WFR's

The notion that morphemes constitute the base for word formation is not a novel idea; rather it was the generally accepted viewpoint in most pre-Generative studies of Morphology, (e.g. Bloomfield.²⁴ However, the definition of the term morpheme found in these earlier works is different from that which I propose here. A morpheme was defined as "the minimal sign," the smallest unit of meaning in a language. The problem with this definition, as Bloomfield himself noted, is that there exist morphemes which have no meaning. In Moroccan it would be an impossible task to attempt to assign a systematic meaning to all roots.

In this work I will propose for Moroccan Arabic a theory which differs from earlier versions of morpheme-based Morphology as well as from the current word-based view. A preliminary version will have the following features:

(33) Morpheme-Based Morphology: Hypotheses:

- 1) All word-formation processes are morpheme-based;
- 2) A morpheme is defined as an ordered set of segments generated by the Morpheme Formation Rules of the language (in Moroccan Arabic, chapter 2'd rule 16);
- 3) Morphemes are syntactically and semantically empty;
- 4) WFR's are associated with lexical insertion:
 - i) the assignment of major categorial features to words (and at times other grammatical features);
 - ii) semantic interpretation;
 - iii) assignment of metrical structure.

There are a number of advantages which a theory of this type offers a language such as Moroccan. It permits a simple account of morphological operations, limiting these to the five types discussed in section 1.1. It permits an explanation of gaps in classes of "base" words; since all word classes are formed by WFR's applying to an idiosyncratic set of roots, gaps in all word classes are to be expected. Like the theory of word-based morphology, it contains an explanation of morphemes which do not have meaning. The formal relationship between words of different classes is explained as a function of the root and the different WFR's which can apply to it. And finally, unlike the word-based hypothesis, it makes no predictions regarding the semantic and syntactic relationships between words. Thus, the fact that some Measure II verbs have

corresponding Measure I verbs, some corresponding nouns, and some neither is not problematic, since all are formed directly from roots, not from one another. Similarly, the fact that the meaning of a given word is not predictable on the basis of the meaning of a related word of a different class does not pose a problem, since both are derived directly from a meaningless root, and assigned semantic interpretation independently after the WFR has applied.

4.2.4 Problems for a Morpheme-Based Theory

While a morpheme-based theory avoids many of the pitfalls of a word-based theory, there remain a number of important problems which should be noted. Since WFR's within this theory serve only to relate a word to a root, there appears to be no way to formalize the special relationships, both semantic and syntactic, which certain word classes have with others. Thus, for example, the relationship between /bit/ 'room' and /byʊt/ 'rooms' is perfectly straightforward: they have identical syntactic and semantic features, except that one is in the singular and the other in the plural. Further, there are no gaps occurring between them: if there is a plural form, there is a singular.²⁵

Relationships of this type can, I believe, be formalized by appeal to the selection features of roots. Roots, it will be recalled, will be required to have certain selection features which will permit the WFR's to identify them. A given root will normally require a substantial number of features, since most

roots will undergo more than one WFR. Thus, the root /gls/ need be marked for application of Measure I verb formation (/gles/ 'to sit'), Measure II verb formation (/gelles/ 'to seat'), feminine noun formation /gelsā/ 'dressing room,' broken plural formation (/glāsī/), etc. Further, as we have seen in 4.1.1, a given WFR will at times apply to different classes of roots, which is to say, roots containing different selection features. Thus, for example, the WFR which forms nouns of "professional or habitual action" (14) will apply to two different types of biliteral roots (those to be reduplicated, and those whose second radical will be doubled twice), a certain class of triliteral roots, and a certain class of quadri-literal roots.

Special relationships between certain word classes can be viewed in terms of redundant root selection features. The case of broken plural rule (Infix /+ā after the second segment) provides a good example of how this might work. We might formalize this rule as follows:

(34) **/ā/ Broken Plural Formation**

1. Selection Restrictions: apply to roots with following root selection features:

RSF ₁	(e.g. /bnt/, fndq/, etc.)
RSF ₂	(e.g. /9mm/, etc.)
RSF ₃	(e.g. /dry/, etc.)
RSF ₄	(e.g. /xǝm/, etc.)
RSF ₅	(e.g. /z1/, etc.)

2. Morphological Operations:

- a) Double Second Radical (roots with RSF₂, RSF₃, RSF₄)
Reduplicate Base (for roots with RSF₅)
- b) Infix /+ā+ after second segment.

3. Syntactic Function:

Assign Syntactic Features [+Noun, +Plural]

- Derivations: 1. /bnāt/ 'girls,' /fnādeq/ 'hotels'
2. /9mām/ 'uncles'
3. /drārī/ 'boys'
4. /xdādem/ 'workers'
5. /zlāzel/ 'earthquakes'

Note that the WFR's which will form the singular nouns will refer to the same classes of roots (roots with the same Root Selection Features). One such rule, that applying to roots containing RSF 1, 2, and 3, can be formulated as follows:

(35) Noun Formation 1

1. Selection Restriction: Apply to Roots RSF₁, RSF₂, RSF₃, etc.
2. a) Double Second Segment (for Roots RSF₂, RSF₃)
None (for Roots RSF₁)
b) Infix /e/ after first segment
3. Syntactic Function: [+Noun, -Plural]

- Derivations: 1. /bent/ 'girl,' /fendeq/ 'hotel'
2. /9emm/ 'uncle,' /derrī/ 'boy'

In this way, the special relationship between the word class of singular nouns and that of plural nouns (e.g. /bent/ vs. /bnāt/ can be captured: they are both formed from the same root, by means of the application of a WFR which refers to the same root selection feature (RSF₁). Further, it predicts that no gaps will occur in such pairs of word classes, since both WFR's will automatically apply if the required Root Selection Feature is present in the root. It also permits a simple explanation of the fact that certain word classes can undergo distinct processes with identical syntactic and semantic functions. Thus, for example, for the nouns of "professional/habitual

activity," two plural forms are possible: one, the broken /+ā+/ plural (34), and the plural formed by the suffix /+a/ (/xādem/ or /xeddāmā/ 'workers'). This fact can be formalized by claiming that both plural formation processes apply to roots containing the same Root Selection Feature (RSF₄). Finally, it is possible that rules of semantic interpretation also refer to Root Selection Features, thereby explaining the straightforward semantic relationship of such pairs.

There is evidence, however, that the morpheme-based hypothesis can not alone account for derivational processes in many languages. First, it does not account for cases of compounding, and especially those cases where the meaning of the derived word totally predictable on the basis of its component parts (e.g. bookstore, meatstore, etc.). Secondly, while appeal to Root Selection Features can account for special relationships between word classes, it does not explain cases where two different WFR's contain identical component parts which apply to identical roots. We have seen cases of this in Moroccan:

(36)		
A.	Singular WFR	B. Plural WFR
i)	reduplicate (roots RSF ₅) double 2x (roots RSF ₂) double 1x (roots RSF ₁)	i) reduplicate (roots RSF ₅) double 2x (roots RSF ₂) double 1x (roots RSF ₁)
ii)	infix /ā/ (all roots)	ii) infix /ā/ (all roots)
iii)	--	iii) suffix /+ā/ (all roots)
Derives:	xeddām 'worker' nezzār 'carpenter' etc. etc.	xeddāmā 'workers' nezzārā 'carpenters'

However, as noted in chapter 4 section 1.4, we can in fact account for the fact that both rules undergo identical subcomponents i) and ii) with identical classes of roots, by appealing to the fact that the output of both rules are associated with a specific metrical structure.

While I believe a morpheme-based theory of this type will account for the Moroccan data, it is nonetheless clear that no similar explanation is available to account for a variety of morphological processes in many other languages. In English, for example, there are a number of rules which apply to almost any words of a specific category:

(37)	<u>Adjective</u>	<u>Noun</u>
	happy	happiness
	hopeful	hopefulness
	unfaithful	unfaithfulness

In these cases, a morpheme-based theory does not account for the fact that both Noun formation and Adjective Formation undergo identical subrules (/+ful/ or /un+/). Even more problematic are cases of compounding (e.g. /+store/ [bookstore, meatstore, drugstore, etc.]). While these types of cases do not occur in Moroccan Arabic (there are no compounding processes), it is nonetheless necessary to incorporate the mechanisms used in the description of Moroccan into a more general theory of Morphology.

I believe a possible solution to this problem would be to propose a synthesis of the Word-based and Morpheme-based views, by borrowing the notion "level-ordered morphology" from the theory of "Lexical Phonology" (as in Kiparsky²⁶, Mohanan and

Mohanan²⁷, and others). Accordingly, (33.1) can be revised as follows:

(38) Revised Hypothesis

1. Word-Stem Formation Processes (Derivation) consists of two levels. Level 1 morphological rules are morpheme-based, and their output are fully specified lexical items (word-stems). Level 2 morphological rules are word-based, applying to classes of output of Level 1 rules. The semantic and syntactic properties of the output of Level 2 rules is predictable on the basis of their input.

Level 1 morphology, then, can be characterized by (33), while Level 2 morphology will have the formal characteristics noted by Strauss (24). While a study of the latter is outside the scope of this work, two points should be noted. First, it is important that adequate criteria exist for the distinction between Level 2 Derivation and Inflection. I will return briefly to this question in the following section. And second, while Level 1 Morphology is clearly lexicon-internal, I know of no reason for insisting that Level 2 morphology also apply inside the Lexicon (c.f. Kiparsky²⁸). The fact that in many cases (e.g. [37]) the semantic and syntactic output of many such processes is completely predictable on the basis of the input and the WFR might well constitute counterevidence to this view.²⁹

4.3 Derivation and Inflection

An underlying assumption of previous sections has been that morphological processes in Moroccan Arabic are to be divided into two types: 1) derivational processes, Word-Stem Formation Rules which apply directly to the root and result in the formation of the word-stem; and 2) inflectional processes, which

apply to word-stems to form the inflected word. The principle motivation for this distinction has been a practical one, noted in chapter 2, section 6: it is not possible to correctly predict the derivation of inflected forms unless both a root and stem level are postulated.

The division of morphological processes into these two types is not a novel idea. There has been, nonetheless, substantial disagreement regarding the characteristics of derivation and inflection, and there is no generally accepted view concerning the criteria for determining whether a given morphological process is derivational or inflectional. The goal of this section is to examine this difficult question in the light of the morphological data from Moroccan, which in many respects is particularly useful in the attempt to establish a principled basis for the distinction between these two types of processes.

4.3.1 Previous Proposals

There is no shortage of proposed criteria for the distinction between derivation and inflection. Most, however, turn out either to be easily falsified or of little practical value.

One commonly accepted view (e.g. Aronoff³⁰) is that inflectional morphemes are composed of grammatical markers: affixes associated with case, tense, person, number, gender, etc. While it is generally true that these types of affixes occur as inflectional affixes in many languages, they can not serve as criteria in this regard. There exist many languages

which contain grammatical markers that are best considered derivational morphemes. In Moroccan, there are no case markers, and tense and person marking are indeed inflectional processes. But many noun plural formation processes, on the other hand, are best considered derivational (Word-Stem formation) processes, for a number of reasons. First, they are typically unproductive, applying to form an idiosyncratic class of words, at times very small in number (e.g. broken plural of nouns by means of the prefix /ʔ-/ with the infix /+ā+/. Secondly, as noted in 3.6, broken plural formation processes do not apply cyclically (e.g. /bīt/ vs. /byūt/ 'room/rooms'). Cyclic rule application is characteristic of inflectional processes in Moroccan, as in many other languages.

The notion of productivity has at times been appealed to. But as Anderson has noted, many inflectional processes are not completely productive (Anderson gives the example of a class of Russian verbs which take no 1st person singular). In Moroccan, the possessive suffixes, presumably inflectional since they apply cyclically, apply in most dialects to only a relatively small class of nouns (see Appendix XVIII). Anderson claims that there are also cases where derivational processes take productive suffixes.³¹ And so again, while it is generally true that inflectional processes are more productive than derivational processes, productivity can not serve as a criterion for the distinction.

Strauss³² claims that the principal characteristic of inflection is that it does not change category. But he does not

intend this to mean³³, nor is it the case, that derivational processes therefore must change category. There are in fact derivational processes in many language which must be considered category preserving (e.g. Anderson's example of /rewrite/ from /write/ in English³⁴). In Arabic, there are numerous cases which within a word-based theory can only be interpreted as category-preserving derivational operations (e.g. derivation of the various verb measures). Hence, while it is generally true that inflectional processes do not change category, this fact nonetheless does not serve as a criterion for distinguishing inflection and derivation.

Anderson himself proposes that it is the overlap between morphology and syntax which defines the domain of inflectional morphology. He states that inflection is that part of morphology which is relevant to syntax. Thus, if an agreement rule causes lexical item X to agree with lexical item Y in property P, then P is an inflectional property for both X and Y. Excluded from the domain of inflection are lexical insertion itself and subcategorization rules, which Anderson claims are part of the lexicon, not syntax.

The Moroccan morphological data, however, includes many cases which I believe to be counterexamples to Anderson's characterization of inflection. First, there are cases, as noted above, where syntactic agreement properties appear to have their source outside of inflection. The Moroccan broken plural formation of nouns, required for syntactic agreement between nouns and adjectives and nouns and verbs, is best considered a

derivational process, since such rules apply non-cyclically and to only small idiosyncratic classes of roots. Feminine gender, most commonly formed by attachment of the suffix /+a/, appears to be a lexical property with other roots:

(39) Mono-morphemic Feminine Nouns

dār 'house'	šems 'sun'	left 'turnips'	yedd 'hand'
suf 'wool'	nefs 'soul'	lerd 'earth'	kerš 'stomach'
nār 'fire'	ʕeyn 'eye'	ʔden 'ear'	nās 'people'
zīt 'oil'	blād 'town'	rzel 'leg'	ʕeqreb 'scorpion'

Such cases are by no means limited to Arabic; these words obviously contain agreement properties, yet it is difficult to see how they can be considered inflectional processes, as they do not undergo any morphological operation at all.³⁵

4.3.2 Inflection as a Syntactic Process

After dismissing a variety of possible criteria for this distinction, Anderson notes that the fundamental insight is that inflection corresponds to paradigmatic changes to a single lexical item, whereas derivational processes form new lexical items.³⁶ This generalization seems to me to be essentially correct, although it remains for the notion "paradigmatic change" to be adequately defined. In determining its definition, there are three aspects which might be considered: 1) phonological make-up of the base and inflected form; 2) syntactic make-up of the base and inflected form; and 3) semantic make-up of the base and inflected form.

The key insight in Anderson's attempt to define inflection is, I believe, that it performs essentially syntactic functions. His error is in further assuming that it is only inflection

which performs them. His view can be modified slightly to more correctly characterize inflection, avoiding the difficulties noted above. What I propose here is that inflectional processes be considered the assignment of a set of non-categorical syntactic properties to a single lexical item, where lexical item is defined as the output of a derivational (word-stem formation) process. This view differs from Anderson in several important aspects.

First, it is not claimed that inflection alone is responsible for the assignment of syntactic properties, for as noted above, it seems very likely that in Moroccan, at least, many agreement properties are not a function of inflection (e.g. as the broken plural or mono-morphemic feminine nouns in Moroccan).

Second, although inflection is not the only place where these properties are assigned, the principal effect of inflection is the assignment of these properties. In other words, inflection is essentially a syntactic operation, one that does not allow idiosyncratic change in meaning or phonological make-up. It is this aspect of inflection that is "regular," since it means that inflected words are always analyzable. Any change in the phonological make-up of the base will be predictable on the basis of the phonological shape of the inflectional morpheme and phonological rules. Any change in semantic make-up is likewise predictable on the basis of that semantic change directly associated with the syntactic change brought about by the inflectional process.

The claim that the phonological shape of the all members of an inflectional paradigm must be predictable is a controversial one, particularly with regard to two types of processes. One is suppletion -- the substitution of an "irregular" inflected form which is phonologically distinct from the base (e.g. the relationship the plural /nsā/ 'women' has with its singular /mrā/ 'woman' in Moroccan, or that which the English past /went/ has with /go/) -- has been traditionally considered an inflectional process. There are, I believe, two problems with this view. First, semantic and syntactic criteria alone do not suffice to determine if two forms are inflectionally related. For if /go+ed/ is related to /went/ by an inflectional rule, why cannot /understand+ed/ be related to /comprehended/? The reason is that it is necessary that members of the same inflectional paradigm be morphemically related as well. And secondly, this view will require that inflectional rules have absurdly complex phonological components (e.g. /mrā /→ /nsā/ or /go/ → /went/), thereby eliminating the possibility of any general theory of possible phonological processes.

A second class of cases which can not be considered inflectional within the theory proposed here is that where a member of a paradigm is not analyzeable either semantically or phonologically into component parts. In Moroccan, for example, certain irregular verbal paradigms (e.g. /klā/ 'to eat', /xdā/) 'to take' should not be considered wholly inflectional. Thus:

(40)	<u>Perfect</u>	<u>Imperfect</u>	
	klīt	nākul	1st Person Sing.
	klīt	tākul	2nd Person Sing.
	klā	yākul	3rd Person Sing.
	klīna	nāklu	1st Person Pl.
	klītū	tāklu	2nd Person Pl.
	klāw	yāklu	3rd Person Pl.

Thus, we cannot claim that there is an exceptional inflectional rule changing the stem /klā/ to /ākul/ (or vice versa); rather the perfect stem and imperfect stem are distinct for this verb: the perfect stem /klā/ is formed from the root /klā/ by the same rule that forms the Measure I Final Vowel Word Class (e.g. /nsā/ 'to forget' /bdā/ 'to start', etc.), while the imperfect stem is formed from the root /ākl/ by the rule which infixes 'u' after the second radical of sound roots (e.g. /dxul/ 'to enter', /sxun/ 'to snore', etc.). The fact that both these word-stem formation rules are independently required lends support to the view that these irregular forms should not be related at the inflectional level. We have seen a similar case in Palestinian Arabic in 3.4, where it is argued that the perfect stems are formed at the derivational rather than inflectional level, thereby accounting for the lack of phonological predictability of the stem.

According to this view, then, the syntactic properties of words can be generated at three levels: 1) lexically (such as /mrā/ vs. /nsā/, or /go/ vs. /went/); 2) derivationally (such as irregular verb stems or noun plural formation in Moroccan); and 3) inflectionally (such as /źber/ 'he went' vs. /źbert/ 'I went.' The fact that morphological rules do not apply if there exists a lexical item which contains all the morpho-syntactic

features which would be assigned by a morphological rule can be formalized by a slightly expanded version of Anderson's "blocking" filter:

- (41) When morphological rule X refers to features $M=F_1...F_i$ in morphosyntactic representations, and all the features in M are already specified in the lexical identity of a given stem S, then X is blocked from applying to the pair [S,M].

Accordingly, forms which are fully specified as to their syntactic features prior to the application of inflectional rules (e.g. cases of suppletion) will undergo no inflectional processes. Forms which are partially specified (e.g. broken plurals) will be blocked from application of the inflectional plural formation process. It seems, then, that the fundamental insight into the definition of inflection is that it is responsible for the generation of necessary syntactic properties which have not been generated at the lexical or derivational levels.

Finally, note that this characterization of inflection permits a principled basis for distinguishing between "Level 2" (word-based) morphology (as outlined briefly in the previous section) and inflection. First, inflectional processes are regular, in that they will assign necessary syntactic features to underspecified stems. This is not the case with Level 2 processes. Second, as Strauss has noted, Level 2 processes can cause a change in category (as in [Adj+ness]_N), while inflection does not. Level 2 processes can also result in a predictable change in semantics (e.g. /book+store/) which have no relevance to syntax. Finally, inflection is claimed to be phonologically analyzeable; this claim is not made for Level 2 morphology.

4.3.3 Inflection vs. Derivation

The characterization of inflection proposed in the previous section provides a solid base for determining the type of processes which can be inflectional. It will not, however, serve to permit us to predict in all cases whether a given process is inflectional or derivational. There is nothing which prohibits a derivational WFR from performing a purely syntactic function. In Moroccan, however, there are a number of interesting differences in the mode of application of inflectional and derivational processes which are useful in distinguishing them. These include:

1) Rule Ordering - Derivational WFR's apply disjunctively and non-cyclically at each level (in Moroccan, only at Level 1). This means that it is not possible for a sequence of two WFR's to apply to a root, and further, that phonological rules treat the output at each level of derivational WFR's as a unit, without reference to internal boundaries. (This is equivalent to the Bracket Erasure Convention of the theory of Lexical Phonology.³⁷) Thus, we have seen that the vocalization process does not apply cyclically to word-stems formed by derivational rules (e.g. [[twy]+an] → /tūyan/ 'a fold' vs. [twy] → /twɪ/ 'to fold').

Inflectional affixes apply cyclically: all phonological rules will apply to the innermost constituent (the word stem), and innermost brackets are then deleted; rules will apply cyclically to each new innermost bracket until the maximal domain of application, the inflected word, is reached (Chomsky

and Halle³⁸). In section 4 I will further argue, following a suggestion by Langendoen (personal communication), that an insightful account of the ordering of inflectional affixes can be obtained using a set of Phrase Structure Rules.

Finally, derivational rules will be ordered intrinsically prior to inflectional rules. This is a rather obvious fact, since inflectional processes operate on the output of derivational processes, the word stem. It will, nonetheless, obviate the need for extrinsic rule ordering statements in a few cases:

- (42) U.R. [[mknās + Infix [ɪ] + ɪ]
 Infix & Suffix [[mk [+ɪ+] nās] +i]
 V-Shortening [[mkɪnes] +ɪ]
 V-Deletion [mkɪnsɪ] 'Inhabitant of Meknes (dim.)'

Thus, in (42), it is necessary that Vowel Shortening precede Vowel Deletion for the correct form to be derived. This is, of course, what is predicted by the intrinsic ordering of derivational processes prior to inflectional ones.

The intrinsic ordering of morphological rules, then, will be as follows:

- (43) 1. Morpheme Formation Rules
 a) Formation of Roots and Affixes (Chapter 2, Rule 14)
 b) Assignment of Root Selection Features
 2. Word-Stem Formation Rules:
 Root Based WFR's discussed in previous sections.
 3. Word-based Rules:
 None in Moroccan Arabic
 4. Inflectional Rules
 Formation of inflected words from word-stems.

2) Geminate Clusters - As noted in chapter 2, derivational processes freely break up geminate clusters. Thus, for example, in verbal noun formation (e.g. /fkāk/ 'deliverance'), broken

plural formation (e.g. /ḥkāk/ 'boxes'), adjective formation (e.g. /rqiḡ/ 'thin'), and others, geminate clusters are divided. Inflectional processes, on the other hand, do not normally break up geminate clusters;³⁹ thus, in some Southern dialects the general vowel insertion process inserts /e/ to support the syllable in /lektāb/ ([l+ [ktāb]] 'the book') but not in /ellwān/ ([l+ [lwān]] 'the colors'). An explanation for this fact is inherent in the proposals made in chapter 3 section 7 regarding geminate clusters. There it was claimed that geminate clusters are normally assigned to a distinct syllabic category, the Margin, inside the Onset of the syllable, thereby explaining the distinct phonotactic constraints which apply to them. However, since metrical structure is not assigned until after derivational rules have applied, it is not surprising that they can be divided by WFR's, since they are not yet constituents of any syllabic category.

3. Differences in Phonological Change - Phonological change occurring in association with derivational WFR's is often distinct from that associated with more general inflectional processes. These differences include the following:

i) Distinct vowel redundancy rules in the word-stem formation and inflectional levels: thus, the vowel /e/ is pronounced [I] in unmarked environments when inserted by word stem formation processes, but is pronounced as a schwa when inserted by automatic inflectional processes.

ii) Distinct vowel shortening rules apply at these two morphological levels: the word formation version applies only

when an infix is added; the inflectional version applies when a suffix is added.

iii) In many cases, there are distinct results when a suffix beginning with a vowel is added to a stem ending in a vowel. Thus, it is quite common to insert a glide between the two vowels when the suffix part of a word-stem formation process (e.g. /ħlɒ/ 'sweet [s.]' vs. /ħlɒwɪn/ 'sweet [pl.]', and /meʃrɪ/ 'Egyptian [m.]' vs. /meʃrɪyɐ/ 'Egyptian [fem.]'). But with inflectional processes, the suffix vowel is always deleted in such cases (e.g. /ʒebrɒ + ek/ [ʒebrɒk] 'they found you [s.]').

4. In Northern dialects, there is a difference in behavior in the voicing assimilation which affects the prefix /t+/. The word formation prefix /t+/, forming Measure a Verbs, assimilates in voicing when immediately preceding any voiced consonant. But the inflectional prefix /t+/, indicating second person - imperfect tense, assimilates in voicing only when immediately preceding a coronal obstruent.

One of the important advantages of a theoretic distinction between derivation and inflection is that it permits an explanation of these different modes of rule application, one that is not provided by a theory of morphology which does not make this distinction (e.g. McCarthy's autosegmental analysis). At the same time, these differences can serve as additional criteria in determining if a given morphological process is inflectional or derivational.

4.4 Morphology and Syntax

While a treatment of the syntax of Moroccan Arabic is outside the scope of this paper, in this section I will briefly examine those syntactic aspects which are relevant to morphology, especially the relationship between syntactic agreement properties and inflectional morphology.

4.4.1 Syntactic Agreement Properties

The basic facts concerning syntactic agreement are as follows:

1. The subject and verb agree in person and number, and singular subjects can also agree in gender.
2. Adjectives agree in number with the nouns they modify, and singular adjectives also agree in gender. (The feminine plural form found in Classical Arabic is not used in Moroccan.)
3. Transitive verbs are either followed by a specified direct object, or are inflected by an object suffix (+nī, etc.).
4. Prepositions are either followed by a specified object, or are inflected with an object suffix.
5. Nouns which occur in the construct state are either followed by a specified noun phrase, or are inflected with a possessive suffix.

For purposes of a brief description of these facts, I will borrow here without discussion two conventions recently proposed which can be used to account for syntactic agreement properties. The first of these is the feature notation of Pullum and Gazdar⁴⁰. They propose to collapse the notions of "feature"

and "feature value" by allowing features to have other features as their coefficients:

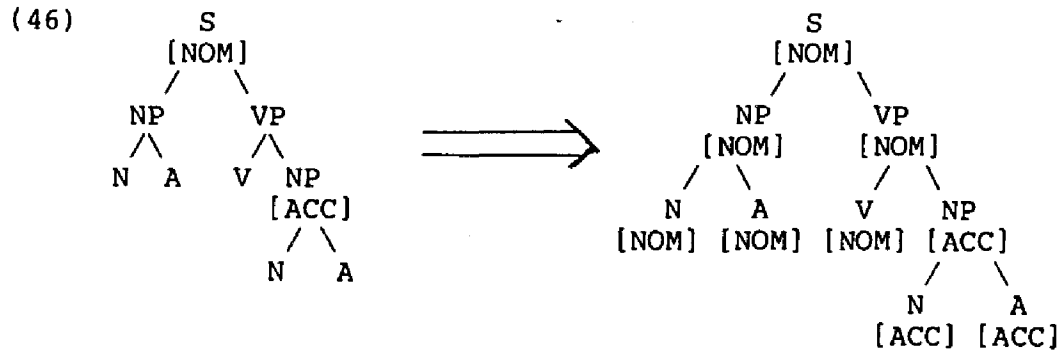
- (44) A feature consists of a feature name optionally followed by one or more features or feature names. Features begin with a left bracket and end with a right bracket.

Using this approach, we can state Moroccan agreement features as follows:

- (45) A. [AGR PER NBR]
B. [PER {1PER, 2PER, 3PER}]
C. [NBR {1NBR, 2NBR}]
D. [1NBR GNDR]
E. [GNDR {MGNDR, FGNDR}]

Agreement for third person feminine singular, for example, will be represented by the feature [AGR [PER 3PER] [NBR 1NBR [GNDR FGNDR]]], while first person plural will be represented as [AGR [PER 1PER] [NBR 2NBR]]. Following Gazdar and Pullum, I will also assume that no feature can have itself as a coefficient.

I will also adopt here Batistelli's⁴¹ notion of case-dropping. In Batistelli's framework Case features [NOM] and [ACC] (his [+nom] and [-nom]) cross-cut the categories NP, VP, and S with different reflexes. Some nodes (S, SPEC of NP, PP) bear inherent case. Nodes which do not bear case are assigned it by Case Dropping: Node A will assign a copy of its case feature to node B (not already bearing Case) which is immediately dominated by A. The following illustrates:



Assuming further that both nominative and accusative nodes take agreement features ([NOM AGR] and [ACC AGR]), many of the agreement facts noted above become a natural consequence of case-dropping. The agreement between Noun Phrase and Verb is assured because they are both assigned identical agreement properties from S. Agreement between Noun and Adjective is ensured, since both will receive identical features from the NP which dominates them.

The fact that the direct object NP receives accusative case can be accounted for by assuming, following Chomsky⁴², that they are assigned case ([ACC]) from transitive verbs. We can further account for the complementary distribution of the presence of an object-inflected verb and the presence of a specified Direct Object as follows:

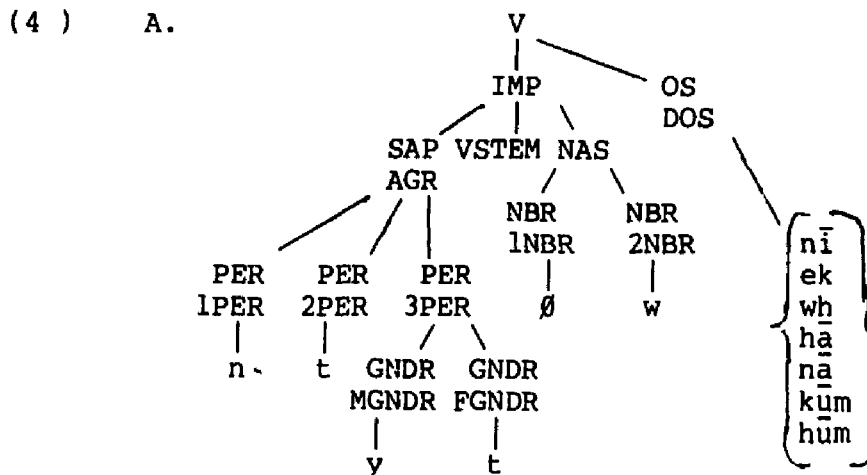
- (47) a. [VERB TRANSITIVE]
 b. [TRANSITIVE {OS, [__NP]}]

The feature [__NP] permits a specified object, and will be responsible for the assignment of [ACC] to that object. The feature [OS] permits an object suffix. Note that if we assume that prepositions and certain nouns (those which can occur in the construct state) also have the features in (47b), the

- (49) a. [V {IMP, PRF} OS IOS]
 b. [IMP SAP VSTEM NAS]
 c. [PRF VSTEM SAS]
 d. [SAP [AGR PER]]
 e. [SAS [AGR PER NBR]]
 f. [NAS [AGR NBR]]
 g. [OS {DOS, PS, OPS}]
 h. [NBR {1NBR, 2NBR}]
 i. [PER {1PER, 2PER, 3PER}]
 j. [1NBR GNDR]
 k. [3PER GNDR]
 l. [GNDR {MGNDR, FGND}]

Thus, (49d), for example, specifies that SAP affixes bear the Agreement features for Person, while (49e) specifies that SAS affixes bear Agreement features for both person and number. The fact that only singular affixes are specified as to gender is captured by (49h). And in affixes which contain no number distinction (e.g. SAP), gender is only specified in the 3rd person (49i).

The following illustrates possible expansions of (49) for the Imperfect Stem:



There are a number of advantages to this approach. First, it accounts for the ordering of inflectional affixes in a constrained fashion. Second, it permits a straightforward

account of the relationship between inflection and syntax: we assume simply that features of inflectional categories percolate to their head (in [41] to V), and further, that when feature match-up between the inflectional and syntactic levels occurs, the inflected V can be mapped onto the syntactic structure generated in (46). Further, it will permit us to collapse the complementary relation that exists in Noun Phrases, Verb Phrases, and Prepositional Phrases between specified objects/possessives and inflected stems. Finally, this approach also permits a simple account of ambiguities which arise:

- (50) a. žbernā 'he found us' or 'we found'
 b. nžebrū 'I find him' or 'we find'

In each case, the ambiguity can be explained in terms of distinct feature specification for the inflected verb:

- (51)
 a. [V PRF [SAS [AGR [PER 3PER][NBR 1NBR]] OS] 'he found us'
 [V IMP [SAP [AGR [PER 1PER]][NAS [NBR 2NBR]]]] 'we found'
 b. [V IMP [SAP [AGR [PER 1PER]][NAS [NBR 1NBR]] OS] 'I find him'
 [V IMP [SAP [AGR [PER 1PER]][NAS [NBR 2NBR]]]] 'we find'

Note that the rules in (49) will need to be expanded to incorporate subcategorization properties of the stem. First, only transitive stems will take Object Suffixes. Hence, we can assume that the syntactic feature [TRANS], with the extensions [TRANS {OS, [__NP]} discussed in the previous section, is borne by certain classes of verb stems, a small class of nouns stems, and most prepositional stems. Secondly, since object pronoun suffixes differ slightly depending on the category of the stem to which they are attached (verb, noun, or preposition [see 2.7 for details]), it is necessary that each category of stem be

subcategorized for a specific Object Suffix (DOS, PS, or OPS).

The proposed framework makes certain predictions concerning the relationship between inflection and derivation. It is claimed that the formal characteristics of derivational processes and inflectional processes are distinct: the former are characterized as a set of ID rules and LP statements as described in 4.1, while the latter are seen as a set of syntactic feature extensions. This formal difference clearly expresses the generalizations discussed in section 3 of this chapter regarding the formal differences between these two levels of morphology.

NOTES

1. Aronoff, op. cit.
2. Anderson, op. cit.
3. The "Nisbas," words formed with the suffix /+f/ or the suffix /ānf/, encompass a wide variety of semantic functions, and include several noun and adjective classes.
4. Measure IX verbs include the color verbs (to become red, etc.). The one clearly predictable syntactic feature that I can discern is that they are intransitive.
5. The one suffix that is not encompassed by this abbreviation is the Nisba suffix /ānf/.
6. Gazdar and Pullum op. cit.
7. Note that since complex processes consisting of two or more simple operations can also apply in many cases, it will be necessary to permit Affixation to apply recursively. We can accomplish this by rewriting the ID Rules for affixation as: S --- {R,S}, A. While this will correctly predict that reduplication and doubling always precede affixation, there remains a problem, since doubling will at times reapply to its own output (e.g. /hemmem/ 'to bathe' from /hm/). I am not certain as to the correct way to formalize this.
8. Gazdar and Pullum, op. cit. p. 1.
9. Note that although in this case the relative ordering of Doubling and Infixing is not crucial, it will be argued below that Doubling does in fact precede Infixing.
10. It should be noted that these cases are not a problem within an Autosegmental analysis, since the Singular/Plural Redundancy Rule which relates such forms does not take into consideration whether they are mono-morphemic or not.
11. Broselow⁴³ has made this same argument for roots in Egyptian Arabic.
12. There is an alternative analysis which I have not followed here. Note that in many cases, nouns of the shape CVCCVC (e.g. kunnās 'notebook') are clearly bi-morphemic, as the long vowel has been inserted as part of the noun formation process (see Appendix XXII, H.2). One might claim that all singular nouns of this shape are formed by this WFR, while the plural formation WFR does not insert one, and hence Shortening Rule (21) is actually not required. The problem with this approach is that there are substantial number of nouns for which there is no

evidence of bi-morphemic structure (e.g. /gesbūr/ 'corriandar,' /keṭṭān/ 'cloth,' /kebbūt/ 'coat,' /serwāl/ 'pants,' etc.). This approach would also leave a gap in root shapes, since there would be no quadri-literal roots of the shape /CC[-con]C/ corresponding to the hollow tri-literal roots /C[-con]C/.

13. Aronoff, op. cit.

14. Strauss, op. cit.

15. Anderson, op. cit.

16. Aronoff, op. cit., p. 1.

17. Aronoff (op. cit, p. 27) assumes that words like /peddle/ were at some point derived from the word /peddler/. This is not necessarily the case: it is possible that when /peddler/ came to be analyzed as bi-morphemic, the word /peddle/ was then formed from the morpheme /peddle/ rather than from the word /peddler/.

18. Strauss, op. cit. pp. 253-256.

19. Ibid., pp. 254.

20. Harrell (1962), op. cit.

21. Note that the rules being objected to are of the same type as Aronoff's /+ous/ deletion, required within his theory to derive cases such as /mordacity/ from /mordacious/. Since words containing /+ous/ are clearly not monomorphemic, one must assume that there exists at one level a rule affixing /+ous/, and a rule deleting it at a different level. Similar types of problems occur with other word classes. Thus, /+y/ deletion is required for /miserable/, /memorable/, /equitable/, /en+/ deletion is required for /durable/, etc.

22. Aronoff, op. cit., pp. 28-29.

23. Aronoff (op. cit., p. 32) argues that since "...morphology is not syntax, this relationship [between base and derived word] will seldom be one of neat compositionality. There will usually be some divergence." The fact that morphology is not syntax is, I believe, irrelevant. A valid theory of morphology will be one which accounts for such divergence. And in English, as in Arabic, it is frequently the case within a word-based theory of morphology that predictions concerning the meaning of a derived word can not be made on the basis of the meaning of the base and the WFR. Even with many of the more productive English derivational processes, it is not always possible to predict what the meaning of the derived word will be:

<u>Base</u>	<u>Adverb</u>	<u>Approximate Meaning</u>
quick	quickly	"in a quick manner"
hopeful	hopefully	"in a hopeful manner" (or) "the speaker hopes that..."
interesting	interestingly	"in an interesting manner"? "it is interesting that..."
awful	awfully	"in an awful manner"
short	shortly	"very" (e.g. /awfully well/) "in a short manner"? "soon"
famous	famously	"in a famous manner"? "very well"

With less productive WFR's, it is frequently impossible to make any predictions as to what the meaning of the derived word might be:

- /+less/: hapless, shiftless, fathomless, listless, reckless;
- /+ful/: awful, lawful, youthful, rightful, tearful, dreadful, wishful, fruitful;
- /+tion/: vacation, congregation, vocation;
- /+ity/: university, sorority, fraternity, community.
- /+able/: personable, suitable, sociable.

However, as noted in section 2.4 of this chapter, a theory of morphology based purely on meaningless morphemes clearly will not work for English either.

24. Bloomfield, Leonard 1933: Language, pp. 161-168.

25. There is one exception: the plural noun /wāldīn/ 'parents' has no corresponding singular form.

26. Kiparsky, op. cit.

27. Mohanan, K. P. and Tara Mohanan 1984: "Lexical Phonology of the Consonant System of Malayalam." Linguistic Inquiry 15.4. pp. 575 - 602.

28. Kiparsky, op. cit. pp. 131-135.

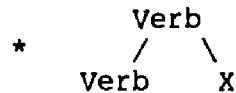
29. Kiparsky (ibid, pp. 136-141), uses the distinct levels of morphology to provide an intrinsic account of a number of rule ordering problems in English, as well as the fact that different WFR's have different phonological processes associated with them (e.g. assimilation in /in+legible/, but not in /non+legible/.)

30. Aronoff, op. cit. p. 2.

31. In support of this claim, Anderson cites the derivational version of /+ing/ in English, and claims that since it is at times completely productive, it is not possible to claim that as a different process it is not productive. I do not think this argument is valid: in Arabic, for example, the prefix /t+/ 'second person' is completely productive, while the prefix /t+/ 'Measure-a Verb' is not.

32. Strauss, op. cit. p. 254.

33. Thus, Strauss (op. cit, p. 264-266) argues that the grammar of English contains a language-particular filter ruling out verbs derived from other verbs:



No such constraint applies for noun formation within his theory.

34. If Anderson is right in claiming that English Verb Formation with /re+verb/ is a derivational process, it would constitute counterevidence to Strauss's claim that English verbs cannot be derived from other verbs (see footnote 33). Within the theory proposed by Anderson, as well as the modification of that theory proposed here, the /write/ vs. /rewrite/ cases cannot be inflectional, since they are not relevant to syntax.

35. Anderson, op. cit., p. 587.

36. Ibid., p. 607.

37. Mohanan and Mohanan's (op. cit.) version of the bracketing erasure convention states that at the the end of a stratum all internal bracketing is erased.

38. Chomsky and Halle, op. cit., p. 60.

39. However, as noted in chapter 3, section 7, geminate clusters can be split by inflectional processes in cases where they would not otherwise be assigned to a well-formed syllabic structure. Thus, the derivation [ḍ+[l+[ḍār]]] → [ḍ+ [ḍḍār] → [ḍḍḍār] 'of the house' is blocked, since the result contains three initial consonants, and cannot be assigned to a well-formed Margin.

40. Pullum and Gazdar, op. cit. pp. 37.

41. Batistelli, Edwin L. 1981: Topics on the Theory of Inflection. Doctoral Dissertation, City University of New York, pp. 26-33.

42. Chomsky, Noam 1965: Aspects of the Theory of Syntax, M.I.T. Press, Cambridge, pp. 90-91.

43. Broselow, Ellen 1979: "Cairene Arabic Syllable Structure." Linguistic Analysis 5, pp. 345-382.

Chapter 5

CONCLUSION

On the basis of discussion in previous chapters, the following linguistic model has been proposed to account for the Moroccan morphological and phonological data:

Segmental Level: following SPE, segments are defined as a set of distinctive features.

Morphemic Level: morphemes (roots and suffixes) are defined as a set of segments. They will be subject to co-occurrence restrictions as noted in 2.6.1, and will be assigned Root Selection Restrictions so that they can be identified for application of appropriate Word Formation Rules.

Derivational Level: Word Formation Rules are of two types:

Level 1: In Moroccan WFR's apply disjunctively to idiosyncratic sets of morphemes and result in the formation of word-stems. WFR's consist of a set of one or more morphological operations (Affixing, Doubling, and Reduplication). The output (word-stems) are assigned certain syntactic features (at least major category) semantic interpretation, and metrical structure.

Level 2: Word-based WFR's (compounding, etc.). I have argued that they are not found in Moroccan.

Inflectional Level: concatenative processes which assign missing syntactic features to word-stems. Their output, the inflected word, can then be mapped into larger syntactic structures. Phonological change associated with inflectional processes are automatic in nature (e.g. vowel insertion/ deletion and vocalization in Moroccan) and are constrained cyclically by the metrical structure of the language.

Syntactic Level: accounts for the order of words in sentences (but not treated in this work).

This model, consisting of clearly defined levels, permits a relatively simple account of the complex Moroccan data within a highly constrained theory of grammar.

APPENDIX I
DIALECTAL VARIATION IN MOKRISSET AREA

A. Additional Fricative Series Following Vowels:

/b/	1. #	2. C	3. Doubled
	biθ 'room'	tbālt 'tables'	xebbe9 'to hide'
	brā 'letter'	derb 'street'	lebbes 'to dress'
	bīr 'well'	xber 'news'	hebbā 'grain'
	4. V C	5. V V	6. V #
	sepsī 'pipe'	šbāpā 'flute'	bāp 'door'
	yeβsā 'dry(f.)'	yāpā 'forest'	shāp 'clouds'
	meβhūt 'surprised'	rīpā 'cliff'	ktāp 'book'
/d/	1	2	3
	dār 'to do'	bda 'to begin'	xeddām 'worker'
	dābā 'now'	berd 'cold'	yeddā 'tomorrow'
	dfen 'to bury'	kdūp 'lie'	quddām 'next to'
	4	5	6
	xedma 'work'	hādā 'this'	blād 'country'
	kudya 'hill'	sīdī 'sir'	zīdī 'new'
	radya 'radio'	yahūdī 'Jew'	b9īd 'far'
/t/	1	2	3
	telz 'snow'	mterqā 'hammer'	hetta 'until'
	tāq 'to trust'	štā 'rain'	setta 'six'
	tlāθā 'three'	9teq 'save'	ketter 'to add to'
	4	5	6
	līθnīn 'Monday'	hādīθā 'accident'	tulūθ 'a third'
	bāθnā 'we spent the night'	?aθār 'trace'	bīθ 'room'
		tāθā 'chamelion'	māθ 'to die'
/k/	1	2	3
	kās 'glass'	škūn 'who?'	sukkār 'sugar'
	kelb 'dog'	burk 'ducks'	sekken 'to calm'
	kbīr 'bit'	bka 'to cry'	tsekkā 'to complain'
	4	5	6
	meqlā 'food'	sācen 'living'	šūc 'thorns'
	šeqrān 'drunk'	febrīcā 'factory'	smeç 'deaf'
	yeçmā 'perhaps'	rāçep 'riding'	hādāç 'that'

B. /d/ and /d̥/ contrast:

/d̥/	1	2	3
	ders 'lesson'	qder 'to be able'	seddeq 'to donate'
	derrī 'boy'	mdey 'to chew'	qedder 'to decree'
	dār 'house'	šweldā 'old coins'	
/d/	1	2	3
	deww 'light'	xder 'green'	feddā 'to complete'
	dlām 'to be dark'	mde11 'umbrella'	meddī 'past'
	dunn 'to think'	bde9 'the inside of bread'	
	dhek 'to laugh'		

APPENDIX II
Distribution of Consonants

A. Obstruents

1. /b/

#__V	Gloss	#__C	Gloss	#C__	Gloss
bāb	'door'	brā	'letter'	śbābā	'flute'
bābā	'father'	bṭāṭā	'potato'	ṭbālī	'potatoes'
bīt	'room'	bkā	'to cry'	xbār	'news'
V__#	Gloss	V__C#	Gloss	VC__#	Gloss
bāb	'door'	xubz	'bread'	krumb	'cabbage'
śāb	'to find'	hebs	'prison'	derb	'street'
dāb	'to melt'			qelb	'heart'
V__V	Gloss		DOUBLE	Gloss	
baba	'father'		xebbe9	'to hide'	
yābā	'forest'		hebbā	'a grain'	
dābā	'now'		lebbes	'to dress'	

2. /t/

#__V	Gloss	#__C	Gloss	#C__	Gloss
telz	'snow'	tqāḏā	'to run out'	mterqā	'hammer'
tāq	'to trust'	tlāṭā	'three'	štā	'rain'
tātā	'chameleon'	tmenyā	'eight'	9ṭā	'to give'
V__#	Gloss	V__C#	Gloss	VC__#	Gloss
māt	'to die'			left	'turnip'
fāt	'to pass'			bent	'girl'
bāt	'to spend the night'			telt	'three-'
V__V	Gloss		DOUBLE	Gloss	
ātāy	'tea'		hetṭā	'until'	
kāteb	'clerk'		setṭā	'six'	
rāteb	'soft'		fetteś	'to look for'	

3. /d/

#__V	Gloss	#__C	Gloss	#C__	Gloss
dūk	'those'	drāri	'children'	bḏā	'to begin'
dār	'to do'	dheb	'gold'	yḏā	'lunch'
dābā	'now'	dxul	'to enter'	kḏūb	'lie'

APPENDIX II (continued)

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
blād	'country'			berd	'cold'
ūzed	'to find'			želd	'skin'
b9fd	'far'			weld	'boy'

V__V	Gloss	DOUBLE	Gloss
hada	'this'	yedda	'tomorrow'
hadita	'accident'	quddam	'next to'
šidī	'sir'	xeddām	'worker'

4. /t/

#__V	Gloss	#__C	Gloss	#C__	Gloss
teblā	'table'	tbālī	'tables'	yta	'lid'
tāh	'to fall'	thīn	'flour'	bātā	'potato'
tebbāx	'cook'	trīq	'street'	qtān	'cotton'

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
sāt	'to blow'	nutq	'pronunciation'	wušt	'middle'
rbāt	'Rabat'			qent	'corner'
kebbūt	'coat'			be9d	'some'

V__V	Gloss	DOUBLE	Gloss
fūta	'towel'	vetta	'to cover'
šbitār	'hospital'	m9etṭel	'late'
bišklīṭa	'bicycle'	šetṭeb	'to sweep'

5. /d/

#__V	Gloss	#__C	Gloss	#C__	Gloss
ḍār	'house'	ḍreb	'to hit'	fdūlī	'noisy'
ḍers	'lesson'	ḍher	'back'	xḍer	'green'
ḍeww	'light'	ḍrūz	'stairs'	hḍer	'to talk'

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
naḍ	'to arise'			werḍ	'rose'
faḍ	'to overflow'			lerḍ	'ground'
yaḍ	'to offend'				

V__V	Gloss	DOUBLE	Gloss
tqāda	'to run out'	seddeq	'to donate'
rwīda	'wheel'	qedḍer	'to decree'
šyāda	'hunting'		

APPENDIX II (continued)

6. /k/

#__V	Gloss	#__C	Gloss	#C__	Gloss
kās	'glass'	kbīr	'big'	škūn	'who?'
dīk	'that'	kmā	'to smoke'	bkā	'to cry'
kull	'all'	kṭeb	'to write'	mkuḥlā	'rifle'
V__#	Gloss	V__C#	Gloss	VC__#	Gloss
flāyek	'boats'			melk	'property'
dīk	'that'			burk	'duck'
šekk	'to doubt'			bank	'bank'
V__V	Gloss	DOUBLE	Gloss		
flūkā	'boat'	sukkār	'sugar'		
sāken	'living'	tšekkā	'to complain'		
mākīnā	'machine'	sekken	'to calm'		

7. /g/

#__V	Gloss	#__C	Gloss	#C__	Gloss
gāmīlā	'pan'	gles	'to sit'	9gez	'laziness'
gezzār	'butcher'	grāžem	'throat'	rge9	'to botch up'
garrū	'cigarette'	grīq	'Greek'		
V__#	Gloss	V__C#	Gloss	VC__#	Gloss
sūg	'to drive'			ferg	'clock'
V__V	Gloss	DOUBLE	Gloss		
šigān	'calves (of leg)'	msegged	'straight'		
māgānā	'watch'				

8. /q/

#__V	Gloss	#__C	Gloss	#C__	Gloss
qāl	'to say'	qrā	'to study'	bqā	'to stay'
qanṭra	'bridge'	qṭān	'cotton'	dqīqa	'minute'
qehwā	'coffee'	qṣīr	'short'	rqīq	'thin'
V__#	Gloss	V__C#	Gloss	VC__#	Gloss
sūq	'market'	weqt	'time'	9unq	'neck'
fāq	'to awake'			ferq	'difference'
yreq	'to drown'			šerq	'east'

APPENDIX II (continued)

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
bāqf	'still'	weggef	'to stop'
wāqaf	'standing'	beqqāl	'grocer'
tlāqā	'to meet'	seqqāya	'drinking fountain'

9. /f/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
fār	'mouse'	flūs	'money'	šfer	'yellow'
fāq	'to awake'	flūkā	'boat'	dfe9	'to push'
ferq	'difference'	fḏulī	'noisy'	mfāteh	'keys'

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
šāf	'to see'	left	'turnip'	šerf	'change'
šif	'summer'			terf	'piece'
šuf	'wool'			nelf	'felt'

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
šāfer	'trip'	tneffes	'to breathe'
šifet	'to send'	šeffe	'to whistle'
kifān	'caves'	teffāh	'apple'

10. /s/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
sā9ā	'hour'	sxḏn	'hot'	nsā	'to forget'
sāl	'to flow'	sme9	'to hear'	ḥsen	'better'
sīr	'go!'	smīyā	'name'	bsālā	'nonsense'

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
kās	'glass'			šems	'sun'
ḡles	'to sit'			hebs	'prison'
flūs	'money'			fels	'a penny'

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
masāḡā	'surface'	hessen	'to shave'
kasel	'laziness'	ḡessās	'guard'
kīsān	'glasses'		

APPENDIX II (continued)

/z/

#__V	Gloss	#__C	Gloss	#C__	Gloss
zad	'to pass'	zrabt	'rugs'	bzeq	'to spit'
zerb	'fence'	zbfb	'raisins'	qzadr	'tinsmith'
zār	'to visit'	zher	'luck'	mziwen	'cute'

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
lūz	'almonds'			xubz	'bread'
fūz	'to succeed'			xenz	'smelly'
hūz	'to get'			terz	'embroidery'

V__V	Gloss	DOUBLE	Gloss
ūzen	'to weigh'	xīzzū	'carrots'
bāzer	'shop'	bezzāf	'a lot'
māzāl	'not yet'	gezzār	'butcher'

12. /s/

#__V	Gloss	#__C	Gloss	#C__	Gloss
şuf	'wool'	şyfr	'small'	bşel	'onions'
şabūn	'soap'	şbitār	'hospital'	qşfr	'short'
şniyā	'tray'	şbah	'morning'	qşem	'section'

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
xelles	'to pay'	wušt	'middle'	ders	'lesson'
xess	'need'			yers	'garden'
drūs	'lessons'				

V__V	Gloss	DOUBLE	Gloss
ūşel	'to arrive'	wuşşel	'to bring'
meḍraşā	'school'	xuşşes	'special'
9aşfr	'juice'	m9eşşeb	'nervous'

13. /ś/

#__V	Gloss	#__C	Gloss	#C__	Gloss
śaf	'to see'	śkūn	'who?'	mśā	'to go'
śedd	'to close'	śher	'month'	hśūmā	'shame'
śezra	'tree'	śrā	'to buy'	tśār	'country'

APPENDIX II (continued)

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
kunnās	'notebook'			kerś	'stomach'
bās	'in order to'			9erś	'branch'
fraś	'bedding'				

V__V	Gloss	DOUBLE	Gloss
māśt	'going'	tmeśśā	'to walk'
nīśān	'exactly'	heśśem	'to shame'
xnāśt	'bags'	9eśśā	'to give supper'

14. /ž/

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
žā	'to come'	džāž	'chicken'	žbed	'to pull'
žāb	'to bring'	rže9	'to return'	žrā	'to run'
žame9	'mosque'	nžer	'to pave'	žber	'to find'

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
džāž	'chicken'			telž	'snow'
xrež	'to go out'			melž	'leg of lamb'
mwāž	'waves'			sfenž	'donut'

C__C	Gloss	DOUBLE	Gloss
māžt	'coming'	režže9	'to return'
rāžel	'man'	nežžār	'carpenter'
hāžā	'thing'	wužžed	'to prepare'

15. /x/

#__V	Gloss	#__C	Gloss	#C__	Gloss
xūx	'peach'	xdem	'to work'	dxul	'to enter'
xā	'brother'	xbār	'news'	sxūn	'hot'
xubz	'bread'	xqer	'green'	šxur	'to snore'

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
dāx	'to get dizzy'				
xāx	'peach'				
nfex	'to blow up/pump'				

V__V	Gloss	DOUBLE	Gloss
tšūpaxā	'balloon'	duxxān	'smoke'
dāxel	'inside'	wexxā	'O.K.'
xūxā	'a peach'	sexxer	'to commission'

APPENDIX II (continued)

16. /v/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
yālī	'expensive'	yḏā	'lunch'	byā	'to want'
yedda	'tomorrow'	yseḷ	'to wash'	syīr	'small'
yerb	'West'	yḃār	'manure'	byel	'mule'

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
sbey	'to paint'				
bley	'to attain'				
zey	'to get out of hand'				

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
ślayem	'moustache'	meyvet	'to lay down'
blayī	'shoes'	weyyel	'to stick'
buyal	'grasshopper'	seyyel	'to hire'

17. /ḥ/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
ḥālu	'sweet'	ḥlfb	'milk'	śḥāl	'how much?'
ḥāl	'home'	ḥmer	'donkey'	bḥer	'river'

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
śḥīḥ	'strong'	ṣḥḃ	'friend'	sulḥ	'peace'
rīḥ	'wind'				
sleḥ	'to correct'				

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
rīḥā	'smell'	ṣḥḥā	'health'
ṣāheb	'friend'	ṣḥḥeb	'to get cloudy'
Brāḥīm	'boy's name'	ṣḥḥār	'magician'

18. /9/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
9aṣīma	'capital'	9ref	'to know'	b9īd	'far'
9aqeb	'to punish'	9gez	'laziness'	ś9el	'to put out'
9arabī	'Arab'	9qel	'mind'	ś9er	'hair'

APPENDIX II (continued)

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
zū9	'hunger'	be9d	'after'		
bā9	'to sell'	bu9d	'distance'		
dfe9	'to push'	le9q	'leeches'		

V__V	Gloss	DOUBLE	Gloss
sā9ā	'hour'	be99ed	'to move away'
nā9es	'sleeping'	se99ed	'to make happy'
sā9ir*	'poet'	ne99es	'to put to sleep'

19. /h/

#__V	Gloss	#__C	Gloss	#C__	Gloss
hā	'here is'	hdiyā	'gift'	šer	'month'
hiyā	'she'	hna	'here'	nhār	'day'
hūwā	'he'	hwā	'air'	dheb	'gold'

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
fqīh	'koranic teacher'	muhr	'dowry'	kurh	'hatred'
alīeh	'God'	zehd	'strength'		
		sehm	'portion'		

V__V	Gloss	DOUBLE	Gloss
sāhel	'easy'	fehhem	'to make understand'
zāhed	'to combat'	rehheb	'to frighten'

20. /?/

#__V	Gloss	#__C	Gloss	#C__	Gloss
ʔādeb	'courtesy'				
ʔāter	'trace'				
ʔālef	'thousand'				

V__#	Gloss	V__C#	Gloss	VC__#	Gloss
------	-------	-------	-------	-------	-------

V__V	Gloss	DOUBLE	Gloss
sūʔāl	'question'		
btīdāʔīya	'elementary'		

APPENDIX II (continued)

21. /m/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
mā	'water'	mdād	'ink'	sme9	'to hear'
meklā	'food'	mrid	'sick'	smā	'sky'
merrā	'time'	mnen	'while'	hmem	'pigeon'

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
yūm	'day'	krumb	'cabbage'		
dīrhām	'Dirham'	šems	'sun'		
fhem	'to understand'				

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
tāmān	'price'	hemmem	'bath'
nāmūs	'mosquito'	9emmer	'to fill'
ṭūmūbīl	'car'	kemmel	'to finish'

22. /n/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
nā9es	'sleeping'	nsā	'to forget'	hnā	'here'
nif	'nose'	nta	'you'	xnāšf	'bags'
nuṣṣ	'half'	nher	'day'	bnāt	'girls'

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
kūn	'if'	bent	'girl'		
snīn	'years'	9unq	'neck'		
ferhān	'happy'	hend	'steel'		

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
ānā	'I'	yennā	'to sing'
māgānā	'clock'	stennā	'to wait'
šīnyā	'tray'	tmennā	'to hope'

3. /l/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
lā	'no'	lbes	'to get dressed'	blā	'without'
lūn	'color'	ldīd	'delicious'	flūs	'money'
lellā	'madam'	lben	'type of butter'	klā	'to eat'

APPENDIX II (continued)

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
mahlūl	'open'	kelb	'dog'		
luwwel	'first'	selk	'wire'		
mešyūl	'busy'	telž	'snow'		

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
bālī	'old'	m9ellem	'master'
wālū	'nothing'	sellef	'to lend'
tālūt	'a third'	wella	'or'

4. /r/

#__V	<u>Gloss</u>	#__C	<u>Gloss</u>	#C__	<u>Gloss</u>
rāžel	'man'	rkel	'to kick'	mrā	'woman'
rās	'head'	rteh	'to rest'	mrīd	'sick'
ribā	'cliff'	rmel	'sand'	qrā	'to study'

V__#	<u>Gloss</u>	V__C#	<u>Gloss</u>	VC__#	<u>Gloss</u>
dār	'to do'	lerd	'ground'		
yīr	'only'	serf	'change'		
kbīr	'big'	ferq	'difference'		

V__V	<u>Gloss</u>	DOUBLE	<u>Gloss</u>
kūrā	'ball'	merrā	'time'
žīrān	'neighbors'	herres	'to break'
kārī	'renting'	berrād	'teapot'

APPENDIX III
Measure I Verbs - Perfect Tense

Root	Gloss
zber	'to find'
dreb	'to hit'
sten	'to bother'

Singular

<u>1st Person</u>						
<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>		
zbert	zbertu	zbertha	zbertkum	zberthum		
drebt	drebtu	drebtha	drebtukum	drebthum		
stent	stentu	stentha	stentkum	stenthum		
<u>2nd Person</u>						
<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>		
zberti	zbertih	zbertiha	zbertina	zbertihum		
drebtī	drebtih	drebtihā	drebtinā	drebtihum		
stenti	stentih	stentihā	stentinā	stentihum		
<u>3rd Per(m.)</u>						
<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
zber	zberni	zbrek	zbru	zberha	zberna	zberkum
dreb	drebnī	derbek	derbu	drebha	drebnā	derbkum
sten	stenni	setnek	setnu	stenha	stenna	stengkum
<u>3rd Per(f.)</u>						
<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
zebrāt	zebrātnī	zebrātek	zebrātu	zebrātha	zebrātnā	zebrātkum
derbāt	derbātnī	derbātek	derbātu	derbātha	derbātnā	derbātkum
setnāt	setnātnī	setnātek	setnātu	setnātha	setnātnā	setnātkum

APPENDIX III (continued)

Plural

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
žbernā	žbernāk	žbernāh	žbernāhā	žbernākūm	žbernāhūm
drebnā	drebnāk	drebnāh	drebnāhā	drebnākūm	drebnāhūm
štennā	štennāk	štennāh	štennāhā	štennākūm	štennākūm

<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>
žbertū	žbertūnī	žbertūh	žbertūhā	žbertūnā	žbertūhūm
drebtū	drebtūnī	drebtūh	drebtūhā	drebtūnā	drebtūhūm
štentū	štentūnī	štentūh	štentūhā	štentūnā	štentūhūm

<u>3rd Person</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
žebrū	žebrūnī	žebrūk	žebrūh	žebrūhā	žebrūnā	žebrūkūm	žebrūhūm
derbū	derbūnī	derbūk	derbūh	derbūhā	derbūnā	derbūkūm	derbūhūm
šetnū	šetnūnī	šetnūk	šetnūh	šetnūhā	šetnūnā	šetnūkūm	šetnūhūm

Negative

	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
	māžbertsī	māžbertīsī	māžbersī	māžebrātsī
Sing.	mādrebtīsī	mādrebtīsī	mādrebsī	māderbātsī
	māžbertsī	māštentīsī	māštensī	māšetnātsī
Plur.	māžbernāsī	māžbertūsī	māžebruśī	
	mādrebnāsī	mādrebtūsī	māderbuśī	
	māštennāsī	māštentūsī	māšetnuśī	

APPENDIX IV

Measure I (Hallow) Verbs - Perfect Tense

Root	Gloss
<u>sāf/suf</u>	'to see'
<u>zār/zur</u>	'to visit'
<u>bā9/bi9</u>	'to sell'

Singular

1st Person	+you(s.)	+him	+her	+you(pl.)	+them
suft	suftek	suftū	sufthū	suftkūm	sufthām
zurt	zurtek	zurtu	zurthā	zurtkūm	zurthūm
bi9t	bi9tek	bi9tū	bi9thā	bi9tkūm	bi9thūm

2nd Person	+me	+him	+her	+us	+them
suftī	suftīnī	suftīh	suftīhā	suftīnā	suftīhūm
zurtī	zurtīnī	zurtīh	zurtīhā	zurtīnā	zurtīhūm
bi9tī	bi9tīnī	bi9tīh	bi9tīhā	bi9tīnā	bi9tīhūm

3rd Per(m.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
sāf	sāfnī	sāfek	sāfū	sāfhā	sāfnā	sāfkūm	sāfhūm
zār	zārnī	zārek	zārū	zārthā	zārnā	zārkūm	zārthūm
bā9	bā9nī	bā9ek	bā9ū	bā9hā	bā9nā	bā9kūm	bā9hūm

3rd Per(f.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
sāfet	sāfetnī	sāftek	sāftū	sāfethā	sāfetnā	sāfetkūm	sāfethūm
zāret	zāretnī	zārtēk	zārtū	zārethā	zāretnā	zāretkūm	zārethūm
bā9et	bā9etnī	bā9tek	bā9tū	bā9ethā	bā9etnā	bā9etkūm	bā9ethūm

APPENDIX IV (continued)

Plural

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
sufnā	sufnāk	sufnāh	sufnāhā	sufnākūm	sufnāhūm
zurnā	zurnāk	zurnāh	zurnāhā	zurnākūm	zurnāhūm
bi9nā	bi9nāk	bi9nāh	bi9nāhā	bi9nākūm	bi9nāhūm

<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>
suftū	suftūnī	suftūh	suftūhā	suftūnā	suftūhūm
zurtū	zurtūnī	zurtūh	zurtūhā	zurtūnā	zurtūhūm
bi9tū	bi9tūnī	bi9tūh	bi9tūhā	bi9tūnā	bi9tūhūm

<u>3rd Person</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
sāfū	sāfūnī	sāfūk	sāfūh	sāfūhā	sāfūnā	sāfūkūm	sāfūhūm
zārū	zārūnī	zārūk	zārūh	zārūhā	zārūnā	zārūkūm	zārūhūm
bā9ū	bā9ūnī	bā9ūk	bā9ūh	bā9ūhā	bā9ūnā	bā9ūkūm	bā9ūhūm

Negative:

	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
	māsuftśī	māsuftīśī	māsāfśī	māsāftśī
Sing.	māzurtśī	māzurtīśī	māzārśī	māzārtśī
	mābi9tśī	mābi9tīśī	mābā9śī	mābā9tśī
	māsufnāśī	māsuftūśī	māsāfūśī	
Plur.	māzurnāśī	māzurtūśī	māzāruśī	
	mābi9nāśī	mābi9tūśī	mābā9ūśī	

APPENDIX V

Measure I (Final Vowel) - Perfect Tense

Root	Gloss
bvā	'to want'
9tā	'to give'
śrā	'to buy'

Singular

1st Person	+you(s.)	+him	+her	+you(pl.)	+them
bvīt	bvītek	bvītū	bvīthā	bvītkūm	bvīthūm
9tīt	9tītek	9tītū	9tīthā	9tītkūm	9tīthūm
śrīt	śrītek	śrītū	śrīthā	śrītkūm	śrīthūm

2nd Person	+me	+him	+her	+us	+them
bvītī	bvītīnī	bvītīh	bvītīhā	bvītīnā	bvītīhūm
9tītī	9tītīnī	9tītīh	9tītīhā	9tītīnā	9tītīhūm
śrītī	śrītīnī	śrītīh	śrītīhā	śrītīnā	śrītīhūm

3rd Per(m.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
bvā	bvānī	bvāk	bvāh	bvāhā	bvānā	bvākūm	bvāhūm
9tā	9tānī	9tāk	9tāh	9tāhā	9tānā	9tākūm	9tāhūm
śrā	śrānī	śrāk	śrāh	śrāhā	śrānā	śrākūm	śrāhūm

3rd Per(f.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
bvāt	bvātnī	bvātek	bvātū	bvāthā	bvātnā	bvātkūm	bvāthūm
9tat	9tātnī	9tātek	9tatū	9tāthā	9tātnā	9tātkūm	9tāthūm
śrāt	śrātnī	śrātek	śrātū	śrāthā	śrātnā	śrātkūm	śrāthūm

APPENDIX V (continued)

Plural

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>		
<u>bvīnā</u>	<u>bvīnāk</u>	<u>bvīnāh</u>	<u>bvīnāhā</u>	<u>bvīnākūm</u>	<u>bvīnāhūm</u>		
<u>9ṭīnā</u>	<u>9ṭīnāk</u>	<u>9ṭīnāh</u>	<u>9ṭīnāhā</u>	<u>9ṭīnākūm</u>	<u>9ṭīnāhūm</u>		
<u>śrīnā</u>	<u>śrīnāk</u>	<u>śrīnāh</u>	<u>śrīnāhā</u>	<u>śrīnākūm</u>	<u>śrīnāhūm</u>		
<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>		
<u>bvītū</u>	<u>bvītūnī</u>	<u>bvītūh</u>	<u>bvītūhā</u>	<u>bvītūnā</u>	<u>bvītūhūm</u>		
<u>9ṭītū</u>	<u>9ṭītūnī</u>	<u>9ṭītūh</u>	<u>9ṭītūhā</u>	<u>9ṭītūnā</u>	<u>9ṭītūhūm</u>		
<u>śrītū</u>	<u>śrītūnī</u>	<u>śrītūh</u>	<u>śrītūhā</u>	<u>śrītūnā</u>	<u>śrītūhūm</u>		
<u>3rd Person</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
<u>bvāw</u>	<u>bvāwnī</u>	<u>bvāwek</u>	<u>bvāweh</u>	<u>bvāwhā</u>	<u>bvāwnā</u>	<u>bvāwkūm</u>	<u>bvāwhūm</u>
<u>9ṭāw</u>	<u>9ṭāwnī</u>	<u>9ṭāwek</u>	<u>9ṭāweh</u>	<u>9ṭāwhā</u>	<u>9ṭāwnā</u>	<u>9ṭāwkūm</u>	<u>9ṭāwhūm</u>
<u>śrāw</u>	<u>śrāwnī</u>	<u>śrāwek</u>	<u>śrāweh</u>	<u>śrāwhā</u>	<u>śrāwnā</u>	<u>śrāwkūm</u>	<u>śrāwhūm</u>

Negative

	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
Sing.	<u>mābvītśī</u>	<u>mābvītīśī</u>	<u>mābvāśī</u>	<u>mābvātśī</u>
	<u>mā9ṭītśī</u>	<u>mā9ṭītīśī</u>	<u>mā9ṭāśī</u>	<u>mā9ṭātśī</u>
	<u>māśrītśī</u>	<u>māśrītīśī</u>	<u>māśrāśī</u>	<u>māśrātśī</u>
Plur.	<u>mābvīnāśī</u>	<u>mābvītūśī</u>	<u>mābvāwśī</u>	
	<u>mā9ṭīnāśī</u>	<u>mā9ṭītūśī</u>	<u>mā9ṭāwśī</u>	
	<u>māśrīnāśī</u>	<u>māśrītūśī</u>	<u>māśrāwśī</u>	

APPENDIX VI

Measure I (Doubled) Verbs - Perfect Tense

Root	Gloss
fekk	'to untie'
9edd	'to bite'
hekk	'to rub'

Singular

1st Person	+you(s.)	+him	+her	+you(pl.)	+them
fekkīt	fekkītek	fekkītū	fekkīthā	fekkītūm	fekkīthūm
9eddīt	9eddītek	9eddītū	9eddīthā	9eddītūm	9eddīthūm
hekkīt	hekkītek	hekkītū	hekkīthā	hekkītūm	hekkīthūm

2nd Person	+me	+him	+her	+us	+them
fekkītī	fekkītīnī	fekkītīh	fekkītīhā	fekkītīnā	fekkītīhūm
9eddītī	9eddītīnī	9eddītīh	9eddītīhā	9eddītīnā	9eddītīhūm
hekkītī	hekkītīnī	hekkītīh	hekkītīhā	hekkītīnā	hekkītīhūm

3rd Per(m.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
fekk	fekknī	fekkek	fekkū	fekkhā	fekknā	fekkkūm	fekkhūm
9edd	9eddnī	9eddek	9eddū	9eddhā	9eddnā	9eddkūm	9eddhūm
hekk	hekknī	hekkek	hekkū	hekkhā	hekknā	hekkkūm	hekkhūm

3rd Per(f.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
fekkāt	fekkātīnī	fekkātek	fekkātū	fekkāthā	fekkātīnā	fekkātūm	fekkāthūm
9eddāt	9eddātīnī	9eddātek	9eddātū	9eddāthā	9eddātīnā	9eddātūm	9eddāthūm
hekkāt	hekkātīnī	hekkātek	hekkātū	hekkāthā	hekkātīnā	hekkātūm	hekkāthūm

APPENDIX VI (continued)

Plural

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
fekkīnā	fekkīnāk	fekkīnāh	fekkīnāhā	fekkīnākūm	fekkīnāhūm
9eddiṇā	9eddiṇāk	9eddiṇāh	9eddiṇāhā	9eddiṇākūm	9eddiṇāhūm
ḥekkīnā	ḥekkīnāk	ḥekkīnāh	ḥekkīnāhā	ḥekkīnākūm	ḥekkīnāhūm

<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>
fekkītū	fekkītūnī	fekkītūh	fekkītūhā	fekkītūnā	fekkītūhūm
9eddiṭū	9eddiṭūnī	9eddiṭūh	9eddiṭūhā	9eddiṭūnā	9eddiṭūhūm
ḥekkītū	ḥekkītūnī	ḥekkītūh	ḥekkītūhā	ḥekkītūnā	ḥekkītūhūm

<u>3rd Person</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
fekkū	fekkūnī	fekkūk	fekkūh	fekkūhā	fekkūnā	fekkūkūm	fekkūhūm
9eddu	9edduṇī	9edduḳ	9edduh	9edduhā	9edduṇā	9edduḳūm	9edduhūm
ḥekkū	ḥekkūnī	ḥekkūk	ḥekkūh	ḥekkūhā	ḥekkūnā	ḥekkūkūm	ḥekkūhūm

Negative

	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
Singular	māfekkītšī	māfekkītīšī	māfekkšī	māfekkātšī
	mā9eddiṭšī	mā9eddiṭīšī	ma9eddišī	mā9eddiātšī
	māḥekkītšī	māḥekkītīšī	māḥekkšī	māḥekkātšī
Plural	māfekkīnāšī	māfekkītūšī	māfekkūšī	
	mā9eddiṇāšī	mā9eddiṭūšī	mā9eddiūšī	
	māḥekkīnāšī	māḥekkītūšī	māḥekkūšī	

APPENDIX VII

Measure II Verbs - Perfect Tense

Root	Gloss
xeddem	'to operate'
fiyyeq	'to wake'
tellef	'to lose'

Singular

1st Person	+you(s.)	+him	+her	+you(pl.)	+them
xeddemt	xeddemtek	xeddemtū	xeddemthā	xeddemtkū	xeddemthū
fiyyeqt	fiyyeqtek	fiyyeqtū	fiyyeqthā	fiyyeqtkū	fiyyeqthū
telleft	telleftek	telleftū	tellefthā	telleftkū	tellefthū

2nd Person	+me	+him	+her	+us	+them
xeddemti	xeddemtini	xeddemtihi	xeddemtiha	xeddemtina	xeddemtihi
fiyyeqti	fiyyeqtini	fiyyeqtihi	fiyyeqtiha	fiyyeqtina	fiyyeqtihi
tellefti	telleftini	telleftihi	telleftiha	telleftina	telleftihi

3rd Per(m.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
xeddem	xeddemni	xeddemek	xeddemu	xeddemha	xeddemna	xeddemku	xeddemhu
fiyyeq	fiyyeqni	fiyyeqek	fiyyequ	fiyyeqha	fiyyeqna	fiyyeqku	fiyyeqhu
tellef	tellefni	tellefek	tellefu	tellefha	tellefna	tellefku	tellefhu

3rd Per(m.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
xeddmāt	xeddmātni	xeddmātek	xeddmātū	xeddmāthā	xeddmātna	xeddmātkū	xeddmāthu
fiyyqāt	fiyyqātni	fiyyqātek	fiyyqātū	fiyyqāthā	fiyyqātna	fiyyqātkū	fiyyqāthu
tellfāt	tellfātni	tellfātek	tellfātū	tellfāthā	tellfātna	tellfātkū	tellfāthu

APPENDIX VII (continued)

Plural

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
xeddemnā	xeddemnāk	xeddemnāh	xeddemnāhā	xeddemnākūm	xeddemnāhūm
fiyyeqnā	fiyyeqnāk	fiyyeqnāh	fiyyeqnāhā	fiyyeqnākūm	fiyyeqnāhūm
tellefnā	tellefnāk	tellefnāh	tellefnāhā	tellefnākūm	tellefnāhūm

<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>
xeddemtū	xeddemtūnī	xeddemtūh	xeddemtūhā	xeddemtūnā	xeddemtūhūm
fiyyeqtū	fiyyeqtūnī	fiyyeqtūh	fiyyeqtūhā	fiyyeqtūnā	fiyyeqtūhūm
telleftū	telleftūnī	telleftūh	telleftūhā	telleftūnā	telleftūhūm

<u>3rd Person</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
xeddmū	xeddmūnī	xeddmūk	xeddmūh	xeddmūhā	xeddmūnā	xeddmūkūm	xeddmūhūm
fiyyqū	fiyyqūnī	fiyyqūk	fiyyqūh	fiyyqūhā	fiyyqūnā	fiyyqūkūm	fiyyqūhūm
tellfū	tellfūnī	tellfūk	tellfūh	tellfūhā	tellfūnā	tellfūkūm	tellfūhūm

Negative

	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
Singular	māxeddemsī	māxeddemsī	māxeddemsī	māxeddmātsī
	māfiyyeqtsī	māfiyyeqtsī	māfiyyeqtsī	māfiyyeqtsī
	mātelleftsī	mātelleftsī	mātelleftsī	mātelleftsī
Plural	māxeddemnāsī	māxeddemnāsī	māxeddmūsī	māxeddmūsī
	māfiyyeqnāsī	māfiyyeqnāsī	māfiyyeqtsī	māfiyyeqtsī
	mātellefnāsī	mātellefnāsī	mātelleftsī	mātelleftsī

APPENDIX VIII

Measure II (Final Vowel) Verbs - Perfect Tense

<u>Root</u>	<u>Gloss</u>
xellā	'to leave(tr.)'
werrā	'to show'
heffā	'to make feeble, week'

Singular

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
xellīt	xellītek	xellītū	xellīthā	xellītkūm	xellīthūm
werrīt	werrītek	werrītū	werrīthā	werrītkūm	werrīthūm
heffīt	heffītek	heffītū	heffīthā	heffītkūm	heffīthūm

<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>
xellītī	xellītīnī	xellītīh	xellītīhā	xellītīnā	xellītīhūm
werrītī	werrītīnī	werrītīh	werrītīhā	werrītīnā	werrītīhūm
heffītī	heffītīnī	heffītīh	heffītīhā	heffītīnā	heffītīhūm

<u>3rd Per(m.)</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
xellā	xellānī	xellāk	xellāh	xellāhā	xellānā	xellākūm	xellāhūm
werrā	werrānī	werrāk	werrāh	werrāhā	werrānā	werrākūm	werrāhūm
heffā	heffānī	heffāk	heffāh	heffāhā	heffānā	heffākūm	heffāhūm

<u>3rd Per(f.)</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
xellāt	xellātīnī	xellātek	xellātū	xellāthā	xellātīnā	xellātkūm	xellāthūm
werrāt	werrātīnī	werrātek	werrātū	werrāthā	werrātīnā	werrātkūm	werrāthūm
heffāt	heffātīnī	heffātek	heffātū	heffāthā	heffātīnā	heffātkūm	heffāthūm

APPENDIX VIII (continued)

Plural

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
xellīnā	xellīnāk	xellīnāh	xellīnāhā	xellīnākūm	xellīnāhūm
werrīnā	werrīnāk	werrīnāh	werrīnāhā	werrīnākūm	werrīnāhūm
ḥeffīnā	ḥeffīnāk	ḥeffīnāh	ḥeffīnāhā	ḥeffīnākūm	ḥeffīnāhūm

<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>
xellītū	xellītūnī	xellītūh	xellītūhā	xellītūnā	xellītūhūm
werrītū	werrītūnī	werrītūh	werrītūhā	werrītūnā	werrītūhūm
ḥeffītū	ḥeffītūnī	ḥeffītūh	ḥeffītūhā	ḥeffītūnā	ḥeffītūhūm

<u>3rd Person</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
xellāw	xellāwnī	xellāwek	xellāweh	xellāwhā	xellāwnā	xellāwkūm	xellāwhūm
werrāw	werrāwnī	werrāwek	werrāweh	werrāwhā	werrāwnā	werrāwkūm	werrāwhūm
ḥeffāw	ḥeffāwnī	ḥeffāwek	ḥeffāweh	ḥeffāwhā	ḥeffāwnā	ḥeffāwkūm	ḥeffāwhūm

Negative

	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
Singular	māxellītśī	māxellītīśī	māxellāśī	māxellātśī
	māwerrītśī	māwerrītīśī	māwerrāśī	māwerrātśī
	māḥeffītśī	māḥeffītīśī	māḥeffāśī	māḥeffātśī
Plural	māxellīnāśī	māxellītūśī		māxellāwśī
	māwerrīnāśī	māwerrītūśī		māwerrāwśī
	māḥeffīnāśī	māḥeffītūśī		māḥeffāwśī

APPENDIX IX

Measure III Verbs - Perfect Tense

Root	Gloss
9āqeb	'to punish'
zāweb	'to answer'
9āwen	'to help'

Singular

1st Person	+you(s.)	+him	+her	+you(pl.)	+them
9āqebt	9āqebtek	9āqebtū	9āqebthā	9āqebtkūm	9āqebthūm
zāwebt	zāwebtek	zāwebtū	zāwebthā	zāwebtkūm	zāwebthūm
9āwent	9āwentek	9āwentū	9āwenthā	9āwentkūm	9āwenthūm

2nd Person	+me	+him	+her	+us	+them
9āqebtī	9āqebtīnī	9āqebtīh	9āqebtīhā	9āqebtīnā	9āqebtīhūm
zāwebtī	zāwebtīnī	zāwebtīh	zāwebtīhā	zāwebtīnā	zāwebtīhūm
9āwentī	9āwentīnī	9āwentīh	9āwentīhā	9āwentīnā	9āwentīhūm

3rd Per(m.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
9āqeb	9āqebnī	9āqbek	9āqbū	9āqebhā	9āqebnā	9āqebkūm	9āqebhūm
zāweb	zāwebnī	zāwbek	zāwbū	zāwebhā	zāwebnā	zāwebkūm	zāwebhūm
9āwen	9āwennī	9āwnek	9āwnū	9āwenhā	9āwennā	9āwenkūm	9āwenhūm

3rd Per(f.)	+me	+you(s.)	+him	+her	+us	+you(pl.)	+them
9āqbāt	9āqbātīnī	9āqbātek	9āqbātū	9āqbāthā	9āqbātīnā	9āqbātkūm	9āqbāthūm
zāwbāt	zāwbātīnī	zāwbātek	zāwbātū	zāwbāthā	zāwbātīnā	zāwbātkūm	zāwbāthūm
9āwnāt	9āwnātīnī	9āwnātek	9āwnātū	9āwnāthā	9āwnātīnā	9āwnātkūm	9āwnāthūm

APPENDIX IX (continued)

Plural

<u>1st Person</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>		
9āqebnā	9āqebnāk	9āqebnāh	9āqebnāhā	9āqebnākūm	9āqebnāhūm		
zāwebnā	zāwebnāk	zāwebnāh	zāwebnāhā	zāwebnākūm	zāwebnāhūm		
9āwennā	9āwennāk	9āwennāh	9āwennāhā	9āwennākūm	9āwennāhūm		
<u>2nd Person</u>	<u>+me</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+them</u>		
9āqebtū	9āqebtūnī	9āqebtūh	9āqebtūhā	9āqebtūnā	9āqebtūhūm		
zāwebtū	zāwebtūnī	zāwebtūh	zāwebtūhā	zāwebtūnā	zāwebtūhūm		
9āwentū	9āwentūnī	9āwentūh	9āwentūhā	9āwentūnā	9āwentūhūm		
<u>3rd Per(m.)</u>	<u>+me</u>	<u>+you(s.)</u>	<u>+him</u>	<u>+her</u>	<u>+us</u>	<u>+you(pl.)</u>	<u>+them</u>
9āqbū	9āqbūnī	9āqbūk	9āqbūh	9āqbūhā	9āqbūnā	9āqbūkūm	9āqbūhūm
zāwbū	zāwbūnī	zāwbūk	zāwbūh	zāwbūhā	zāwbūnā	zāwbūkūm	zāwbūhūm
9āwnū	9āwnūnī	9āwnūk	9āwnūh	9āwnūhā	9āwnūnā	9āwnūkūm	9āwnūhūm

Negative

	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
Singular	mā9āqebtśī	mā9āqebtīśī	mā9āqebśī	mā9āqbātśī
	māzāwebtśī	māzāwebtīśī	māzāwebśī	māzāwbātśī
	mā9āwentśī	mā9āwentīśī	mā9āwenśī	mā9āwnātśī
Plural	mā9āqebnāśī	mā9āqebtūśī	mā9āqbūśī	
	māzāwebnāśī	māzāwebtūśī	māzāwbūśī	
	mā9āwennāśī	mā9āwentūśī	mā9āwnūśī	

APPENDIX X

Measure IX Verbs* - Perfect Tense

	<u>Root</u>	<u>Gloss</u>		
	xlāq	'to be born'		
	hmār	'to become red'		
	hmq	'to go crazy'		
Singular				
	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
	xleqt	xleqtī	xlāq	xlāqāt
	hmert	hmertī	hmār	hmārāt
	hmeqt	hmeqtī	hmq	hmqāt
Plural				
	xleqnā	xleqtū	xlāqū	
	hmernā	hmertū	hmārū	
	hmeqnā	hmeqtū	hmqū	

* Many speakers conjugate Measure IX Verbs as if they were Measure I Verbs; thus /xlāqāt/ appears as /xelqāt/.

APPENDIX XI

Verbs With Four Radicals - Perfect Tense

	<u>Root</u>	<u>Gloss</u>		
	teržem	'to translate'		
	seqsef	'to put in order'		
	seqšā	'to ask'		
	<u>1st Person</u>	<u>2nd Person</u>	<u>3rd Per(m.)</u>	<u>3rd Per(f.)</u>
Singular				
	teržemt	teržemtī	teržem	teržmāt
	seqseft	seqseftī	seqsef	seqsfāt
	seqšīt	seqšītū	seqšā	seqšāt
Plural				
	teržemnā	teržemtū	teržmū	
	seqsefnā	seqseftū	seqsfū	
	seqšinā	seqšītū	seqšāw	

APPENDIX XII

Imperative - Measure I Verbs

Final_V-Gloss	Hallow-Gloss	Dble_C-Gloss	Sound	Gloss
āzī 'come'	kūl 'eat'	kubb 'pour'	āgles 'sit'	
āsī 'buy'	sīr 'go'	šudd 'close'	āskut 'be quiet'	
āqrā 'study'	šūf 'look'	duqq 'knock'	āxdem 'work'	
āmī 'go'	bī9 'sell'	šumm 'smell'	āxrež 'leave'	

APPENDIX XIII

Measue I Verbs - Durative Tense Samples

Root	Gloss
žber	'to find'
dreb	'to hit'
šten	'to bother'

Singular

1st Person	+you	+him	+her
kānežber/kenžber	kānžebrek	kānžebra	kenežberhā/kānžberhā
kānedreb/kenđreb	kānderbek	kānderbū	kānedrebhā/kendrebhā
kānešten/kenšten	kānšetnek	kānšetnū	kāneštenhā/kenštenhā
<u>+you(pl.)</u>		<u>+them</u>	
kānežberkūm/kenžberkūm		kānežberhūm/kenžberhūm	
kānedrebkūm/kendrebkūm		kānedrebhūm/kendrebhūm	
kāneštenkūm/kenštenkūm		kāneštenhūm/kenštenhūm	

Plural

1st Person	+you	+him	+her
kānžebra	kānžebrauk	kānžebrauh	kānžebrauha
kānderbū	kānderbūk	kānderbūh	kānderbūhā
kānšetnū	kānšetnūk	kānšetnūh	kānšetnūhā
<u>+you(pl.)</u>		<u>+them</u>	
kānžebraūkūm		kānžebrauhūm	
kānderbūkūm		kānderbūhūm	
kānšetnūkūm		kānšetnūhūm	

APPENDIX XIV

Measure I (Hallow) Verbs - Durative Tense Samples

	Root	Gloss		
	<u>suf</u>	'to see'		
	<u>zür</u>	'to visit'		
	<u>bi9</u>	'to buy'		
Singular				
1st Person	+me	+you	+him	+her
<u>kānsuf</u>	kānsufni	kānsufek	kānsufa	kānsufha
kānzür	kānzürni	kānzürek	kānzürü	kānzürha
kānbī9	kānbī9ni	kānbī9ek	kānbī9ü	kānbī9ha
+us	+you(pl.)	+them		
kānsufna	kānsufkūm	kānsufhūm		
kānzürna	kānzürkūm	kānzürhūm		
kānbī9na	kānbī9kūm	kānbī9hūm		
Plural				
1st Person	+me	+you	+him	+her
<u>kānsufü</u>	kānsufanti	kānsufuk	kānsufuh	kānsufuha
kānzürü	kānzürüni	kānzürük	kānzürüh	kānzürüha
kānbī9ü	kānbī9üni	kānbī9ük	kānbī9üh	kānbī9üha
+us	+you(pl.)	+them		
kānsufüna	kānsufükūm	kānsufühūm		
kānzürüna	kānzürükūm	kānzürühūm		
kānbī9üna	kānbī9ükūm	kānbī9ühūm		

APPENDIX XV
Measure I (Double Consonant) - Durative Tense Samples

	<u>Root</u>		<u>Gloss</u>	
	fekk		'to grab'	
	9edd		'to bite'	
	hekk		'to deceive'	
Singular				
<u>1st Person</u>	<u>+you</u>	<u>+him</u>	<u>+her</u>	
kānfekk	kānfekkek	kānfekkū	kānfekkḥā	
kān9edd	kān9eddek	kān9eddū	kān9eddḥā	
kānhekk	kānhekkek	kānhekkū	kānhekkḥā	
<u>+you(pl.)</u>		<u>+them</u>		
kānfekkkūm		kānfekkkḥūm		
kān9eddkūm		kān9eddḥūm		
kānhekkkūm		kānhekkḥūm		
Plural				
<u>1st Person</u>	<u>+you</u>	<u>+him</u>	<u>+her</u>	
kānfekkū	kānfekkūk	kānfekkūh	kānfekkūḥā	
kān9eddū	kān9eddūk	kān9eddūh	kān9eddūḥā	
kānhekkū	kānhekkūk	kānhekkūh	kānhekkūḥā	
<u>+you(pl.)</u>		<u>+them</u>		
kānfekkūkūm		kānfekkūḥūm		
kān9eddūkūm		kān9eddūḥūm		
kānhekkūkūm		kānhekkūḥūm		

APPENDIX XVI
Measure I (Final Vowel) Verbs - Durative Tense Samples

	Root	Gloss
	<u>bvī</u>	<u>'to want'</u>
	<u>9tī</u>	<u>'to give'</u>
	<u>śrī</u>	<u>'to buy'</u>
Singular		
<u>1st Person</u>	<u>+you</u>	<u>+him</u>
kenbvī/kānebvī	kenbvīk/kānebvīk	kenbvīh/kānebvīh
ken9tī/kāne9tī	ken9tīk/kāne9tīk	ken9tīh/kāne9tīh
kenśrī/kāneśrī	kenśrīk/kāneśrīk	kenśrīh/kāneśrīh
<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
kenbvīhā/kānebvīhā	kenbvīkūm/kānebvīkūm	kenbvīhūm/kānebvīhūm
ken9tīhā/kāne9tīhā	ken9tīkūm/kāne9tīkūm	ken9tīhūm/kāne9tīhūm
kenśrīhā/kāneśrīhā	kenśrīkūm/kāneśrīkūm	kenśrīhūm/kāneśrīhūm
Plural		
<u>1st Person</u>	<u>+you</u>	<u>+him</u>
kenbvīw/kānebvīw	kenbvīwek/kānebvīwek	kenbvīweh/kānebvīweh
ken9tīw/kāne9tīw	ken9tīwek/kāne9tīwek	ken9tīweh/kāne9tīweh
kenśrīw/kāneśrīw	kenśrīwek/kāneśrīwek	kenśrīweh/kāneśrīweh
<u>+her</u>	<u>+you(pl.)</u>	<u>+them</u>
kenbvīwhā/kānebvīwhā	kenbvīwkūm/kānebvīwkūm	kenbvīwhūm/kānebvīwhūm
ken9tīwhā/kāne9tīwhā	ken9tīwkūm/kāne9tīwkūm	ken9tīwhūm/kāne9tīwhūm
kenśrīwhā/kāneśrīwhā	kenśrīwkūm/kāneśrīwkūm	kenśrīwhūm/kāneśrīwhūm

APPENDIX XVII

Distribution of Geminate Clusters

A. Word Initial

a.	bbā	'father'
b.	ddā	'he brought'
c.	ddār	'the house'
d.	ffrānsā	'in France'
e.	llūn	'the color'
f.	nnūrā	'for Nora'
g.	rrāžēl	'the man'
h.	ssīf	'the sword'
i.	ssāheb	'the friend'
j.	ššhar	'the month'
k.	ṭṭerf	'the piece/side'
l.	ṭṭelmīd	'the student'
m.	wwēqqef	'and he stopped (tr.)'
n.	zzenqā	'the street'
o.	žžāme9	'the mosque'

B. In Intervocalic Position

a.	txebbe9	'to hide'
b.	beddel	'to change'
c.	neḍḍef	'to clean'
d.	tnēffes	'to breathe'
e.	fehhem	'to make understand'
f.	ṣehhā	'health'
g.	nežžār	'carpenter'
h.	tšekkā	'to complain'
i.	zellīž	'tile'
j.	ḥemmem	'bath'
k.	yennā	'to sing'
l.	wēqqef	'to stop (tr.)'
m.	werrā	'to show'
n.	9essās	'guard/guardian'
o.	wēṣṣel	'to bring, make arrive'
p.	tmeššā	'to walk'
q.	ḥetta	'until'
r.	šetṭeb	'to sweep'
s.	wāxxā	'O.K.'
t.	šeyyel	'to hire'
u.	wezzān	'weigher'
v.	beyyet	'to put someone up for the night'
w.	luwwā	'to twist'

C. Medial Preceding a Consonant

a.	xeddmāt	'she worked'
b.	beyytāt	'she put (s.o.) up for the night'
c.	wēqqfū	'the stopped (tr.)'
d.	lebbsū	'the dressed'
e.	mxēssrā	'not functioning (fem.)'
f.	mherrisā	'broken (fem.)'

APPENDIX XVIII

Nouns Commonly Taking Possessive Suffix

A. Parts of the Body:

yedd	'hand'	dher	'back'
yeddīn	'two hands'	qelb	'heart'
nif	'nose'	še9r	'hair'
ūden	'ear'	kerś	'stomach'
fumm	'mouth'	šbe9	'finger'
rzel	'leg'	9eyn	'eye'
režlīn	'two legs'	9eynīn	'two eyes'

B. Personal Relationships

bābā	'father'	9emm	'paternal uncle'
yemma	'mother'*	9emmāt	'paternal aunt'
wāldīn	'parents'	rāžēl	'husband'
weld	'son'	mrāt	'wife'
bent	'daughter'	šāheb	'friend'
xā	'brother'	žār	'neighbor'
xet	'sister'	xāl	'maternal uncle'

C. Others

ḍār	'house'	bāb	'door'
bīt	'room'	ḥāl	'home'
tāmān	'price'	smīyāt	'name'
flūs	'money'	ktāb	'book'
žellābat	'men's robe'	mīnāt	'town'

*/yemma/ does not take the first person singular suffix /+ya/;
thus this form means both 'mother' and 'my mother.'

APPENDIX XIX
The Preposition

A. The Preposition with Person Pronouns: Additional Examples

f+ 'in' l+ 'to' b+ 'by' 9lā+ 'on'					
Sing.	1st per.	fīyā	līyā	bīyā	9līyā
	2nd per.	fīk	līk	bīk	9līk
	3rd per.(m.)	fīh	līh	bīh	9līh
	3rd per.(f.)	fīhā	līhā	bīhā	9līhā
Plur.	1st per.	fīnā	līnā	bīnā	9līnā
	2nd per.	fīkūm	līkūm	bīkūm	9līkūm
	3rd per.	fīhūm	līhūm	bīhūm	9līhūm

dyāl+ 'of' men 'from'					
Sing.	1st per.	dyālī	mennī		
	2nd per.	dyālek	mennek		
	3rd per.(m.)	dyālū	mennū		
	3rd per.(f.)	dyālhā	menhā		
Plur.	1st per.	dyānnā	mennā		
	2nd per.	dyālkūm	menkūm		
	3rd per.	dyālhūm	menhūm		

B. The Preposition Preceding Alveolar Consonants

	<u>Definite</u>	<u>Indefinite</u>	<u>Gloss</u>
f+ 'in'	ferrāzel ferrzāl	frazēlhā ferzālhā	'the man/her husband' 'the men/their husbands'
n+ 'to'	nerrāzel nerrzāl	nrāzelhā nerzālhā	'the men/her husband' 'the men/their husbands'
b+ 'by'	bettāmān beḍḍār	btāmānhā bḍārī	'the price/it's price' 'the house/my house'
d+ 'of'	dettāmān deḍḍār	dtāmānhā ḍḍārī	'the price/it's price' 'the house/my house'

The preposition /men/ 'from'

	<u>Definite</u>	<u>Indefinite</u>	<u>Gloss</u>
1.	melbent melbnāt melgelb	menbentī menbnātī menqelbī	'from the girl/my daughter' 'from the girls/my daughters' 'from the heart/my heart'
2.	merrāzel merrzāl meṣṣāheb	menrāzī menrāzālnā menṣāhbī	'from the man/my husband' 'from the men/our husbands' 'from the friend/my friend'

APPENDIX XX

Dialectal Variation The Definite Article

A. Preceding a Single Consonant: All Dialects

lbāb	'the door'	lfār	'the mouse'
lwād	'the river'	lkās	'the glass'
l9ām	'the year'	lkār	'the bus'
ddār	'the house'	ttīr	'the bird'
ddīn	'the religion'	ttāz	'the crown'
ssūq	'the market'	zzīt	'the cooking oil'

B. Preceding Two Consonants

Northern

lktāb	'the book'	lmdīnā	'the town'
lhlib	'the milk'	lblād	'the country'
lqnāter	'the bridges'	lbwāb	'the doors'
llwān	'the colors'	ddyūr	'the houses'
ššher	'the month'	zznāqī	'the streets'
ddrārī	'the children'	nnbī	'the prophet'

Southern*

lektāb	'the book'	lemdīnā	'the town'
lehlīb	'the milk'	leblād	'the town'
leqnāter	'the bridges'	lebwāb	'the doors'

Harrell's (1962) reference grammar and (1966) dictionary indicate that word initial geminate clusters in the southern dialects behave the same as in northern dialects.

APPENDIX XXI

Simple Word Formation Processes

A. SUFFIXES

1. /+ā/

(1) <u>Collective Singular</u>					
<u>Coll.</u>	<u>Single</u>	<u>Gloss</u>	<u>Coll.</u>	<u>Single</u>	<u>Gloss</u>
ḥẓel	ḥeẓlā	'partridge'	xubz	xubzā	'bread'
berquq	berquqā	'plum'	ḥẓer	ḥeẓrā	'rock'
bṣel	beṣlā	'onion'	burk	burkā	'duck'
leṭt	leṭtā	'turnip'	qseb	qesbā	'reed'

(2) <u>Feminine Marker</u>					
<u>Word</u>	<u>Fem.</u>	<u>Gloss</u>	<u>Word</u>	<u>Fem.</u>	<u>Gloss</u>
ḥmer	ḥemrā	'donkey'	byel	beylā	'mule'
mālik	mālikā	'king/queen'	sxūn	sxūnā	'hot'
ferḥan	ferḥanā	'happy'	gāles	gālsā	'sitting'

(3) <u>Verbal Noun Formation</u>					
<u>Verb</u>	<u>Gloss</u>			<u>Noun</u>	<u>Gloss</u>
ḍreb	'to hit'			ḍerbā	'blow'
ḥder	'to talk'			hedrā	'speech'
dxul	'to enter'			dexlā	'entrance'
ngel	'to copy'			neqlā	'copy'
xdem	'to work'			xedmā	'work'
dūx	'to get dizzy'			dūxā	'dizziness'
yīb	'to be absent'			yībā	'absence'
fdī	'to replace'			fedyā	'replacement'
ẓrī	'to run'			ẓeryā	'manner of living'

2. /+ī/

(4) <u>Nisbas of Origin or Habitual Activity</u>			
<u>Noun</u>	<u>Gloss</u>	<u>Nisba</u>	<u>Gloss</u>
A.			
fās	‘Fez’	fāsī	‘native of Fez’
māṣer	‘Egypt’	māṣrī	‘Egyptian’
tūnes	‘Tunisia’	tūnsī	‘Tunisian’
ẓānūb	‘south’	ẓānūbī	‘southern’
B.			
bḥer	‘sea’	beḥrī	‘sailor’
rẓel	‘foot’	reẓlī	‘foot-soldier’
mūsiqā	‘music’	mūsiqī	‘musician’

(5) Nisba Adjectives

A. Noun	Gloss	Nisba	Gloss
xūx	'peach'	xūxf	'peach-colored'
tben	'straw'	tebnf	'straw-colored'
9sel	'honey'	9eslf	'honey-colored'
līmūn	'lemon'	līmūnf	'lemon-colored'
B. šer	'month'	šhrf	'monthly'
yūm	'day'	yūmf	'daily'
xrif	'autumn'	xrif	'autumn (adj.)'

3. /+at/

(6) Plural Formation

Noun	Plural	Gloss
bnfā	bnfāt	'little girl'
9essāsā	9essāsāt	'guard (f.)'
mālikā	mālikāt	'queen'
fābrīkā	fābrīkāt	'factory'
bīrū	bīrūwāt	'office'
qdīrā	qdīrāt	'little pot'
nezzāra	nezzārat	'carpenter (f.)'
mdebza	mdebzāt	'quarrel'
mākīnā	mākīnāt	'machine'
kedbā	kedbāt	'lie, falsehood'

4. /+an/

(7) Plural Formation

Noun	Plural	Gloss	Noun	Plural	Gloss
zār	zīrān	'neighbor'	sā9	sī9ān	'measurement'
nār	nīrān	'fire'	yār	yīrān	'cave'
fār	fīrān	'mouse'	kās	kīsān	'glass'
kār	kīrān	'bus'	tāz	tīzān	'crown'
bāb	bībān	'door'	sāl	sīlān	'scarf/schawl'

(8) Verbal Noun Formation

Verb	Noun	Gloss	Verb	Noun	Gloss
A. With Hollow Roots containing [i]:					
mīl	mīlān	'lean'	tīś	tīśān	'swing'
dīr	dīrān	'do'	śīh	śīhān	'howl'
9īq	9īqān	'notice'			
B. With Hollow Roots containing [u]:					
9ūm	9ūmān	'swim'	lūm	lūmān	'blame'
dūq	dūqān	'taste'	sūs	sūsān	'blow nose'
śūf	śūfān	'see'	dūb	dūbān	'melt'
C. With Double Final Roots:					
twī	tūyān	'fold'	tff	tefyān	'put out'
redd	reddān	'return'	kubb	kebbān	'pour'
9edd	9eddān	'bite'	šedd	šeddān	'grab'

<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>	<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>
D. With Sound Roots:					
xšer	xušrān	'lose'	btel	betlān	'cease'
E. With Quadriliteral Roots:					
beršem	beršmān	'fringe'	teržem	teržmān	'translator'

(9) <u>Adjective Formation</u>					
<u>Base</u>	<u>Gloss</u>		<u>Adjective</u>	<u>Gloss</u>	
bred	'to be cold'		berdān	'cold'	
freh	'to rejoice'		ferhān	'happy'	
9rā	'nudity'		9eryān	'naked'	
zreb	'to hurry'		zerbān	'in a hurry'	
9teš	'thirst'		9ešsān	'thirsty'	
ksūl	'laziness'		keslān	'lazy'	
ydeb	'to get angry'		yedbān	'angry'	
9yā	'to get tired'		9eyyān	'tired'	

5. /+tīn/

(10) <u>Plural Formation</u>					
<u>Base</u>	<u>Plural</u>	<u>Gloss</u>	<u>Base</u>	<u>Plural</u>	<u>Gloss</u>
(wld)	weldīn	'parents'	sxūn	sxūnīn	'hot'
kāteb	kātbīn	'writing'	medrūb	medrūbīn	'beaten'
māšī	māšīn	'going'	nqī	nqīyyīn	'clean'
mešrī	mešrīyīn	'Egyptian'			

6. /+ānī/

(11) <u>Adjective Formation</u>					
<u>Base</u>	<u>Gloss</u>	<u>Der. Word</u>	<u>Gloss</u>		
luwwel	'first'	luwwlānī	'first'		
šewhwā	'appetite'	šehwānī	'gluttonous'		
šīb	'white hair'	šībānī	'white haired, old'		
fūq	'up'	fūqānī	'upper, upper one'		
dāxel	'inside'	dāxlānī	'inner'		
wušt	'middle'	wuštānī	'central'		

7. /+āyn/

(12) <u>Dual Formation</u>					
<u>Noun</u>	<u>Dual</u>	<u>Gloss</u>	<u>Noun</u>	<u>Dual</u>	<u>Gloss</u>
ʔalef	ʔalfāyn	'thousand'	yūm	yūmāyn	'day'
šher	šehrayn	'month'	9ām	9āmāyn	'year'
simānā	simānatāyn	'week'	qesm	qesāyn	'5/10 minutes'
ryāl	ryālāyn	'rial'	myā	myātāyn	'hundred'

B. DOUBLING OF SECOND RADICAL

(13)

<u>Measure II Verb Formation</u>					
<u>Base</u>	<u>Gloss</u>		<u>M-II Verb</u>	<u>Gloss</u>	
lwɪ	'to twist'		luwwɪ	'to wrap up'	
ffɪq	'to awake'		fiyyeq	'to wake (tr.)'	
qɾɪ	'to study'		qerrɪ	'to teach'	
tlef	'to get lost'		tellef	'to lose'	

(14)

<u>Noun Formation</u>				<u>Gloss</u>	
<u>Root</u>	<u>Noun</u>				
kfs	keffes			'soot'	
hms	hemmes			'chickpeas'	
hnā	henna			'henna'	
ḍry	ḍerrɪ			'boy'	

C. INFIXES

1. /+e+/ after Second Segment

(15)

<u>"Color and Defect" Formation</u>			
<u>Adjective</u>	<u>Gloss</u>	<u>Adjective</u>	<u>Gloss</u>
9wer	'one eyed'	şfer	'yellow'
bkem	'mute'	xḍer	'green'
9rež	'lame'	zreq	'blue'
hmeq	'crazy'	khel	'black'
şfer	'yellow'	hmer	'red'

(16)

<u>Verb Formation</u>					
<u>Root</u>	<u>Verb</u>	<u>Gloss</u>	<u>Root</u>	<u>Verb</u>	<u>Gloss</u>
ḍrş	ḍreş	'to study'	rkb	rkeb	'to go up'
qls	qlēs	'to sit'	slb	sleb	'to steal'
žbr	žber	'to find'	slq	sleq	'to boil'

2. /+e+/ after First Segment

(17)

<u>Noun Formation</u>					
<u>Root</u>	<u>Noun</u>	<u>Gloss</u>	<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
žld	želd	'skin'	wld	weld	'son'
qrn	qern	'horn'	lrḍ	lerḍ	'earth'
frq	ferq	'difference'	klb	kelb	'dog'
9lm	9elm	'science'	bnt	bent	'girl'
šms	šems	'sun'	brd	berd	'cold'

(18) Verb Formation					
Root	Verb	Gloss	Root	Verb	Gloss
9dd	9edd	'to bite'	šdd	šedd	'to shut, grab'
hzz	hezz	'to lift'	sbb	sebb	'to insult'
škk	šekk	'to doubt'	hbb	hebb	'to love'

3. /+u+/- after Second Segment

(19) Verb Formation			
Root	Verb	Gloss	
	skn	skun	'to live'
	skt	skut	'to be quiet'
	dxl	dxul	'to enter'
	sxr	sxur	'to snore'
	sxn	sxun	'to be warm'

4. /+u+/- after First Segment

(20) Noun Formation					
Root	Noun	Gloss	Root	Noun	Gloss
xbz	xubz	'bread'	b9d	bu9d	'distance'
ntq	nutq	'pronunciation'	hmq	humq	'madness'
9nq	9unq	'neck'	krh	kurh	'hatred'
všš	vušš	'deception'	d9f	du9f	'weakness'

(21) Verb Formation					
Noun	Verb	Gloss	Root	Verb	Gloss
kbb	kubb	'to pour'	ḏnn	ḏunn	'to think'
rdd	rudd	'to return'	ḥkk	ḥukk	'to scrub'
šmm	šumm	'to smell'	šll	šull	'to pick out'

5. /+ā+/- after Second Segment

(22) "Broken" Plural Formation					
Noun	Plural	Gloss	Noun	Plural	Gloss
bent	bnāt	'girl'	kelb	klāb	'dog'
weld	wlād	'son'	ḥukk	ḥkāk	'box'
bvel	bvāl	'mule'	žmel	žmāl	'camel'
fendūq	fnādeq	'hotel'	seržem	sražem	'window'
mterqā	mtāreq	'hammer'	qentrā	qnāter	'bridge'

(23) Noun Formation			
Verb	Gloss	Noun	Gloss
lbēs	'to get dressed'	lbās	'dressing style'
nseb	'to add'	nsāb	'addition'
hsed	'to harvest'	hsād	'harvest'
dūm	'to last'	dwām	'duration'
fekk	'to deliver'	fkāk	'deliverance'
kteb	'to write'	ktāb	'book'

(24) <u>Measure IX Verb Formation</u>		
<u>Root</u>	<u>Verb</u>	<u>Gloss</u>
rṭḥ	rtāḥ	'to rest'
xlq	xlāq	'to be born'
ḥmq	ḥmāq	'to go crazy'
hmr	hmār	'to become red'

(25) <u>Adjective Plural Formation</u>					
<u>Adj.</u>	<u>Plur.</u>	<u>Gloss</u>	<u>Adj.</u>	<u>Plur.</u>	<u>Gloss</u>
kbīr	kbar	'big'	rqīq	rqāq	'thin'
ldīd	ldād	'delicious'	smīn	smān	'fat'
ṣyīr	ṣyār	'small'	ṭwīl	ṭwāl	'tall, long'

6. /+a+/ after First Segment

(26) <u>Present Participle/Adjective Formation</u>				
<u>Verb</u>	<u>Gloss</u>	<u>Pres.Part.</u>	<u>Gloss</u>	
rkeb	'to ride'	rākeb	'riding'	
n9es	'to sleep'	nā9es	'sleeping'	
gles	'to sit'	gāles	'sitting'	
kūn	'to be'	kāyen	'there is/are'	
zīd	'to add'	zāyed	'unnecessary'	
bqā	'to stay'	bāqī	'still'	

(27) <u>Verb Formation (Measure III)</u>		
<u>Root</u>	<u>Verb</u>	<u>Gloss</u>
qda	qāda	'to finish'
9wn	9āwen	'to help'
r29	rāze9	'to review'
s9k	sā9ek	'to help'
dbz	dābez	'to fight'
hwl	hāwel	'to try'
9qb	9āqeb	'to punish'
qwl	qāwel	'to promise'
sfr	sāfer	'to travel'
ḥfd	ḥāfed	'to handle with care'

(28) <u>Noun Formation</u>					
<u>Root</u>	<u>Noun</u>	<u>Gloss</u>	<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
ṣḥb	ṣāḥeb	'friend'	mṭr	māṭer	'rain'
ktb	kāteb	'clerk'	ṣfr	ṣāfer	'trip'
wrt	wāret	'heir'	xdm	xādem	'women servant'

7. /+a+/ after Third Segment

(29) <u>Noun of "Professional or Habitual Activity" Formation</u>					
<u>Root</u>	<u>Noun</u>	<u>Gloss</u>	<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
zrzy	zerzāy	'porter'	hrwl	herwāl	'ambler'
srst	sersāy	'waiter'	smsr	semsār	'real estate broker'
sndf	sendāf	'busy-body'	syms	seynās	'letter opener'
yrb1	yerbāl	'sieve'	grmt	germāt	'short eared'
qrts	qurtās	'bullet'	mrmd	mermād	'tending to get dirty'

8. /t/ after Second Segment

(30) <u>Verbal Noun Formation</u>					
<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>	<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>
rbet	rbīt	'tie'	rbeh	rbīh	'win'
xser	xsīr	'lose'	dfen	dfīn	'bury'
qsem	qsīm	'divide'	hreb	hrīb	'flee'
sreb	srīb	'drink'	qleb	qlīb	'turn over'

(31) <u>Adjective Formation</u>					
<u>Root</u>	<u>Adj.</u>	<u>Gloss</u>	<u>Root</u>	<u>Adj.</u>	<u>Gloss</u>
kbr	kbīr	'big'	ldd	ldīd	'delicious'
mrđ	mrīd	'sick'	zdd	zdīd	'new'
rqq	rqīq	'thin'	smn	smīn	'fat (animals)'
qsr	qsīr	'short'	qrb	qrīb	'near'
tql	tqīl	'heavy'	rhf	rhīf	'light'
syf	syīf	'little'	twl	twīl	'tall, long'
b9d	b9īd	'far'	qbh	qbīh	'bad'
yrb	yrib	'funny'	qdm	qdīm	'old'

9. /+ū+/ after Second Segment

(32) <u>Verbal Noun Formation</u>					
<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>	<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>
rkeb	rkūb	'ride'	kdeb	kdūb	'lie'
dfe9	dfū9	'push'	xrež	xrūž	'go out'
hbet	hbūt	'go down'	šreq	šrūq	'rise (sun)'
hreb	hrūb	'flee'	yreb	yrūb	'set (sun)'

(33) <u>"Broken" Plural Formation</u>					
<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
xedd	xdūd	'cheek'	želd	žlūd	'skin'
bīt	byūt	'room'	đar	dyūr	'room'
žīm	zyūm	'pocket'	sīf	syūf	'sword'
xeyt	xyūt	'thread'	rās	ryūs	'head'
đīk	dyūk	'rooster'	xet̤t̤	x̤t̤t̤	'line'

10. /+u+/- after First Segment

(34) <u>Plural Formation - Adjectives of Color and Defect</u>					
<u>Sing.</u>	<u>Plural</u>	<u>Gloss</u>	<u>Sing.</u>	<u>Plur.</u>	<u>Gloss</u>
zreq	zūreq	'blue'	mles	mūles	'soft'
khel	kūhel	'black'	bkem	būkem	'mute'
xḡer	xūḡer	'green'	ṣfer	ṣūfer	'yellow'

12. /+yy+/- ~ /+i+/- ~ /+iy/- after Second Segment

(35) <u>Diminutive Formation</u>		
<u>Noun</u>	<u>Dimin.</u>	<u>Gloss</u>
A.		
kelb	kleyyeb	'doggy'
weld	wleyyed	'little boy'
byel	byeyyel	'little mule'
fār	fweyyer	'little mouse'
B.		
ḡūṭā	ḡwīṭā	'little fish'
munxār	mnīxer	'little nose'
ḡelwā	ḡlīwā	'little candy'
serḡem	srīḡem	'little window'
C.		
blāsā	bliysā	'little place'
meknāsī	mkīnsī	'little native of Meknes'
berbrī	brībrī	'little Berber'

13. /+ay+/- after Second Segment

(36) <u>Plural Formation</u>					
<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
rīḡā	rwāyeh	'odor'	sāḡā	swāyeḡ	'hour'
zīḡā	zwayeh	'side'	ḡāzā	ḡwāyez	'thing'

D. PREFIXES

1. /m+/-

(37) <u>Noun Formation</u>			
<u>Verb</u>	<u>Gloss</u>	<u>Der.Noun</u>	<u>Gloss</u>
dxūl	'to enter'	medxel	'entrance'
dūz	'to pass'	medwez	'corridor'
xreḡ	'to leave'	mexreḡ	'exit'
tḡeb	'to pierce'	metḡeb	'drill'
bred	'to file'	medbred	'file'

(38) Past Participle Formation

<u>Verb</u>	<u>Gloss</u>	<u>Past Part.</u>	<u>Gloss</u>
śrī	'to buy'	meśrī	'bought'
kmī	'to smoke'	mekmī	'smoked'
nsā	'to forget'	mensī	'forgotten'
qrā	'to study'	meqrī	'studied'
bdā	'to begin'	medbī	'begun'
bnā	'to build'	mebnī	'built'

2. /t+/

(39) Intransitive Verb Formation

a.	<u>M-I Verb</u>	<u>Gloss</u>	<u>M-Ia Verb</u>	<u>Gloss</u>
	derr	'to hurt'	dderr	'to get hurt'
	seff	'to line up'	tseff	'to get in line'
	ḍreb	'to hit'	ḍḍerbū	'to hit each other'
b.	<u>M-II Verb</u>	<u>Gloss</u>	<u>M-IIa Verb</u>	<u>Gloss</u>
	beddel	'to change'	tbeddel	'to be changed'
	kellem	'to summon'	tkellem	'to talk'
	herres	'to break'	therres	'to be broken'
	9ellem	'to teach'	t9ellem	'to teach'
c.	<u>M-III Verb</u>	<u>Gloss</u>	<u>M-IIIa Verb</u>	<u>Gloss</u>
	żaweb	'to answer'	dżaweb	'to answer each other'
	lāqā	'to find'	tlāqā	'to meet'
	qāda	'to finish'	tqāda	'to be used up'
d.	<u>Non-verb</u>	<u>Gloss</u>	<u>M-a Verb</u>	<u>Gloss</u>
	żūż	'two'	dżuwweż	'to get married'
	yda	'lunch'	tyedda	'to have lunch'

E. REDUPLICATION

(40) Verb Formation

<u>Root</u>	<u>Verb</u>	<u>Gloss</u>
zl	zelzel	'to shake'
sr	serser	'to cry out'
šm	šemšem	'to sniff'
kš	keškeš	'to scare off'
tr	terter	'to boom'
gm	gemgem	'to grumble'
kr	kerker	'to pile'
nq	neqneq	'to nose around'
nf	nefnef	'to speak with twang'
śr	śerśer	'to rush (water)'
sb	sebseb	'to depart in shame'
dr	derder	'to powder'
zr	zerzer	'to drag'
fr	ferfer	'to repeatedly flap wings'

(41) Noun Formation, Adjective Formation

<u>Root</u>	<u>Noun</u>	<u>Gloss</u>	<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
sb	sebseb	'mongoose'	fl	felfel	'pepper'
kāw	kāwkāw	'peanuts'	ṭay	ṭayṭay	'frankness'
kyf	kifkif	'same'	bl	belbel	'fluent'

APPENDIX XXII

Complex Word Formation Processes

A. PREFIXES WITH INFIXES

1. /ʔe+/ with /+ā+/ after Second Segment

(1) Plural Formation

<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
merd	ʔemrād	'disease'	dīn	ʔedyān	'religion'
reqm	ʔerqām	'number'	9ām	ʔe9wām	'year'
qesm	ʔeqsām	'class'	qewl	ʔeqwāl	'saying'
nū9	ʔenwā9	'type'	sfer	ʔesfār	'journey'

2. Prefix /m+/ with Infix /+ū+/ after Second Segment

(2) Past Participle Formation

<u>Verb</u>	<u>P.P.</u>	<u>Gloss</u>	<u>Verb</u>	<u>P.P.</u>	<u>Gloss</u>
a. Predictable Meaning					

qleb	meqlūb	'turned over'	sne9	mesnū9	'manufactured'
nšer	menšūr	'published'	qtel	meqtūl	'killed'
sreq	mesrūq	'stolen'	hell	mehlūl	'open'
kreb	mektūb	'written'	9ref	me9rūf	'known'
rbet	merbūt	'tied'	mne9	memnū9	'forbidden'

<u>Base</u>	<u>Gloss</u>	<u>P.P.</u>	<u>Gloss</u>
b. No Predictable Meaning			

šemm	'to smell'	mešmūm	'bouquet'
xrež	'to go out'	mexrūž	'expense'
šten	'to bother'	meštūn	'mischievous'
ženn	'ghost'	mežnūn	'possessed'
žehd	'strength'	mežhūd	'effort'

3. Prefix /m+/ with Infix /+ā+/ after First Segment

(3) Plural Formation

<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
meftāḥ	mfāteḥ	'key'	mehraz	mhārez	'mortar'
medxel	mdāxel	'entrance'	meftel	mfatel	'joint'
mender	mnāder	'sight'	mekteb	mkāteb	'office'
mesken	msāken	'residence'	meslen	msālen	'buttock'
meslek	msālek	'passage'	mesreh	msāreh	'pasture'

4. Prefix /te+/ with Infix /+ā+ after Second Segment

(4) Verbal Noun Formation

<u>M-II</u>	<u>Verb</u>	<u>Gloss</u>	<u>Verbal Noun</u>	<u>Gloss</u>
	kemmel	'to finish'	tekmał	'completion'
	lebbes	'to dress'	telbās	'dressing (tr.)'
	yebbes	'to dry'	tībās	'drying (tr.)'
	keśset	'to rob'	tekśāt	'robbing (tr.)'
	śuwwet	'to burn'	teśwāt	'burning (tr.)'

5. Prefix /te+/ with Infix /+ī+ after Second Segment

(5) Verbal Noun Formation

<u>M-II</u>	<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>
śerret	teśrit		'mark up'
śekkel	teśkil		'hobble'
heḏḏer	teḏḏir		'summon'
śerreg	teśrif		'tear, rip'
śūwwer	teświr		'photograph'
śemmes	teśmīs		'put in sun'

6. Prefix /te+/ with /+ī+ after Third Segment

(6) Verbal Noun Formation

<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>
hernen	thernin	'grumble'
kerdey	tkerdiy	'crunch'
śeqleb	tseqlib	'mess up'
śelweh	tśwlwih	'swing in air'
kebret	tekbrīt	'treat (sulphur)'
kerfes	tkerfis	'botch up'
bendeq	tbendiq	'greet with a bow'

B. PREFIXES WITH DOUBLING OF SECOND SEGMENT

1. Prefix /m+ with Doubling of Second Segment

(7) Participle Formation

<u>Root</u>	<u>Part.</u>	<u>Gloss</u>	<u>Root</u>	<u>Part.</u>	<u>Gloss</u>
hrs	mherres	'broken'	xśr	mxeşşer	'broken'
9bs	m9ebbes	'sad'	qlq	mqelleq	'worried'
fś	mfeşşes	'spoiled'	wsx	mwessex	'dirty'
ḏxm	mḏexxem	'excellent'	ṭwr	mṭewwer	'intelligent'

(8) Noun/Adjective Formation

<u>Base</u>	<u>Gloss</u>	<u>Der.Noun</u>	<u>Gloss</u>
9ellem	'to teach'	m9ellem	'master craftsman'
sebbā	'cause'	msebbā	'pretense'
weddā	'to fulfill'	mwuddā	'gift'
xnūnā	'mucus'	mxennen	'having runy nose'

2. Prefix /t+/ with Doubling of Second Segment

(9) Measure IIa (Intransitive) Verbs

<u>Root</u>	<u>M-IIa Verb</u>	<u>Gloss</u>
žwž	džuwwež	'to get married'
9lm	t9ellem	'to learn'
swb	tsuwweb	'to get repaired'
hrs	therres	'to get broken'
snā	tsennā	'to wait for'

C. DOUBLING OF SECOND SEGMENT WITH INFIX

1. Double Second Segment,
Insert /+ā+/ after Third Segment

(10) <u>Noun/Adjective of Habitual Activity Formation</u>					
<u>Root</u>	<u>Noun</u>	<u>Gloss</u>	<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
kdb	keddāb	'liar'	nsā	nessāy	'forgetful'
nžr	nezzār	'carpenter'	sbr	sebbār	'patient'
bka	bekkay	'weeper'	dhb	dehhab	'goldworker'
nhl	nehḥāl	'beekeeper'	9rq	9errāq	'given to sweating'
syf	seyyāf	'executioner'	trf	terrāf	'show repairman'
xbz	xebbāz	'baker'	ydb	yeddab	'easily irritated'
bql	beqqāl	'greengrocer'			

(11) <u>Noun Formation</u>					
<u>Root</u>	<u>Der.Noun</u>	<u>Gloss</u>	<u>Root</u>	<u>Der.Noun</u>	<u>Gloss</u>
knś	kennās	'notebook'	brd	berrād	'teapot'
lqt	leqqāt	'pincers'	dxn	duxxān	'cigarettes'

2. Double Second Segment Twice,
Insert /+ā+/ after Third Segment

(12) <u>Noun/Adjective of Habitual Activity Formation</u>					
<u>Root</u>	<u>Noun</u>	<u>Gloss</u>	<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
nm	nemmām	'slanderer'	ms	messās	'venom sucker'
dg	geggāg	'jeweler'	dī	dellāl	'auctioneer'
9s	9essās	'guard'			

D. DOUBLING OF SECOND SEGMENT WITH INFIX AND SUFFIX

1. Double Second Segment, Infix /+a+/ after Three, Suffix /+a/

(13) Plural Formation - Nouns of Habitual Activity

<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
le99ab	le99aba	'player'
9essās	9essāsa	'guard'
nežžār	nežžāra	'carpenter'
fellāh	fellāha	'farmer'
gezzār	gezzāra	'butcher'
ṭerrāf	ṭerrāfa	'shoe repairman'

(14) Feminine Formation - Nouns of Habitual Activity

<u>Noun</u>	<u>Fem.</u>	<u>Gloss</u>
le99ab	le99aba	'player'
9essās	9essāsa	'guard'
nežžār	nežžāra	'carpenter'
fellāh	fellāha	'farmer'
gezzār	gezzāra	'butcher'
ṭerrāf	ṭerrāfa	'shoe repairman'

E. INFIXES WITH INFIXES

1. Infix /+u+/ after First and Second Segment

(15) Classicized Plural Formation

<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
ders	dārūs	'lessons'	ferd	fūrūd	'religious obligation'
9elm	9ūlūm	'science'	remz	rūmūz	'sign symbol'

(16) Verbal Noun Formation

<u>Noun</u>	<u>Verb</u>	<u>Gloss</u>	<u>Noun</u>	<u>Verb</u>	<u>Gloss</u>
yurūb	yreb	'set (sun)'	yūrūr	yerr	'delusion/delude'
būlūy	bley	'attain'	sūkūn	skun	'life/live'

F. INFIXES WITH SUFFIXES

1. Infix /+u+/ with Suffix /+a/

(17) Plural Formation, Northern Dialects

<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
žbel	žbūla	'mountain'	žmel	žmūla	'camel'
dīb	dyūba	'jackal'	derb	drūba	'street'
mḍell	mḍūlla	'umbrella'	mḡess	mḡūsa	'scissors'
byel	byūla	'mule'	mhed	mhūda	'cradle'

2. Infix /+ā+/ with Nisba Suffix /+ī/

(18) <u>Nisbas of Habitual Activity Formation</u>			
<u>Noun</u>	<u>Gloss</u>	<u>Nisba Noun</u>	<u>Gloss</u>
fīḡk	'boat'	flāykī	'boatsman'
bendīr	'tambourine'	bnādīrī	'tambourine player'
fendūq	'hotel'	fnādqī	'hotel-keeper'

3. Infix /+āy+/ with Nisba Suffix /+ī/

(19) <u>Nisbas of Habitual Activity</u>			
<u>Noun</u>	<u>Gloss</u>	<u>Nisba Noun</u>	<u>Gloss</u>
meštā	'comb maker'	mšāytī	'comb maker'
qubb	'bucket'	qbāybī	'bucket maker'
sellā	'basket'	slāylī	'basket maker'
zerdā	'party'	zrāydī	'glutton'

4. Infix /+āy+/ with /+ī/ and /+ā/ Suffixes:

(20) <u>Plural of Nisbas of Habitual Activity</u>			
<u>Sing.</u>	<u>Plural</u>	<u>Gloss</u>	
flāykī	flāykiyā	'boatsman'	
zrāydī	zrāydiyā	'glutton'	

5. Infix /u/ after First Segment, Suffix /+ān/:

(21) <u>Plural Noun Formation</u>					
<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>	<u>Noun</u>	<u>Plural</u>	<u>Gloss</u>
blād	buldān	'country'	śrīk	śurkān	'partner'
xlīf	xulfān	'caliph'	ḥāžeb	ḥužbān	'eyebrow'
sā9ī	su9yān	'beggar'	rā9ī	ru9yān	'shepherd'

6. Infix /u/ after First Segment, Suffix /+ā/:

(22) <u>Noun Formation</u>			
<u>Verb</u>	<u>Gloss</u>	<u>Noun</u>	<u>Gloss</u>
9qed	'to knot'	9uqdā	'knot'
tqeb	'to puncture'	tuqbā	'hole'
yrez	'to stitch'	yurzā	'stitch'

G. PREFIXES, INFIXES, AND SUFFIXES:

1. Infix /+ā+/ after First Segment, Prefix /m+/, Suffix /+ā/

(23) Noun Formation

<u>Base</u>	<u>Gloss</u>	<u>Noun</u>	<u>Gloss</u>
raže9	'to return'	mraž9a	'continuation'
sameh	'to pardon'	msāmhā	'pardon'
9awed	'to do again'	m9awda	'repetition'
dabez	'to fight'	mdabza	'fight'
bādel	'to exchange'	mbādla	'exchange'

2. Infix /+ī+/ after Two, Prefix /te+/, Suffix /+ā/

(24) Verbal Noun Formation

<u>M-II Verb</u>	<u>Noun</u>	<u>Gloss</u>	<u>M-II Verb</u>	<u>Noun</u>	<u>Gloss</u>
šettab	teštībā	'sweep'	sehheh	teshīlā	'facilitate'
šebben	tesbīnā	'wash'	sellā	tesliyā	'entertain'
šebbek	tešbīkā	'tangle'	yewwey	teywiyā	'to attack'
šebber	tešbīrā	'grab'	šuwwer	tešwīrā	'photograph'

3. Prefix /te+/, Infix /+ī+/ after Three, Suffix /+ā/

(25) Verbal Noun Formation

<u>Verb</u>	<u>Noun</u>	<u>Gloss</u>
fernes	tfernīsā	'grin'
šelten	tšeltīnā	'crown'
tterteq	ttertīqā	'pop'
šermel	tšermīlā	'treat with'
kerdey	tkerdīyā	'crunch'
yūfel	tyūfīlā	'let hair grow'

H. VARIOUS INFIXING PROCESSES

1. Infix /+ū+/ after Third Segment

(26) Noun Formation

<u>Base</u>	<u>Gloss</u>	<u>Noun</u>	<u>Gloss</u>
kerker	'to pile'	kerkūr	'pile of rocks'
qennet	'to roll (pastry)'	qennūt	'roll (of pastry)'
sensel	'chain'	sensūl	'vertebrae'
keffes	'to ruin'	keffūs	'soot; hideous'

2. Infix /+ā+ / after third Radical (Various Bases)

(27) Noun Formation

Base	Gloss	Noun	Gloss
kennēs	'to record'	kunnās	'notebook'
bred	'to get cold'	berrād	'teapot'
keskes	'to cook cous-cous'	keskās	'cous-cous pot'
qerṭes	'to shoot'	qurṭās	'bullet'
leqqet	'to pick up'	leqqāt	'pincers'
hemmem	'to wash'	hemmām	'baths'
dexxen	'to smoke'	duxxān	'cigarette'
ṣerṣer	'to cry out'	ṣerṣār	'cricket'

3. Infix /+ā+ / Three, Suffix /+ā / (Various Bases)

(28) Noun Formation

Base	Gloss	Noun	Gloss
melles	'to make smoothe'	mellāsā	'trowel'
sebbel	'to be boiling'	sebbālā	'fountain'
kwā	'to solder'	kewwāyā	'soldering iron'
yūbes	'to frown'	yūbāsā	'frown'
yūfel	'to let hair long'	yūfālā	'long hair'
reddēh	'put flamable in fire'	reddāhā	'flame'
qetter	'let fall in drops'	qettārā	'dropper'
neššef	'to blot'	neššāfā	'blotter'

I. PREFIX WITH SUFFIX, DOUBLING OF SECOND SEGMENT, AND INFIX

1. Prefix /tā+ / , Infix /+ā / after Second Segment, Double Second Segment, Suffix /+et /

(29) Abstract Noun Formation

Base	Gloss	Der.Noun	Gloss
bennāy	'mason'	tābennāyet	'masonry'
keddāb	'liar'	takeddābet	'excessive lying'
wekkāl	'glutton'	tawekkālet	'gluttony'
suwwāf	'fortune teller'	tāsuwwāfet	'fortune telling'

J. REDUPLICATION

1. Reduplication with Infix /+ā+ / after Third Segment

(30) Noun Formation

Noun	Gloss	Noun	Gloss
sersār	'bell'	ṣerṣār	'cricket'
ferfār	'propeller'	keskās	'cous-cous pot'
zelzāl	'earthquake'	mešmās	'peach'
derdār	'ash (tree)'		

(31) Noun/Adjective of Professional/Habitual Activity Formation

<u>Noun</u>	<u>Gloss</u>
teftāf	'jack-of-all-trades'
nefnāf	'speaker with nasal twang'
temtām	'one who stutters'

2. Reduplication with Infix /+u+/- after Third Segment

(32) Noun Formation

<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
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zr	zerzūr	'starling'
kr	kerkūr	'pile of stones'

3. Reduplication, Infix /+u+/- after Third Segment, Suffix /+ā/-:

(33) Noun Formation

<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
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kś	keśkūśā	'foam'
ql	qelqulā	'scalp tumor'
bl	belbūlā	'kous kous with buttermilk'

4. Reduplication, Infix /+i+/-, /+u+/- or /+ā/- after Third Segment Suffix /+ā/- or /+i/-:

(34) Adjective Formation

<u>Root</u>	<u>Noun</u>	<u>Gloss</u>
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qś	qeśqāśā	'baby rattle'
hr	herhūrī	'turbulent'
zf	zefzāfī	'strong, cold wind'
tn	teṭṭīnā	'booming'
tf	teftīfā	'chore, odd job'

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