

MICHIGAN STATE UNIVERSITY LIBRARIES
3 1293 00910 8758

THESIS

28999576

LIBRARY
Michigan State
University

This is to certify that the

dissertation entitled

Aspects of Comparative Jordanian and
Modern Standard Arabic Phonology

presented by

Khalil AlSughayer

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Linguistics

Major professor

Date August 31, 1990

MSU is an Affirmative Action/Equal Opportunity Institution

O-12771

LIBRARY
Michigan State
University

PLACE IN RETURN BOX to remove this checkout from your record.
TO AVOID FINES return on or before date due.

DATE DUE	DATE DUE	DATE DUE
MAY 1 0 1994		
NOV 2 2 1996		

MSU Is An Affirmative Action/Equal Opportunity Institution
c:\circ\datedue.pm3-p.1

ASPECTS OF C

AND MODERN ST

Khalil

Mic

in partial

DO

Departm

Slavic,

ASPECTS OF COMPARATIVE JORDANIAN AND MODERN STANDARD ARABIC PHONOLOGY

BY

Khalil Ibrahim Al-Sughayer

A Dissertation

Submitted to
Michigan State University
in partial fulfilment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Linguistics and Germanic,
Slavic, Asian and African Languages

1990

ASPECTS OF
AND MODERN S

Kha

The study analyzes th
Modern Standard Arabic (
phonemes, stress assignm
geminates. These struct
linear and non-linear ph

The two varieties ha
differ in respect to /q/
/q/, /k/, and /ḍ/ while
/ay/ and /aw/ are reali

The analyses of str
same stress rules and
which change the segm
The analysis of stress
sometimes fails to yi

C81-8-185

ABSTRACT

ASPECTS OF COMPARATIVE JORDANIAN AND MODERN STANDARD ARABIC PHONOLOGY

BY

Khalil Ibrahim Al-Sughayer

The study analyzes the relation between Jordanian (JA) and Modern Standard Arabic (MSA) in refererence to inventory of phonemes, stress assignment, high vowel alternation, and geminates. These structures are analyzed in reference to both linear and non-linear phonology.

The two varieties have the same inventory of phonemes but they differ in respect to /q/, /g/, /k/, /č/, /ḍ/, /ay/ and /aw/. MSA has /q/, /k/, and /ḍ/ while JA has /g/, /č/, and /ǰ/, respectively. MSA /ay/ and /aw/ are realized in JA as [ee] and [oo], respectively.

The analyses of stress indicate that the two varieties have the same stress rules and that they differ only in respect to the rules which change the segmental string to which the stress rules apply. The analysis of stress also indicates that the metrical apprroach sometimes fails to yield the correct prediction.

Alternating high vowels
consonants word-finally or
In nouns, alternating high v
are epenthetic. In verbs, t
between the first and seco
vowel-initial suffix are u
they are underlying. The a
a critical review of the ap
to these vowels.

As for geminates, the
segments underlyingly ar
behaviour of geminates i
geminate glides. In JA,
they do not.

In the application o
Proper Inclusion Preced
their structural descrip
mophologically conditi
Rules of epenthesis are
phonotactic constraint
Principle (PSP). Epent
PSP is not violated.

Alternating high vowels appear only in JA in the context of two consonants word-finally or that of three consonants word-medially. In nouns, alternating high vowels are predictable. Accordingly, they are epenthetic. In verbs, the alternating high vowels which appear between the first and second radicals in the context of a vowel-initial suffix are unpredictable. Accordingly, we argue that they are underlying. The analyses of alternating high vowels involve a critical review of the approach of non-linear phonology approach to these vowels.

As for geminates, the analyses indicate that they behave as two segments underlyingly and as one long segment phonetically. The behaviour of geminates is similar in both varieties except for geminate glides. In JA, glides degeminate word-finally. But in MSA, they do not.

In the application of rules, the study invokes the principle of Proper Inclusion Precedence (PIP). Otherwise, rules apply whenever their structural description is met. Another principle is that mophologically conditioned rules take precedence over other rules. Rules of epenthesis are late rules which apply to satisfy a phonotactic constraint in compliance with the Peak of Sonority Principle (PSP). Epenthesis does not apply to geminates because the PSP is not violated.

I thank Professor Gr
committee, and the com
Professor Carolyn Harfo
for their helpful comme
Thanks are also due to
Ph.D committee until s

ACKNOWLDGEMENT

I thank Professor Grover Hudson, the Chairman of my Ph.D committee, and the committee members: Professor Barbara Abbott, Professor Carolyn Harford, and Professor Seok Song. I thank them for their helpful comments on earlier versions of this dissertation. Thanks are also due to Professor Carol Myers Scotton who was in my Ph.D committee until she left Michigan State University.

List of Tables

Abbreviations

Chapter 1: Introdu

1.1. Objecti

1.2. Overvi

1.3. Gener

1.4. Sociol

1.5. Litera

Chapter 2: Segm

2.1.1. Conso

2.1.2. Distin

2.1.3. Vowe

2.1.4. Disti

2.2.1. Con

2.2.2. Dist

2.2.3. Vow

2.2.4. Dis

TABLE OF CONTENTS

		page
List of Tables		xi
Abbreviations		xiii
Chapter 1:	Introduction	1
1.1.	Objectives	1
1.2.	Overview	3
1.3.	General background	5
1.4.	Sociolinguistic background	11
1.5.	Literature review	13
Chapter 2:	Segmental phonology	16
2.1.1.	Consonants in MSA	16
2.1.2.	Distinctive features of consonants in MSA	20
2.1.3.	Vowels in MSA	22
2.1.4.	Distinctive features of vowels in MSA	24
2.2.1.	Consonants in JA	25
2.2.2.	Distinctive features of consonants in JA	27
2.2.3.	Vowels in JA	29
2.2.4.	Distinctive features of vowels in JA	30

2.3. The relatio
in MSA &
2.3.1. Consonan
2.3.2. Vowels in

Chapter 3: Stress a
Standar
3.1.1. STGP ap
3.1.2. The met
3.1.2.1. Rhyme
3.1.2.2. Foot as
3.1.2.3. Buildin
3.1.2.4. Labeli
3.1.2.5. The pri
3.2.1. Stress
Some
3.2.2. Stres
app
3.2.3. Haye
3.2.4. Stre
3.2.5. Stre
ap
Hay
(n
3.2.6. Su

2.3. The relation between consonants & vowels in MSA & JA 33
2.3.1. Consonants in MSA and JA 33
2.3.2. Vowels in MSA and JA 34

Chapter 3: Stress assignment in Jordanian and Modern Standard Arabic 35
3.1.1. STGP approach to stress assignment 35
3.1.2. The metrical approach to stress assignment 36
3.1.2.1. Rhyme projection 37
3.1.2.2. Foot assignment 40
3.1.2.3. Building the metrical tree superstructure 42
3.1.2.4. Labeling 45
3.1.2.5. The principle of extrametricality 49
3.2.1. Stress Assignment in MSA (linear approach) 49
Some problematic data to rule (15) 53
3.2.2. Stress assignment in MSA (non-linear approach) 57
3.2.3. Hayes' metrical model 69
3.2.4. Stress assignment in JA (linear approach) 73
3.2.5. Stress assignment in JA (non-linear approach) 76
Hayes' model and stress assignment in JA (non-linear approach) 81
3.2.6. Superheavy syllables and stress assignment 82

3.3.1. Evaluation
stress as
3.3.2. Evaluation
assignm

Chapter 4: Alternatin
4.1. Evidence
4.1.1. Vowel-ini
4.1.2. Stress in
4.1.3. Alternatio
followin
4.1.4. Concludi
4.2.1 Rules of
4.2.2. High vow
4.3.1. Conson
4.3.1.1. Conson
4.3.1.2. Conson
4.3.1.3. Conson
4.3.2. Conson
4.4. Conson
4.5. The pe
4.6. Epenth
vowe
4.7. Epenth
non-
4.7.1. Epent

3.3.1. Evaluation of the metrical approach to stress assignment 86
3.3.2. Evaluation of the STGP approach to stress assignment 90

Chapter 4: Alternating high vowels 91
4.1. Evidence for epenthesis 93
4.1.1. Vowel-initial suffixes 93
4.1.2. Stress in nouns and verbs 94
4.1.3. Alternation high vowels preceding or following a sonorant 95
4.1.4. Concluding remarks 100
4.2.1 Rules of epenthesis 101
4.2.2. High vowel deletion 102
4.3.1. Consonant clusters in JA 108
4.3.1.1. Consonant clusters word-finally 108
4.3.1.2. Consonant clusters word-medially 108
4.3.1.3. Consonant clusters word-initially 110
4.3.2. Consonant clusters in MSA 111
4.4. Consonant clusters in reference to sonority 113
4.5. The peak of sonority principle (PSP) 116
4.6. Epenthesis in the context of a preceding high vowel 121
4.7. Epenthesis in the context of a preceding non-high vowel 123
4.7.1. Epenthesis in the context of folowing labials 126

4.7.2. Epenthes
4.7.3. Epenthes
emphat
4.7.4. Epenthe
non-en
4.7.5. Epenthe
lateral
4.7.6. Epenth
4.7.7. Epenth
phary
4.8. Rule a
4.9. Summ

Chapter 5: Proble
5.1. Proble
5.2. Proble
(34)
5.3. Impe
(34)
5.3.1. The
5.3.2. The
5.3.3. The
5.4. Con

Chapter 6: A
6.1. Th

4.7.2. Epenthesis in the context of following velars 127
4.7.3. Epenthesis in the context of following emphatics 130
4.7.4. Epenthesis in the context of following non-emphatic-coronals 133
4.7.5. Epenthesis in the context of following laterals 135
4.7.6. Epenthesis in the context of a following flap 136
4.7.7. Epenthesis in the context of following pharyngeals 138
4.8. Rule application 140
4.9. Summary 143

Chapter 5: Problematic data 146
5.1. Problematic data to rule (26) 147
5.2. Problematic data to rules (7'), (32), (34), and (40) 150
5.3. Imperfect verbs and rules (7'), (32), (34), and (40) 155
5.3.1. The underlying vowel analysis 158
5.3.2. The metathesis analysis 166
5.3.3. The epenthesis analysis 171
5.4. Conclusion 176

Chapter 6: A Non-linear Approach 177
6.1. The non-linear approach 177

6.1.1. Syncope
6.1.2. Epenthes
6.1.3. Associati
6.1.4. Default
6.1.5. Emphasi
6.1.6. Tier cont
6.1.7. Redunda
6.2. Applicat
6.3. Evaluat

Chapter 7: Gemin
7.1. Gemina
7.1.1. Repres
7.1.2. Gemin
7.1.2.1. Glide
dege
7.1.2.1.1. Glide
7.1.2.1.2. Glide
7.1.2.1.3. Glide
7.1.3. Gemi
7.1.4. Gemi
7.2. Gem
7.2.1. Repr
7.2.2. Gem
7.2.2.1. Glid
7.2.2.2. Glid

6.1.1. Syncope 177
6.1.2. Epenthesis 179
6.1.3. Association 180
6.1.4. Default 183
6.1.5. Emphasis spreading, rounding and backing 184
6.1.6. Tier conflation 189
6.1.7. Redundancy rules 190
6.2. Application of non-linearl rules to JA data 191
6.3. Evaluation 197

Chapter 7: Geminates 203
7.1. Geminates in JA 204
7.1.1. Representation 204
7.1.2. Geminate glides 207
7.1.2.1. Glide deletion, vocalization, and degemination 211
7.1.2.1.1. Glide deletion 211
7.1.2.1.2. Glide vocalization 212
7.1.2.1.3. Glide degemination 218
7.1.3. Geminates and stress 219
7.1.4. Geminates and epenthesis 220
7.2. Geminates in MSA 225
7.2.1. Representation 225
7.2.2. Geminate glides 226
7.2.2.1. Glide deletion 227
7.2.2.2. Glide vocalization 228

7.2.2.3. Glide deg
7.2.3. Geminates
7.2.4. Geminates
7.3. The analy
7.3.1. Geminate
7.3.2. Geminate
7.3.3. Geminate
7.3.4. Geminate
7.4. Summar

Chapter 8: Conclus
8.1. Inventor
8.2. Stress a
8.3. Alternat
8.4. Gemina
8.5. Conclus

References

7.2.2.3. Glide degemination 229
7.2.3. Geminates and stress 230
7.2.4. Geminates and epenthesis 230
7.3. The analysis of geminates in CV phonology 231
7.3.1. Geminates and stress assignment 231
7.3.2. Geminates and epenthesis 231
7.3.3. Geminates and glide vocalization 233
7.3.4. Geminates and glide degemination 237
7.4. Summary 239

Chapter 8: Conclusion 241
8.1. Inventory of phonemes 241
8.2. Stress assignment 243
8.3. Alternating high vowels 249
8.4. Geminates 252
8.5. Conclusion 253

References 257

Table (1): Consonants in
Table (2): Distinctive feat
Table (3): Distinctive feat
Table (4): Consonants in
Table (5): Distinctive fea
Table (6): Distinctive fea
Table (7): Epenthesis in

LIST OF TABLES

Table (1): Consonants in MSA 17

Table (2): Distinctive features of consonants in MSA 21

Table (3): Distinctive features of vowels in MSA 24

Table (4): Consonants in JA 26

Table (5): Distinctive features of consonants in JA 28

Table (6): Distinctive features of vowels in JA 30

Table (7): Epenthesis in consonantal contexts 125

Figure (1): Historical rela

(first assump

Figure (2): Historical rela

(second ass

Figure (3): Vowels in MS

Figure (4): Vowels in JA

LIST OF FIGURES

Figure (1): Historical relation between JA and MSA
(first assumption) 10

Figure (2): Historical relation between JA and MSA
(second assumption) 10

Figure (3): Vowels in MSA 23

Figure (4): Vowels in JA 29

Adjacency-Identity Const

Constraint on Assimilatio

Classical Arabic (CA)

Emphasis (E)

Emphasis Rounding (ER

High Vowel Deletion (HV

High Stem Vowel Deleti

High Vowel Harmony (H

Jordanian Arabic (JA)

Lexical Category Prom

Linking Constraint (LC)

Modern Standard Arab

Obligatory Contour Pri

Proper Inclusion Prece

Phonetic Realization (

Peak of Sonority Princ

Progressive High Vow

Regressive High Vow

Sound Patterns of En

Strong (S)

ABBREVIATIONS

Adjacency-Identity Constraint (AIC)

Constraint on Assimilation Rules (CAR)

Classical Arabic (CA)

Emphasis (E)

Emphasis Rounding (ER)

High Vowel Deletion (HVD)

High Stem Vowel Deletion (HSVD)

High Vowel Harmony (HVH)

Jordanian Arabic (JA)

Lexical Category Prominence Rule (LCPR)

Linking Constraint (LC)

Modern Standard Arabic (MSA)

Obligatory Contour Principle (OCP)

Proper Inclusion Precedence (PIP)

Phonetic Realization (PR)

Peak of Sonority Principle (PSP)

Progressive High Vowel Harmony (PHVH)

Regressive High Vowel Harmony (RHVH)

Sound Patterns of English (SPE)

Strong (S)

Structural Description (SD)

Standard Theory of Genera

Underlying Representation

Weak (W)

Well Formedness **Conditio**

Structural Description (SD)

Standard Theory of Generative Phonology (STGP)

Underlying Representation (UR)

Weak (W)

Well Formedness Condition (WFC)

1.1. Objectives:

The main objectiv
Jordanian Arabic (JA)
comparison is based o
phonemes, rules of st
of geminates in both
may yield some evide
between the two var

Another objectiv
theoretical phonolog
examination of the e
Precedence (PIP), th
phonology vs. non-li
nature of geminates

JA is the Arabic
identified as that
or regional affiliat
Arabic of the acco
holy book of Islam
academic subject.
MSA, one is not su
may not be always

Chapter 1

Introduction

1.1. Objectives:

The main objective of this study is to compare the phonology of Jordanian Arabic (JA) to that of Modern Standard Arabic (MSA). The comparison is based on the synchronic analysis of the inventory of phonemes, rules of stress assignment, epenthesis, and the behavior of geminates in both varieties. The comparison of the two varieties may yield some evidence which reflect on the historical relation between the two varieties.

Another objective is to examine a number of issues of theoretical phonology through this comparison. This includes an examination of the application of the principle of Proper Inclusion Precedence (PIP), the approach to stress assignment of linear phonology vs. non-linear phonology, rules of epenthesis, and the nature of geminates.

JA is the Arabic dialect spoken in northern Jordan. MSA may be identified as that dialect of Arabic which does not reflect the home or regional affiliation of its speakers. MSA is exemplified in the Arabic of the accomplished readers of the news, of the *qurʔaan* "the holy book of Islam", and of educated people formally discussing an academic subject. Accordingly, listening to a native speaker of MSA, one is not supposed to know where he comes from. But this may not be always the case. Historically, MSA is a descendant of

Classical Arabic (CA). CA may
the religious Islamic texts an
Islam. It is the standard vari
ancient Arab grammarians su
have died in 793 A.D. (Semaan
the advent of Islam.

It has to be pointed out t
sometimes inexplicitly used
refer to MSA data. This has
differences between CA and
or unidentifiable. MSA still
which CA has. But it may di
realization of these phonem
[ḍ], which is a voiced emphe
what the phontic realizatio
corresponding to CA /ḍ/ fit

In morphology and synt
if any. Differences may ap
endings. Speakers of MSA
endings utterance-finally.
result of lack of competer

MSA is the learned vers
first concerns the availab
establishes an adequate n
The second question conc
On these grounds, it is qu
identity perfectly unchan

Classical Arabic (CA). CA may be be identified as the language of the religious Islamic texts and the literature written during early Islam. It is the standard variety of early Islam as described by the ancient Arab grammarians such as Sibawaihi, who is believed to have died in 793 A.D. (Semaan, 1968: 38), the second century after the advent of Islam.

It has to be pointed out that the terms MSA and CA are sometimes inexplicitly used. The term CA is sometimes used to refer to MSA data. This has to be attributed to the fact that differences between CA and MSA are either considered insignificant or unidentifiable. MSA still has the same inventory of phonemes which CA has. But it may differ in respect to the phonetic realization of these phonemes. For example, MSA /ḍ/ is realized as [ḍ], which is a voiced emphatic stop. In CA, we do not know for sure what the phontic realization of /ḍ/ is. The decription of the phone corresponding to CA /ḍ/ fits a lateral (in modern terms).

In morphology and syntax, there are no significant differences, if any. Differences may appear in the the use of inflectional endings. Speakers of MSA tend to delete the optional inflectional endings utterance-finally. Sometimes differences may arise as a result of lack of competence by the speakers of MSA.

MSA is the learned version of CA. This raises two problems. The first concerns the availability of an adequate record of CA, which establishes an adequate model for the language teacher to present. The second question concerns the plausibility of perfect learning. On these grounds, it is questionable whether CA has maintained its identity perfectly unchanged over a long period of time.

1.2. Overview:

The study is presented in s
the plan, objectives, and back
literature is reviewed.

Chapter 2 presents the in
MSA, which is necessary as a
chapters.

Chapter 3 deals with the
Two approaches are consider
1979), the assignment of st
metrical structure of a wor
grounds that it does not alw
that it resorts to making ar
against this approach is ba
of JA and MSA data. In the
stress is based on the dist
word. Here stress rules ap
their application, the princ
can be accounted for with

Chapter 4 deals with t
appears in the context of
and that of three consona
distinctive behaviour, I a
rules of epenthesis are a
phonotactic constraints.
some phonological rules

1.2. Overview:

The study is presented in seven chapters. In the present chapter, the plan, objectives, and background are introduced and the literature is reviewed.

Chapter 2 presents the inventory of phonemes in both JA and MSA, which is necessary as a background for the subsequent chapters.

Chapter 3 deals with the assignment of stress in JA and MSA. Two approaches are considered. In the first approach (McCarthy, 1979), the assignment of stress is considered in relation to the metrical structure of a word. I argue against this approach on the grounds that it does not always make the correct prediction, and that it resorts to making arbitrary assumptions. The argument against this approach is based on detailed and systematic analysis of JA and MSA data. In the second approach, the assignment of stress is based on the distribution of the vowels and consonants in a word. Here stress rules apply without reference to the syllable. In their application, the principle of PIP is invoked. I argue that stress can be accounted for within the framework of this approach.

Chapter 4 deals with the analysis of the high vowel which appears in the context of a cluster of two consonants word-finally and that of three consonants word medially. On the basis of its distinctive behaviour, I argue that this vowel is epenthetic and that rules of epenthesis are applied to satisfy language-specific phonotactic constraints. The analysis involves the postulation of some phonological rules to account for the alternation of the vowel

between [i], [u], and zero. The
with the principle of PIP. The
identification of the **contexts**
This involves **some reference**
identification **of its domain.**

Chapter 5 deals with som
counter evidence to the rules
chapter. The problematic da
some nouns, the problem is t
unpredictable by the rules o
the context of some occasio
predictions of the rules of
[u] in the context of coronal
epenthesis predict [i].

To account for these pr
hypotheses. The first hypo
not adjust to the phonolog
Such data enter the lexico
specific marking. The pec
formally accounted for by
hypothesis is that the hig
vowel. Within the framew
accounting for the qualit
to account for the failur
stress. The analysis als
between metathesis and
apparently epenthetic v

between [i], [u], and zero. The postulated rules apply in compliance with the principle of PIP. The analysis in this chapter includes an identification of the contexts where the vowel alternates with zero. This involves some reference to the scale of sonority and an identification of its domain.

Chapter 5 deals with some problematic data which are potential counter evidence to the rules of epenthesis postulated in the third chapter. The problematic data include some nouns and verbs. In some nouns, the problem is that the quality of the high vowel is unpredictable by the rules of epenthesis. The vowel appears as [i] in the context of some occasions of preceding [u], contrary to the predictions of the rules of epenthesis. In some verbs, the vowel is [u] in the context of coronals and preceding [a], where the rules of epenthesis predict [i].

To account for these problematic data, we consider four hypotheses. The first hypothesis is that some borrowed words do not adjust to the phonological system of the borrowing language. Such data enter the lexicon of the borrowing language with a specific marking. The peculiar behavior of such data can be formally accounted for by invoking the principle of PIP. The second hypothesis is that the high vowel in question is a metathesized vowel. Within the framework of this hypothesis the question of accounting for the quality of the vowel does not arise. But we have to account for the failure of the metathesized vowel to be assigned stress. The analysis also involves a consideration of the interaction between metathesis and syncope. The third hypothesis is that the apparently epenthetic vowel is underlying and that it is not assigned

stress as the stress rules pre
is morphologized. The fourth
vowel in question is determir
verb prefix.

Chapter 6 presents a non-
question. This involves first
of this approach, and then ar
JA data. I argue against this
based on some assumptions
and that it does not always

In chapter 7, we conside
argue that geminates are tv
segment phonetically. Gem
to rules of epenthesis and
geminates, we consider so
account for their integrity
Constraint (AIC) (Guersse
(OCP) (McCarthy, 1979), a
1986).

Chapter 8 sums up and
compared in respect to th
assignment, high vowel e

1.3. General background:

Arabic is spoken all
there is usually more th

stress as the stress rules predict because in these contexts stress is morphologized. The fourth hypothesis is that the quality of the vowel in question is determined by that of the high vowel of the verb prefix.

Chapter 6 presents a non-linear approach to the vowel in question. This involves first a presentation of the basic principles of this approach, and then an application of these principles to some JA data. I argue against this approach on the grounds that it is based on some assumptions which are arbitrary and too abstract, and that it does not always yield the correct prediction.

In chapter 7, we consider the representation of geminates. I argue that geminates are two segments underlyingly and one long segment phonetically. Geminates are also considered in reference to rules of epenthesis and stress assignment. In the analysis of geminates, we consider some principles or constraints which account for their integrity. This includes the Adjacency-Identity Constraint (AIC) (Guerssel, 1977), the Obligatory Contour Principle (OCP) (McCarthy, 1979), and the Linking Constraint (LC) (Hayes, 1986).

Chapter 8 sums up and analyzes findings. JA and MSA are compared in respect to their inventory of phonemes, stress assignment, high vowel alternation, and geminates.

1.3. General background:

Arabic is spoken all over the Arab World. In every Arab country, there is usually more than one local variety of Arabic spoken

besides the standard variety.
to as colloquial Arabic, are va
intelligible. Unlike the local
supposed to be identical amor
the case. Sometimes the so-
of competence of its speaker
colloquial accents. When dif
speakers of the standard var
variety is actually the stand

To answer this question,
Arabic term which is used t
Arabic term for the standar
"the clearly articulated Ara
the way town dwellers use
tribes. The town dwellers
the nomads spoke fast (Ani
term *ʔal-fuṣħaa* "the clea
belief that there is only or
distinguished from the oth
This term has commonly b
since early Islam, probabl

On the basis of the an
we do not know whether
We are left with a gramm
assignment. The lack of
open for having different
unlikely that ancient *fus*

besides the standard variety. The local varieties, usually referred to as colloquial Arabic, are varied. In most cases they are mutually intelligible. Unlike the local varieties, the standard variety is supposed to be identical among all of its speakers. But this is not the case. Sometimes the so-called standard variety reflects a lack of competence of its speakers, and at other times it reflects their colloquial accents. When differences arise among different speakers of the standard variety, the question to be raised is: which variety is actually the standard one?

To answer this question, we consider the implications of the Arabic term which is used to refer to the standard variety. The Arabic term for the standard variety is *ʔal-ʕarabiyyah ʔal-fuṣħaa* "the clearly articulated Arabic". Clarity of articulation may concern the way town dwellers used to speak compared to the nomadic tribes. The town dwellers were known for speaking slowly while the nomads spoke fast (Anis,1952; Al-ðunaim,1985). The Arabic term *ʔal-fuṣħaa* "the clearly articulated" reflects the common belief that there is only one standard variety which has to be distinguished from the other varieties for its clarity and elequence. This term has commonly been used to refer to the standard variety since early Islam, probably earlier.

On the basis of the analysis of the ancient Arab grammarians, we do not know whether ancient *fuṣħaa* had stress rules or not. We are left with a grammar which tells us nothing about stress assignment. The lack of reference to the stress leaves the door open for having different readings of contemporary *fuṣħaa*. It is unlikely that ancient *fuṣħaa* did not have stress; most modern

world languages have stress a
an exception. It is more likel
analyses just because the gre
of stress in grammar. A plau
stress was not phonemic.

Two other problems with
fuṣḥaa in relation to ancie
articulation of some of the
interpretation of the linguis
grammarians to describe th
discussed in the section wh
inventory of phonemes in M

Now, to avoid the proble
contemporary *fuṣḥaa* in r
explained above, we will u
contemporary *fuṣḥaa* as
Jordan. It is beyond the s
MSA in its broad sense. T
standard varieties as the

In this study, the MSA
represent the intuition o
fuṣḥaa as it is spoken
MSA in Jordan is the sa
this would have to be de
data in all of those cou

MSA is usually influ
common to find that MS

world languages have stress and so ancient *fuṣħaa* is unlikely to be an exception. It is more likely that stress is missing in the analyses just because the grammarians were not aware of the role of stress in grammar. A plausible explanation for this is that stress was not phonemic.

Two other problems with the identification of contemporary *fuṣħaa* in relation to ancient *fuṣħaa* concern the correct articulation of some of the consonants, on the one hand, and the interpretation of the linguistic terms used by the ancient grammarians to describe them. These related problems will be discussed in the section which deals with the identification of the inventory of phonemes in MSA.

Now, to avoid the problems involved in the identification of contemporary *fuṣħaa* in relation to ancient *fuṣħaa* as we have explained above, we will use the term "MSA" to refer to contemporary *fuṣħaa* as it is spoken and taught nowadays in Jordan. It is beyond the scope of this study to identify the term MSA in its broad sense. This would require some analysis of the standard varieties as they are spoken all over the Arab countries.

In this study, the MSA data to be analyzed is supposed to represent the intuition of a competent speaker of contemporary *fuṣħaa* as it is spoken in Jordan. This does not of course mean that MSA in Jordan is the same as MSA in the other Arabic countries, but this would have to be determined on the basis of the analysis of MSA data in all of those countries.

MSA is usually influenced by the local varieties. It is quite common to find that MSA is spoken with a local accent. This should

explain why MSA may differ f
the influence of the local var
formal instruction which str
standard variety especially
hand, the local varieties are
Speakers of the local variet
formal education, are quite
They are exposed to it on th
discussions, etc. Moreover,
when they say their prayer
influence of the standard v
provided in the section dea
JA.

As for the local varieti
developed. Some people a
by Blau (1981) as "Middle
imperfect learning of the
According to this assump
interlanguage where lear
and generalization. The
process of learning the s
some of the inflectional
inflectional endings wh
gender, and mark the ve
regularly missing in th
not have developed only

The role of the nati

explain why MSA may differ from one Arabic country to another. But the influence of the local varieties on MSA is usually constrained by formal instruction which strictly emphasizes adherence to the standard variety especially when reading the *qurʔaan*. On the other hand, the local varieties are also influenced by the standard variety. Speakers of the local varieties, including those who have had no formal education, are quite often exposed to the standard variety. They are exposed to it on the radio, TV, in the mosque, formal discussions, etc. Moreover, they are expected to use it especially when they say their prayers. Some evidence illustrating the influence of the standard variety on the local variety will be provided in the section dealing with the inventory of phonemes in JA.

As for the local varieties, we do not know for sure how they developed. Some people assume that the local varieties, referred to by Blau (1981) as "Middle Arabic", have developed as a result of imperfect learning of the standard variety after the advent of Islam. According to this assumption, the local varieties developed as an interlanguage where learners apply the principles of simplification and generalization. The application of these principles in the process of learning the standard variety resulted in the deletion of some of the inflectional endings. It is true that many of the inflectional endings which mark the nouns for case, number, and gender, and mark the verb for person, mood, number, and gender are regularly missing in the local varieties. The local varieties would not have developed only in this way.

The role of the native language or languages spoken by the people

living in Jordan before enterin
consideration. This can accou
Any realistic study dealing w
varieties must take into cons
languages which were spoken

In figure (1), we illustra
between JA and MSA under a
from CA and accordingly it i
(2), we illustrate another po
and MSA under an assumptio
unidentified Arabic variety
Evidence for the relation be
from the synchronic analys
support of figure (1) would
identical with the underly
developed. Evidence in sup
underlying forms of JA ar
CA. In either case, eviden
underlying forms of JA ar
exclude the possibility th
shares these features wi

living in Jordan before entering Islam must also be taken into consideration. This can account for the diversity of local varieties. Any realistic study dealing with the development of the local varieties must take into consideration the role of the native languages which were spoken in the area before the spread of Islam.

In figure (1), we illustrate a possible historical relation between JA and MSA under an assumption that JA has developed from CA and accordingly it is a sister language to MSA. In figure (2), we illustrate another possible historical relation between JA and MSA under an assumption that JA has developed from an unidentified Arabic variety which is a sister language to CA. Evidence for the relation between the two varieties may be obtained from the synchronic analysis of the two varieties. Evidence in support of figure (1) would be that the underlying forms of JA are identical with the underlying forms of CA from which MSA has developed. Evidence in support of figure (2) would be that the underlying forms of JA are different from the underlying forms of CA. In either case, evidence cannot be conclusive. That the underlying forms of JA are identical with those of CA does not exclude the possibility that there might be another variety which shares these features with CA.

Figure (1): Historical relation
assumption)

P

MSA

Figure (2): Historical relat
assumption)

CA

MSA

Figure (1): Historical relation between JA and MSA (first assumption)

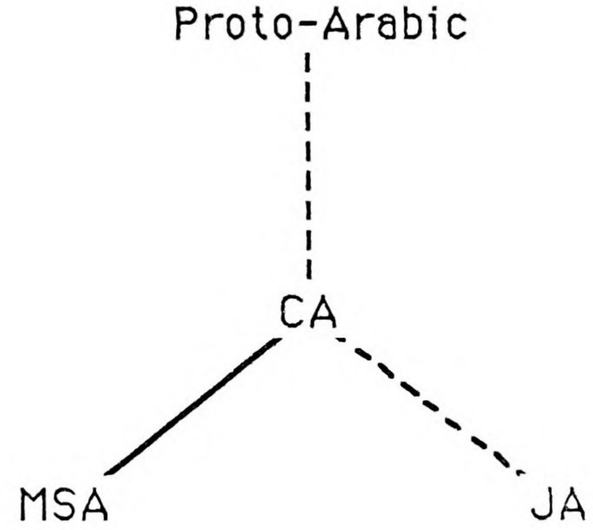
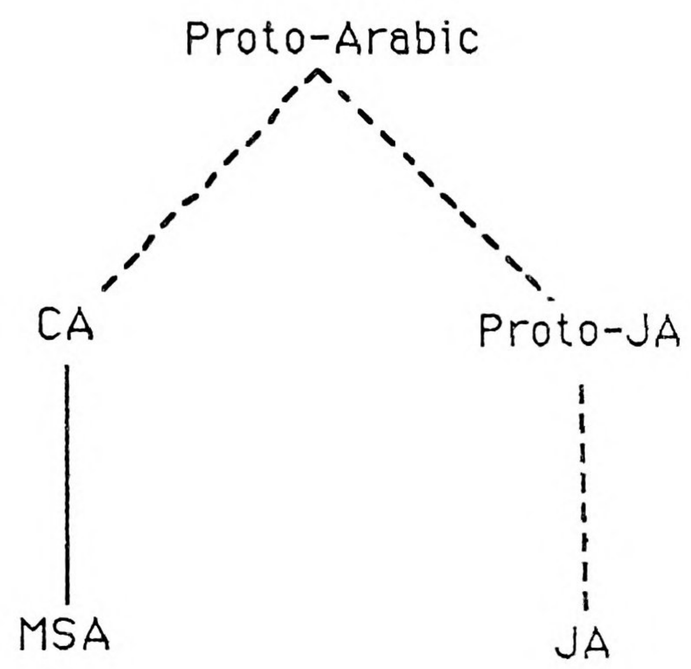


Figure (2): Historical relation between JA and MSA (second assumption)



In Jordan, there are three
urban, and the rural. These t
colloqual Arabic. The three
bedouin dialect is spoken by
nomadic life in the desert w
southern parts of Jordan. T
dialects spoken in the north
considered an extension of
developed as a result of no
Syrian desert.

The urban dialect is spo
similarities with the urbe
Socially, it is the most pr
prestigeous status is refl
dialects adjust their spee
it exerts some influence

The rural dialect is sp
countryside and lead an a
dialect shares a lot of s
spoken in southern Syria
The rural dialect is the
"JA" is used in this stud

The local varieties a
In formal contexts, spe
standard variety. Whe

1.4. Sociolinguistic Background:

In Jordan, there are three main local varieties: the bedouin, the urban, and the rural. These three are varieties or dialects of colloqual Arabic. The three varieties are mutually intelligible. The bedouin dialect is spoken by the bedouins who used to lead a nomadic life in the desert which constitutes the eastern and southern parts of Jordan. This dialect bears great similarity to the dialects spoken in the northern parts of Arabia, and can be considered an extension of them. This dialect is said to have developed as a result of nomadic migrations from Arabia into the Syrian desert.

The urban dialect is spoken by the city-dwellers. It shares some similarities with the urban dialects spoken in Syria and Lebanon. Socially, it is the most prestigious dialect (Ibrahim, 1984). Its prestigeous status is reflected in the way the speakers of the other dialects adjust their speech to fit it. Accordingly, we can say that it exerts some influence on the other dialects.

The rural dialect is spoken by farmers who live in the countryside and lead an agricultural life in northern Jordan. This dialect shares a lot of similarity with the *ħawran* dialect which is spoken in southern Syria, and can be considered an extension of it. The rural dialect is the object of analysis in this study. The term "JA" is used in this study to refer only to this variety.

The local varieties are spoken at home and in informal contexts. In formal contexts, speakers of the local varieties speak the standard variety. When speakers of different dialects meet in an

informal situation, they usu

where an urban and a rural s

makes some adjustment in h

speaker while the speaker o

hardly makes any adjustmen

The rural speaker adjust

phones of his dialect with t

standard variety. For exam

urban speaker would say: *k*

speaker greeting another r

are you?". But a rural spea

keef ħaalak. Here the rur

with the corresponding ur

of MSA. In this example w

[k] is borrowed from the u

both speakers would say:

The following example

urban speaker would say:

rural speaker would say:

context, they both use th

ʔal-qurʔaan. Both the u

phone [q] in the word *qu*

corresponding to MSA *q*

[ʔ] and [aʔ] with [ee]. C

[q] with [g] and [aʔ] wit

Where the rural va

rural speaker does not

informal situation, they usually adjust their speech. In a situation where an urban and a rural speaker meet, the rural speaker usually makes some adjustment in his speech to fit that of the urban speaker while the speaker of the urban dialect, the prestigious one, hardly makes any adjustment in his speech.

The rural speaker adjusts his speech by replacing some of the phones of his dialect with the corresponding ones in the urban or standard variety. For example, an urban speaker greeting another urban speaker would say: *kiif ħaalak* "How are you?". A rural speaker greeting another rural speaker would say: *čeef ħaalak* "How are you?". But a rural speaker talking to an urban speaker would say: *keef ħaalak.* Here the rural speaker replaced the rural phone [č] with the corresponding urban one [k] which is also one of the phones of MSA. In this example we can not tell for sure whether the phone [k] is borrowed from the urban dialect or MSA. In a formal situation, both speakers would say: *kayfa ħaaluka,* which is MSA.

The following example illustrates the influence of MSA. An urban speaker would say: *ʔareet ʔil-qurʔaan* "I read the Qurʔaan". A rural speaker would say: *gareet ʔil-qurʔaan.* But in a formal context, they both use the corresponding MSA form: *qaraʔtu ʔal-qurʔaan.* Both the urban and the rural speakers used the MSA phone [q] in the word *qurʔaan.* But in urban *ʔareet* "I read", corresponding to MSA *qaraʔtu,* the urban speaker replaces [q] with [ʔ] and [aʔ] with [ee]. On the other hand, the rural speaker replaces [q] with [g] and [aʔ] with [ee].

Where the rural variety shares the same phone with MSA, the rural speaker does not adjust his speech to fit that of the urban

speaker. For example, MSA a
and [ð] in *ħadiiθ ziðaasiy*
phones corresponding to the
as we can see in the corresp
this phrase, it is unlikely th
urban phones [s] and [z] for

On these grounds, we ca
influenced by both MSA and
reflected in the way rural
of the other varieties. MS
influence one another. But
that of the other dialects
constrained by formal inst
adherence to the grammar

1.5. Literature review:

There have been a nu
aspects of MSA and rura
related to the main obje
addressed. On the other
other Arabic varieties w
includes studies of Pale

Studies of MSA and
distinction between the
varieties are either ign
phonological analyses.

speaker. For example, MSA and the rural variety share the phones [θ] and [ð] in *ħadiiθ ʔiðaaʕiy* "a radio interview". But the urban phones corresponding to the MSA and the rural variety are [s] and [z] as we can see in the corresponding urban words *ħadiis ʔizaaʕiy*. In this phrase, it is unlikely that the rural speaker will substitute the urban phones [s] and [z] for his [θ] and [ð] which are also MSA phones.

On these grounds, we can say that the rural dialect is likely to be influenced by both MSA and the urban variety. This influence is reflected in the way rural speakers adjust their speech to fit that of the other varieties. MSA and the local varieties mutually influence one another. But the influence of the rural dialect and that of the other dialects on the standard variety is constantly constrained by formal instruction which emphasizes strict adherence to the grammar of ancient *fuṣħaa*.

1.5. Literature review:

There have been a number of studies which deal with different aspects of MSA and rural JA. But none of these studies is directly related to the main objective to which this study is directly addressed. On the other hand, there are some relevant studies of other Arabic varieties which are closely related to JA. This includes studies of Palestinian, Lebanese, and Bedouin JA.

Studies of MSA and CA generally fail to make a clear-cut distinction between the two varieties. Differences between the two varieties are either ignored or considered insignificant in respect to phonological analyses. In most cases, what happens is that some

data which are labelled MSA
CA. In either case, the data
CA as documented in the and
literature, as well.

In this study, to avoid t
terms MSA and CA in a vagu
an identification of MSA. T
a native speaker of Arabic,
Arabic was aimed at achie
informant should represen
speakers of rural JA. This
MSA as it is spoken in dif
Differences have to be de
of representative sample
countries. Studies of CA
of Abdo (1969), Brame (1
there are not that many
related to some aspects
(1987).

Abdo (1969) analyse
that the term CA is use
analyses are done withi
his analyses, the rules
extrinsically ordered.
intrinsically ordered.
argued for the collaps
postulated. The prese

data which are labelled MSA are identical to what might be labelled CA. In either case, the data is based on the current pronunciation of CA as documented in the ancient literature, and modern Arabic literature, as well.

In this study, to avoid the problems related to the use of the terms MSA and CA in a vague sense, we have provided in 1.1 and 1.3 an identification of MSA. The informant of the MSA data analysed is a native speaker of Arabic, the author, whose formal education in Arabic was aimed at achieving fluency in CA. The MSA of the informant should represent the version of the MSA spoken by speakers of rural JA. This MSA does not necessarily differ from the MSA as it is spoken in different areas in the Arabic countries. Differences have to be determined on the basis of explicit analysis of representative samples of MSA data as spoken in different Arabic countries. Studies of CA or MSA related to this study include those of Abdo (1969), Brame (1971), and McCarthy (1979). As for JA, there are not that many studies related to the present one. A study related to some aspects of the present one is that of Alghazo (1987).

Abdo (1969) analysed the assignment of stress in CA, claiming that the term CA is used to refer to both CA and MSA (1969: 1). His analyses are done within the framework of generative phonology. In his analyses, the rules postulated to account for stress are extrinsically ordered. The present study argues that rules are intrinsically ordered. Brame (1971) reviewed the work of Abdo and argued for the collapse into one rule of the rules which Abdo postulated. The present study extends to the analysis of stress in

JA the application of the prin

is postulated.

Unlike the previous analy

model for the analyses of st

stress in some Arabic data,

called CA is not different fr

This study argues against th

complicated, resorts to som

fails to achieve observatio

Alghazo (1987) analyse

Arabic on the basis of rura

is the object of analysis i

done within the framewor

phonology. Thie present s

resorts to very arbitrary

observational adequacy.

The present study is

of the relation between

problems involved in an

and geminates, on the ot

an understanding of the

draws attention to the

relation between MSA a

Arab world.

JA the application of the principles on the basis of which this rule is postulated.

Unlike the previous analyses, McCarthy postulate a metrical model for the analyses of stress and applied it to the assignment of stress in some Arabic data, including CA. The data which McCarthy called CA is not different from the MSA data analyzed in this study. This study argues against this model on the grounds that it is complicated, resorts to some arbitrary assumptions, and above all fails to achieve observational adequacy.

Alghazo (1987) analysed syncope and epenthesis in Levantine Arabic on the basis of rural JA data, the same Arabic variety which is the object of analysis in the present study. Alghazo's analysis is done within the framework of autosegmental and metrical phonology. Thie present study argues that his analysis of epenthesis resorts to very arbitrary assumptions and above all fails to achieve observational adequacy.

The present study is motivated by the lack of a systematic study of the relation between JA and MSA, on the one hand, and the problems involved in an integrated analysis of stress, epenthesis, and geminates, on the other. The present study should contribute to an understanding of the the relation between MSA and JA. The study draws attention to the need for comprehensive research on the relation between MSA and the local varieties spoken all over the Arab world.

Segr

As necessary background
presents the inventory of ph
divided into three sections.
inventory of phonemes in M
identified by place and mar
by distinctive features, on
some reference to the corr
section, the vowels and co
manner of articulation, on
features, on the other. In
between the inventory of

2.1.1. Consonants in MSA:

Table (1) presents th
represented in the artic
consonants are describe
articulation.

Chapter 2

Segmental Phonology

As necessary background to subsequent chapters, this chapter presents the inventory of phonemes in MSA and JA. The chapter is divided into three sections. In the first section, we present the inventory of phonemes in MSA. Here, the vowels and consonants are identified by place and manner of articulation, on the one hand, and by distinctive features, on the other. The analyses also involve some reference to the corresponding phonemes in CA. In the second section, the vowels and consonants in JA are identified by place and manner of articulation, on the one hand, and by their distinctive features, on the other. In the third section, we draw a comparison between the inventory of phonemes in both varieties.

2.1.1. Consonants in MSA:

Table (1) presents the inventory of consonant phonemes in MSA represented in the articulation of the informant of this study. The consonants are described in respect to place and manner of articulation.

Table (1): Consonants in MSA

	1	2
stop	b	
emphatic stop		
fricative		f
emphatic fricative		
affricate		
nasal	m	
lateral		
flap		
glide	w	

1 = labial	2
5 = alveolar	6
9 = pharyngeal	10

Table (1) shows that
six stops (b,t,d,k,q,ʔ), t
eleven fricatives (f,θ,ð
(ḍ,ṣ), one affricate (j),
semivowels (y,w).

The consonant phon
similar to those of CA

Table (1): Consonants in MSA

	1	2	3	4	5	6	7	8	9	10
stop	b			t d̤			k	q		ʔ
emphatic stop				ṭ ḍ						
fricative		f	θ ð̆	s z		š		x ɣ	ħ ʕ	h
emphatic fricative			ð̣	ṣ						
affricate						j̆				
nasal	m			n						
lateral				l						
flap				r						
glide	w					y				

1 = labial 2 = labio-dental 3 = interdental 4 = dental

5 = alveolar 6 = palatal 7= velar 8 = uvular

9 = pharyngeal 10 = glottal

Table (1) shows that MSA has twenty-eight consonant phonemes: six stops (b,t,d,k,q,ʔ), two emphatic stops (ṭ,ḍ) two nasals (m,n), eleven fricatives (f,θ,ð̆,s,z,š,x,ɣ,ħ,ʕ,h), two emphatic fricatives (ð̣,ṣ), one affricate (j̆), one lateral (l), one flap (r), and two semivowels (y,w).

The consonant phonemes in MSA (contemporary *fuṣħaa*) are quite similar to those of CA (ancient *fuṣħaa*). There is hardly any

significant difference betwe
Sibawaihi and those of MSA
the phones: [ṭ], [ɑ], [ḍ], and p
voiceless. But in CA they a
problem lies in the interpre
(1863-93) as quoted by Ser
"pronounced with the voice
to this interpretation, the
this case, the [ṭ] which he
This leads us to the concl
the description of the pho
have changed from being

Sibawaihi was probabl
of the role of the vocal c
"the unawareness of the
least the role of the voc
accounts for some minor
works (Semaan, 1968: 55
inaccurate in his descri
support of this can be d
unemphatic phone corre
phones are: [ṭ], [ḍ], [ẓ],
ones are: [t]. [d], [ð], an
the CA emphatic phone
corresponding unemph
think, that [d] is the c
(1316 A. H. Islamic Lu

significant difference between the CA consonants as described by Sibawaihi and those of MSA as illustrated in Table (1), except for the phones: [ṭ], [q], [ḍ], and probably [r]. In MSA, [ṭ] and [q] are voiceless. But in CA they are described as being *maǰhuurah.* The problem lies in the interpretation of the term *maǰhuur.* For Lane (1863-93) as quoted by Semaan (1968: 43) the term means "pronounced with the voice, and not with the breath only". According to this interpretation, the phones [ṭ] and [q] in CA must be voiced. In this case, the [ṭ] which he described is equivalent to current MSA [ḍ]. This leads us to the conclusion that either Sibawihi is inaccurate in the description of the phones [ṭ] and [ḍ], or that since his time they have changed from being voiced into being voiceless.

Sibawaihi was probably inaccurate. He was probably not aware of the role of the vocal cords in the process of sound production. "the unawareness of the Arab phoneticians of the existence, or at least the role of the vocal cords in the process of sound production accounts for some minor inaccuracies in early Arabic phonetic works (Semaan, 1968: 55)". Thus it is likely that Sibawaihi is inaccurate in his description of these phones. Some evidence in support of this can be derived from his assumption that the unemphatic phone corresponding to [ṭ] is [d]. In MSA, the emphatic phones are: [ṭ], [ḍ], [ẓ], and [ṣ], and the corresponding unemphatic ones are: [t]. [d], [ð], and [s], respectively. According to Sibawaihi, the CA emphatic phone which we refer to as [ḍ] does not have a corresponding unemphatic one. This is contrary to what we tend to think, that [d] is the corresponding unemphatic CA phone. Sibawaihi (1316 A. H. Islamic Lunar Calendar: 406) says: "*wa lawlaa*

ʔal-ʔiṭbaaq laṣaarat ʔal-ṭa

ʔal-ḍaaʔ ðaal-an wa-la-xar

English translation reads: "H

would have become [d] and [

become [ð] and there would

(language)." In (1), we illus

phones and the correspondi

the claim of Sibawaihi.

(1):

/ṭ/ : /d/

/ṣ/ : /s/

/ð̣/ : /ð/

/ḍ/ : ---

All the emphatic phon

phonemes except the pho

corresponding to the em

expected. If this is the

something different fro

MSA, respectively.

The ancient Arab gr

description of MSA [ḍ],

MSA [ḍ] (Anis, 1971: 64

and [ḍ]. In the articula

is said (Anis, 1971: 48

side of the mouth or b

ʔal-ʔiṭbaaq laṣaarat ʔal-ṭaaʔ daal-an wa ʔal-ṣaad siin-an wa ʔal-ðaaʔ ðaal-an wa-la-xaraǰat ʔal-ḍaad min ʔal-kalaam." The English translation reads: "Had there been no feature of emphasis, [ṭ] would have become [d] and [ṣ] would have become [s], [ð̣] would have become [ð] and there would have been no [ḍ] in the speech (language)." In (1), we illustrate this by providing the emphatic phones and the corresponding unemphatic phones in accordance with the claim of Sibawaihi.

(1):

/ṭ/ : /d/

/ṣ/ : /s/

/ð̣/ : /ð/

/ḍ/ : ---

All the emphatic phonemes have non-emphatic corresponding phonemes except the phoneme, /ḍ/. The non-emphatic phoneme corresponding to the emphatic phoneme /ṭ/ is /d/, not /t/ as may be expected. If this is the case, then emphatic [ḍ] and [ṭ] in CA must be something different from what we know to be emphatic [ḍ] and [ṭ] in MSA, respectively.

The ancient Arab grammarians description of "[ṭ]" fits the description of MSA [ḍ], while their description of "[ḍ]" does not fit MSA [ḍ] (Anis, 1971: 64). CA [ḍ] seems to be something between [ð̣] and [ḍ]. In the articulation of CA "[ḍ]" by the time of early Islam, it is said (Anis, 1971: 48-49) that the air goes out from either one side of the mouth or both sides. If this description is accurate, CA

"[d]" must share some simil

and accordingly what the ar

be a different phone **which**

As for [r], **the ancient A**

of [r]: one **is *mufaxxamah***

muraqqaqah **"delicate; lig**

linguistics are: **emphatic a**

they used one orthographic

the differences were not c

considered one phoneme (A

emphatic consonant. It is

example, in MSA, /a/ is b

of a preceding /r/, it is r

with the emphatic phoner

2.1.2. Distinctive feature

Table (2) presents th

"[ḍ]" must share some similarity with the lateral sounds such as [l], and accordingly what the ancient Arab grammarians called "[ḍ]" must be a different phone which is neither [ḍ] nor [ð̣].

As for [r], the ancient Arab grammarians recognized two types of [r]: one is *mufaxxamah* "dignified; dark" and the other is *muraqqaqah* "delicate; light". The equivalent terms in modern linguistics are: emphatic and non-emphatic, respectively. However, they used one orthographic symbol to indicate both types of /r/ as if the differences were not contrastive. Accordingly, they are considered one phoneme (Anis, 1971: 67). In MSA, [r] behaves as an emphatic consonant. It is [+back] like the emphatic coronals. For example, in MSA, /a/ is basically realized as [æ], but in the context of a preceding /r/, it is realized as [ɑ]. In this way, /r/ patterns with the emphatic phonemes: /ṣ/, /ð̣/, /ṭ/, and /ḍ/.

2.1.2. Distinctive features of consonants in MSA:

Table (2) presents the distinctive features of consonants in MSA.

Table (2): Distinctive features

syll.	−	−	−			−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
cons.	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
son.	−	−	−			−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
cont.	−	+	+			+	+	+	−	−	−	−	−	−	−	+	+	+	−	−	−	−	−	−	−
nas.	−	−	−			−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
ant.	+	+	+			+	+	+	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−
cor.	−	−	+			+	+	+	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−
back	−	−	−			−	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−	+	−
high	−	−	−			−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	+	+	+	+	+
low	−	−	−			−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
voi.	+	−				−	+	+	−	−	+	+	−	−	+	+	−	−	+	+	−	−	+	+	−

Table (2): Distinctive features of consonants in MSA

	b	f	θ	ð	ḍ	t	ṭ	d	ḍ	j	s	ṣ	z	š	k	q	x	ɣ	ħ	ʕ	ʔ	h	m	n	l	r	w	y
syll.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cons.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
son.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+
cont.	-	+	+	+	+	-	-	-	-	-	+	+	+	+	-	-	+	+	+	+	-	+	-	-	-	+	+	+
nas.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-
ant.	+	+	+	+	+	+	+	+	+	-	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-
cor.	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+	-	-
back	-	-	-	-	+	-	+	-	+	-	-	+	-	-	+	+	+	+	-	-	-	-	-	-	-	+	-	+
high	-	-	-	-	-	-	-	-	-	+	-	-	-	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+
low.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-
vod.	+	-	-	+	+	-	-	+	+	+	-	-	+	+	-	-	+	+	-	+	-	-	+	+	+	+	+	+

In Table (2), [r] and [l] a
feature [back]; [r] is [+back]
allophonic feature of [l]. T
[+cont] and [l] [-cont]. This
assumption that the defini
of air flow (not total bloc
constriction (Chomsky and
ballistic movement of the
the air stream. In [l], the

In Table (2), Arabic [h
identified in SPE; it alwa
be noted that the pharyng
emphatics [ṣ, ḍ, ṭ, ẓ] are
consonants are referred
identified as [+cor, -hig
306-307). It has also t
they are [-high].

2.1.3. Vowels in MSA:

MSA has three shor
short vowels are: /i/,
and /aa/. Long vowels
in respect to length.
quality but not in quan

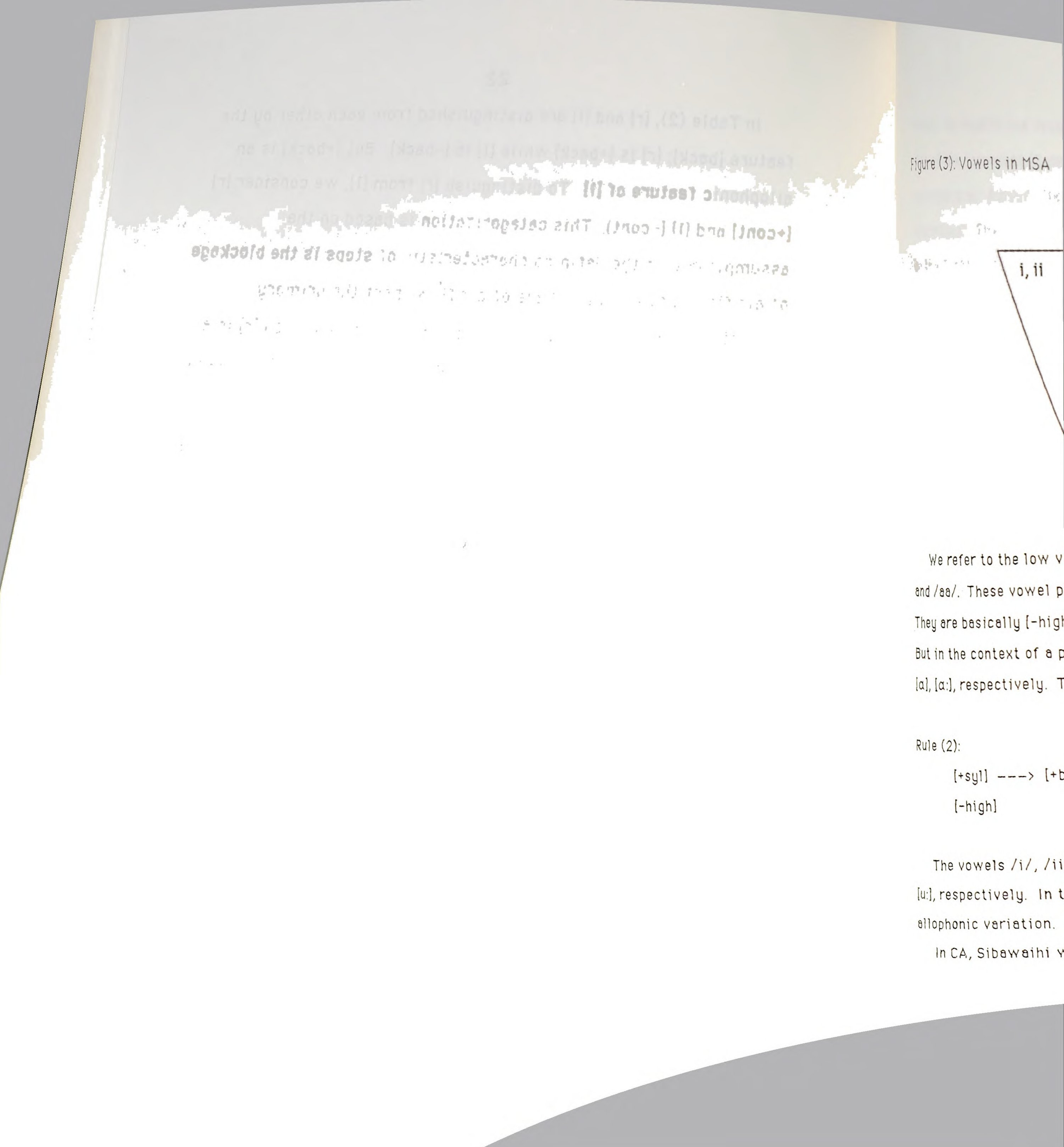
In Table (2), [r] and [l] are distinguished from each other by the feature [back]; [r] is [+back] while [l] is [-back]. But [+back] is an allophonic feature of [l]. To distinguish [r] from [l], we consider [r] [+cont] and [l] [-cont]. This categorization is based on the assumption that the defining characteristic of stops is the blockage of air flow (not total blockage of air flow) past the primary constriction (Chomsky and Halle, 1968: 318). Because flap [r] is a ballistic movement of the tongue, there is no voluntary blockage of the air stream. In [l], there is airflow laterally.

In Table (2), Arabic [h] is classified [+cons], not [-cons] as it is identified in SPE; it always functions like a fricative. It has also to be noted that the pharyngeals [ħ, ʕ] are [+low, +back] while the emphatics [ṣ, ẓ, ṭ, ḍ] are [+cor, +back]. In SPE, the Arabic emphatic consonants are referred to as pharyngealized consonants which are identified as [+cor, -high, +low, +back] (Chomsky and Halle, 1968: 306-307). It has also to be noted that [x, ɣ] are uvular. Accordingly, they are [-high].

2.1.3. Vowels in MSA:

MSA has three short vowel phonemes and three long ones. The short vowels are: /i/, /u/, and /a/. The long vowels are: /ii/, /uu/, and /aa/. Long vowels contrast with the corresponding short vowels in respect to length. Long vowels are identical with short vowels in quality but not in quantity. This is Figure (3).

Figure (3): Vowels in MSA



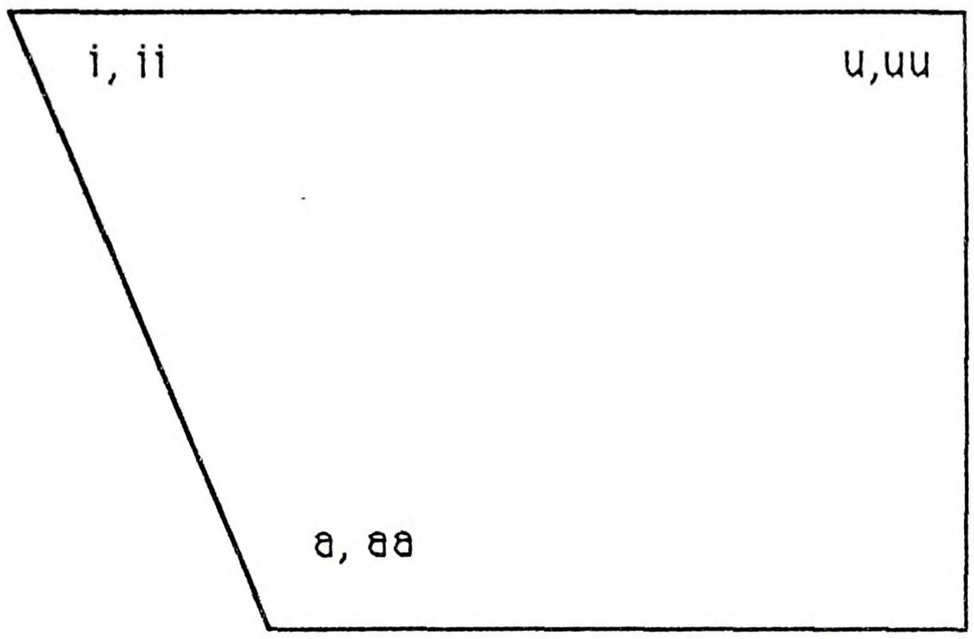
We refer to the low v
and /aa/. These vowel p
They are basically [-high
But in the context of a p
[a], [a:], respectively. T

Rule (2):

[+syl] ---> [+b
[-high]

The vowels /i/, /ii
[u:], respectively. In t
allophonic variation.
In CA, Sibawaihi v

Figure (3): Vowels in MSA



We refer to the low vowel phonemes by using the symbols /a/ and /aa/. These vowel phonemes have some allophonic variation. They are basically [-high, -back], that is [æ] and [æ:], respectively. But in the context of a preceding emphatic or velar, they are [+back], [ɑ], [ɑ:], respectively. This is accounted for by rule (2).

Rule (2):

$$[+syl] \longrightarrow \begin{matrix}[+back] \\ [-high]\end{matrix} \;/\; [-syl] \;\underline{\quad\quad} \begin{matrix}\\ [+back]\end{matrix}$$

The vowels /i/, /ii/, /u/, and /uu/ are realized as [i], [i:], [u], and [u:], respectively. In their phonetic realization, they hardly have any allophonic variation.

In CA, Sibawaihi was unable to recognize the real nature of a

vowel. He regards the voca
part of the consonant (Sem
referred to as *ħuruuf* "le
"diacritics". The long vow
by the Arabic letters *yaa*
short vowels [i], [u], and [a
kasrah, *ḍammah*, and *fat*

The analysis provided
significant differerence b
represented in the inform
described by Sibawaihi (
Differerences in the desc
can be attributed to the
descriptive accuracy or
organs.

2.1.4. Distinctive featu

Table (3) presents

Table (3): Distinctive

hig
bac

vowel. He regards the vocalization of a consonant as an inherent part of the consonant (Semaan,1968, pp. 56). Long vowels were referred to as *ħuruuf* "letters", and short vowels as *ħarakaat* "diacritics". The long vowels /ii/, /uu/, and /aa/ were referred to by the Arabic letters *yaa?, waaw,* and *?alif,* respectively. The short vowels [i], [u], and [a] were referred to by the diacritics *kasrah, ḍammah,* and *fatħah,* respectively.

The analysis provided above shows that there is hardly any significant differerence between the inventory of phonemes in MSA represented in the informant of this study and those of CA as described by Sibawaihi (1316 A.H.), Semaan (1968) and Anis (1971). Differerences in the description of the articulation of some phones can be attributed to the ancient Arab grammarians' lack of descriptive accuracy or lack of awareness of the role of the vocal organs.

2.1.4. Distinctive features of vowels in MSA:

Table (3) presents the distinctive features of the vowels in MSA.

Table (3): Distinctive features of vowels in MSA

	i	u	a	ii	uu	aa
high	+	+	-	+	+	-
back	-	+	-	-	+	-

In Table (3), the distinc

and that of [u] is [+back]. T

distinguished by default by

is allophonic in the identif

Accordingly, the vowel /a/

value in respect to the dis

[+back] at the phonetic lev

or velar consonant. Other

vowels are considered to

vowels.

2.2.1. Consonants in JA:

Table (4) identifies

in respect to their place

In Table (3), the distinctive feature of the vowel [i] is [+high] and that of [u] is [+back]. The vowel /a/ is [-high, -back]. It is distinguished by default by the feature [-high]. The feature [-back] is allophonic in the identification of the non-high vowel /a/. Accordingly, the vowel /a/ could be assigned an underlying zero value in respect to the distinctive feature [back]. The vowel /a/ is [+back] at the phonetic level in the context of a preceding emphatic or velar consonant. Otherwise, it is [-back]. The corresponding long vowels are considered to be sequences of two identical short vowels.

2.2.1. Consonants in JA:

Table (4) identifies the inventory of consonant phonemes in JA in respect to their place and manner of articulation.

Table (4): Consonants in JA

	1	2
stop	b	
emphatic stop		
fricative	f	
emphatic fricative		
affricate		
nasal	m	
lateral		
flap		
glide	w	

1 = labial	2
5 = alveolar	6
9 = pharyngeal	10

Table (4) shows the
six stops /b,t,d,k,g,ʔ/
eleven fricatives /f,θ
/ð̣,ṣ/, two affricates
semivowels /y,w/.

In comparison wit

Table (4): Consonants in JA

	1	2	3	4	5	6	7	8	9	10
stop	b			t d			k g			ʔ
emphatic stop				ṭ						
fricative		f	θ ð		s z		š		x ɣ ħ ʕ	h
emphatic fricative			ð̣		ṣ					
affricate						č ǰ				
nasal	m				n					
lateral					l					
flap					r					
glide	w						y			

1 = labial 2 = labio-dental 3 = interdental 4 = dental

5 = alveolar 6 = palatal 7= velar 8 = uvular

9 = pharyngeal 10 = glottal

Table (4) shows that JA has twenty-eight consonant phonemes: six stops /b,t,d,k,g,ʔ/, one emphatic stop /ṭ/ two nasals /m,n/, eleven fricatives /f,θ,ð,s,z,š,x,ɣ,ħ,ʕ,h/, two emphatic fricatives /ð̣,ṣ/, two affricates /č,ǰ/, one lateral /l/, one flap /r/, and two semivowels /y,w/.

In comparison with MSA, JA differs in respect to the consonants

/g/, /č/, and /ǯ/. JA /g/ c

/ǯ/ corresponds to MSA /ḍ

corresponding to unemphat

one, that is /ǯ/.

JA /č/ corresponds to M

developed in the context o

other contexts. Thus, we

"telling lies" and in that

we can have /k/in the con

something". Without gett

contexts of /č/ and /k/,

/k/ and /č/. The appeara

attributed to borrowing

2.2.2. Distinctive feature

In Table (5), we pres

in JA.

/g/, /č/, and /ǰ/. JA /g/ corresponds to the MSA phoneme /q/. JA /ǰ/ corresponds to MSA /ḍ/ and /ǰ/. JA has no emphatic /ḍ/ corresponding to unemphatic /d/. MSA /ḍ/ and /ǰ/ have merged into one, that is /ǰ/.

JA /č/ corresponds to MSA /k/. JA /č/ seems to have first developed in the context of a preceding or following /i/ and then to other contexts. Thus, we can have [č] in the context of [i] as in *čiðib* "telling lies" and in that of /a/ as in *čaðab* "he said a lie". Still, we can have /k/in the context of /i/ as in *kisrih* "a fragment of something". Without getting further into the analysis of the contexts of /č/ and /k/, we can say that MSA /k/ corresponds to JA /k/ and /č/. The appearance of [k] before the vowel [i] can be attributed to borrowing including dialect borrowing.

2.2.2. Distinctive features of consonants in JA:

In Table (5), we present the distinctive features of consonants in JA.

Table (5): Distinctive features

syll.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cons.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
son.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cont.	-	+	+	+	+	-	-	-	-	+	+	+	+	-	-	-	-	+	+	+	+	-	-	-	-
nas.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ant.	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-
cor.	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+
back	-	-	-	-	+	+	+	+	-	-	-	-	+	+	+	+	-	-	-	-	+	+	+	+	-
high	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	+
low.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
vcd.	+	-	+	+	-	-	+	+	-	-	+	+	-	-	+	+	-	-	+	+	-	-	+	+	-

Table (5): Distinctive features of consonants in JA

	b	f	θ	ð	ǧ	t	ṭ	d	č	ǰ	s	ṣ	z	š	k	g	x	ǧ	ħ	ʕ	ʔ	h	m	n	l	r	w	y
syll.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cons.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-
son.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+
cont.	-	+	+	+	+	-	-	-	-	-	+	+	+	+	-	-	+	+	+	+	-	+	-	-	-	+	+	+
nas.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-
ant.	+	+	+	+	+	+	+	+	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-
cor.	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+	-	-
back	-	-	-	-	+	-	+	-	-	-	-	+	-	-	+	+	+	+	-	-	-	-	-	-	-	+	+	-
high	-	-	-	-	-	-	-	-	+	+	-	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-	+	+
low.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-
vcd.	+	-	-	+	+	-	-	+	-	+	-	-	+	-	+	+	+	+	-	-	+	-	+	+	+	+	+	+

The non-syllabic segme

segments in MSA except fo

and the segments [č], and [

distinctive feature **analys**

JA.

2.2.3. Vowels in JA:

Like MSA, JA has three

ones: /ii/, /uu/, and /aa/

in reference to the positi

Figure (4): JA vowels



JA also has the ph

underlyingly. They ar

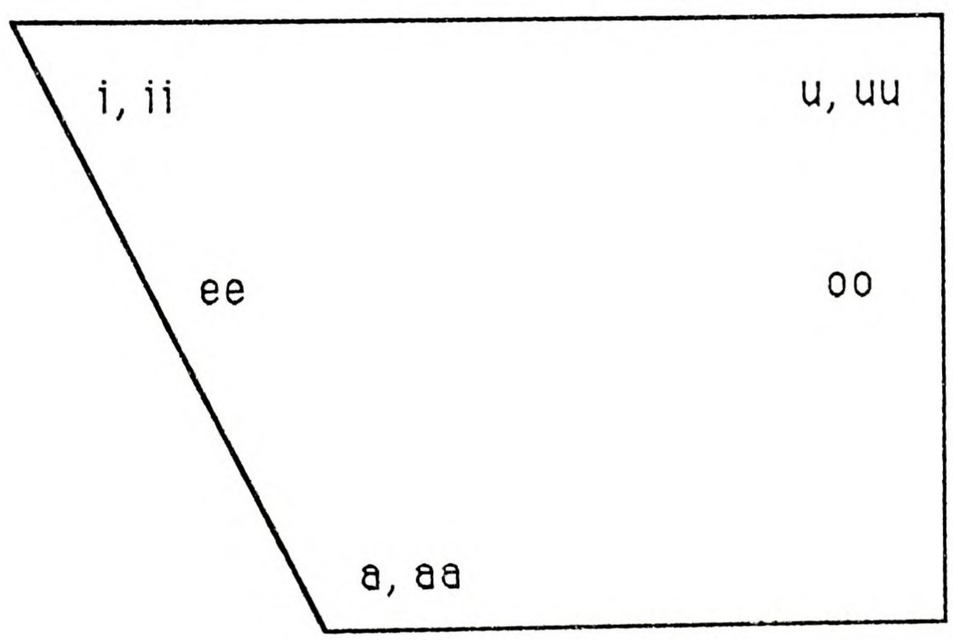
glides /ay/ and /aw/

The non-syllabic segments in JA are similar to the non-syllabic segments in MSA except for the segments [q] and [ḍ] which JA lacks, and the segments [č], and [g] which MSA lacks. Accordingly, the distinctive feature analyses in MSA largely apply to the analyses of JA.

2.2.3. Vowels in JA:

Like MSA, JA has three short vowels: /i/, /u/, /a/, and three long ones: /ii/, /uu/, and /aa/. In figure (4), these vowels are illustrated in reference to the positions of the cardinal vowels.

Figure (4): JA vowels



JA also has the phones [e:] and [o:]. These are not phonemes underlyingly. They are the phonetic realization of the underlying glides /ay/ and /aw/, respectively. Thus the phonetic realization of

/bayt/ "home" and/gawm/

The underlying glides show

and [gwaam] "peoples", pat

"conditions".

2.2.4. Distinctive features

In Table (6), we prese

in JA, which are identica

Table (6): Distinctive fe

	high	back

A problem arises i

vowels /aa/ from the

realization of /ay/ an

and [o:] from /ay/ and

[low] so as to disting

is also [-back, -high].

The JA vowel /a/

consonant other than

/bayt/ "home" and/gawm/ "people" is [be:t] and [go:m], respectively. The underlying glides show up in the plural forms: [byuut] "homes" and [gwaam] "peoples", patterning with [šarṭ] "condition" and [šru:ṭ] "conditions".

2.2.4. Distinctive features of vowels in JA:

In Table (6), we present the distinctive features of the vowels in JA, which are identical to those in MSA.

Table (6): Distinctive features of JA vowels

	i	u	a	ii	uu	aa
high	+	+	-	+	+	-
back	-	+	-	-	+	-

A problem arises in the process of distinguishing the long vowels /aa/ from the long mid-vowels [e:], and [o:], the phonetic realization of /ay/ and /aw/, respectively. In the derivation of [e:] and [o:] from /ay/ and /aw/, we need the non-distinctive feature [low] so as to distinguish [e:] which is [-back, -high] from [æ:] which is also [-back, -high].

The JA vowel /a/ is raised when followed by a glide and a consonant other than a glide. This is rule (3) of vowel raising.

Rule (3):

[+syl] ---> [-lo

[αba

Rule (3) applies to /a

[o] before a *w* glide. Ru

/gawm/, yielding *beyt*

rule (4), which vocalizes

consonant other than a g

This is rule (4).

Rule (4):

[-cons] --->

[-syl]

In (5), we illustra

the derivation of [ʕiid

[goom] "people".

(5):

/ʕiyd/	/kuwʕ/
ʕiid	kuuʕ
---	---
---	---

Rule (3):

$$[+syl] \longrightarrow \begin{matrix}[-low]\\[\alpha back]\end{matrix} \;/\; \_\_\_ \begin{matrix}[+son] & [-syl]\\[-cons] & [+cons]\\[\alpha back]\end{matrix}$$

Rule (3) applies to /a/, raising it to [e] before a *y* glide, and to [o] before a *w* glide. Rule (3) applies to words like /bayt/ and /gawm/, yielding *beyt* and *gowm,* respectively. Rule (3) feeds rule (4), which vocalizes glides between a [-low] vowel and a consonant other than a glide. This includes the vowels [i], and [u]. This is rule (4).

Rule (4):

$$\begin{matrix}[-cons]\\[-syl]\end{matrix} \longrightarrow \begin{matrix}[+syl]\\[\alpha F]\end{matrix} \;/\; \begin{matrix}[+syl]\\[-low]\\[\alpha F]\end{matrix} \_\_\_ [+cons]$$

In (5), we illustrate the the application of rules (3) and (4) in the derivation of [ʕiid] "feast", [kuuʕ] "elbow", [beet] "home" and [goom] "people".

(5):

/ʕiyd/	/kuwʕ/	/bayt/	/gawm/	UR
ʕiid	kuuʕ	---	---	Rule (4): Glide vocalization
---	---	beyt	gowm	Rule (3): Vowel raising
---	---	beet	goom	Rule (4): Glide vocalization

[ɕiid] [kuuɕ] [beet]

In the derivation of [be

to be extrinsically ordered

met. The SD of rule (4) of

either /bayt/ or /gawm/;

The SD of rule (4) is satis

applied. Rules (3) and (4)

raising feeds into rule (4

The vowels /a/ and /a

[æ:]. But they are [+back]

This is accounted for by

above and repeated here

Rule (2):

[+syl] ---> [+b

[-high]

Rule (2) applies to

yielding an [a] vowel a

context of a preceding

is accounted for by ru

Rule (6):

[+son] --->

[-cont]

[-nas]

[ʕiid] [kuuʕ] [beet] [goom] . PR

In the derivation of [beet] and [goom] in (5), the rules do not have to be extrinsically ordered. The rules apply whenever their SD is met. The SD of rule (4) of glide vocalization is not satisfied by either /bayt/ or /gawm/; rule (4) does not apply to [+low] vowels. The SD of rule (4) is satisfied when rule (3) of vowel raising has applied. Rules (3) and (4) are in a feeding relation; rule (3) of vowel raising feeds into rule (4) of glide vocalization.

The vowels /a/ and /aa/ are basically, I assume, [-back], [æ] and [æ:]. But they are [+back], [ɑ] and [ɑ:] after velars and emphatics. This is accounted for by rule (2) of low vowel backing postulated above and repeated here for convenience.

Rule (2):

$$\begin{bmatrix}+\text{syl}\\-\text{high}\end{bmatrix} \longrightarrow [+\text{back}] \;/\; [-\text{syl}] \;\_\_\_\; \begin{bmatrix}+\text{back}\end{bmatrix}$$

Rule (2) applies to /ṣalab/, /ṭalab/, /ðalab/, /xalaʕ/, /ẓalam/, yielding an [ɑ] vowel after the emphatic or velar consonant. In the context of a preceding [ɑ] vowel, light [l] becomes emphatic [ɫ]. This is accounted for by rule (6).

Rule (6):

$$\begin{bmatrix}+\text{son}\\-\text{cont}\\-\text{nas}\end{bmatrix} \longrightarrow [+\text{back}] \;/\; [+\text{syl}] \;\_\_\_\; \begin{bmatrix}+\text{back}\end{bmatrix}$$

Rule (6) applies to the
[i] in the context of a prec
output of rule (6) feeds in
yielding [ṣaʿab], [ṭaʿab], [

2.3. The relation between

In this section, we d
respect to the vowels an

2.3.1. Consonants in MSA

Consonant phoneme
/č/, /q/, /g/, /ḍ/, and /
present the MSA phoner

(7):

MSA	
k	:
q	:
ḍ	:

MSA [k] correspon
which is identical to
phonemic split in JA
corresponds to JA [ǩ
[ḍ] and [ǰ] merged in

Rule (6) applies to the output of rule (2), yielding an emphatic [ˌ] in the context of a preceding [+back] vowel, including [ɑ]. The output of rule (6) feeds into rule (2) which applies iteratively, yielding [ṣɑˌɑb], [ṭɑˌɑb], [ðɑˌɑb], [xɑˌɑʕ], and [ðˇˌɑˌɑm], respectively.

2.3. The relation between consonants & vowels in MSA & JA:

In this section, we draw a comparison between JA and MSA in respect to the vowels and consonants they have.

2.3.1. Consonants in MSA and JA:

Consonant phomemes in MSA and JA are similar except for /k/, /č/, /q/, /g/, /ḍ/, and /ðˇ/. This is illustrated in (7) where we present the MSA phonemes and the corresponding JA ones.

(7):

MSA		JA
k	:	k, č
q	:	g
ḍ	:	ðˇ

MSA [k] corresponds to JA [č]. But in some cognates JA has [k] which is identical to the corresponding MSA phone. This indicates a phonemic split in JA. MSA [q] corresponds to JA [g]. MSA [ḍ] corresponds to JA [ðˇ]. This indicates a phonemic merger in JA; MSA [ḍ] and [ðˇ] merged into JA [ðˇ]. Other differences between MSA and

JA, if any, are insignifica

2.3.2. Vowels in MSA and

In (8), we present the
in JA.

(8): Vowels

MSA		JA
i	:	
ii	:	
u	:	
uu	:	
a	:	
aa	:	
ay	:	
aw	:	

Considering the MS
vowels in both variet
vowels [ee] and [oo] w
Accordingly, we can s
without exception at

JA, if any, are insignificant and without phonological significance.

2.3.2. Vowels in MSA and JA:

In (8), we present the vowels in MSA and the corresponding ones in JA.

(8): Vowels

MSA		JA
i	:	i
ii	:	ii
u	:	u
uu	:	uu
a	:	a
aa	:	aa
ay	:	ee (/ay/)
aw	:	oo (/aw/)

Considering the MSA and JA vowels in (8), we can see that the vowels in both varieties are similar except for the JA mid-long vowels [ee] and [oo] which derive from /ay/ and /aw/, respectively. Accordingly, we can say that vowels in MSA and JA are similar without exception at the underlying level.

Str

Jordanian ar

In this chapter, we ar

Jordanian (JA) and Moder

be done in reference to t

(STGP) (Chomsky and Hal

(McCarthy, 1979a; 1979b

The chapter is divide

we present the principl

This includes a present

assignment, on the one

The presentation of the

of McCarthy (1979) and

we analyse the assignm

third section, the two

based on the capacity

prediction and the app

3.1.1. The STGP appro

According to the S

distribution of vowe

Chapter 3

Stress assignment in Jordanian and Modern Standard Arabic

In this chapter, we analyze the assignment of stress in both Jordanian (JA) and Modern Standard Arabic (MSA). The analysis will be done in reference to the standard theory of generative phonology (STGP) (Chomsky and Halle, 1968), and metrical phonology (McCarthy,1979a; 1979b; Hayes,1981;1982).

The chapter is divided into three sections. In the first section, we present the principles according to which stress is assigned. This includes a presentation of the STGP approach to stress assignment, on the one hand, and the metrical approach, on the other. The presentation of the metrical approach is based on the analysis of McCarthy (1979) and Hayes (1981;1982). In the second section, we analyse the assignment of stress to JA and MSA data. In the third section, the two approaches are evaluated. The evaluation is based on the capacity of each approach to make the correct prediction and the apparent validity of the principles they claim.

3.1.1. The STGP approach to stress assignment

According to the STGP, stress assignment rules are based on the distribution of vowels and consonants. Stress rules apply to a

string of syllabic and non-

syllable structure nor the

formulation of the stress

be sensitive to the kind o

Clusters are identified as

is defined as a string con

followed by no more than

identified as a string cor

followed by two or more

followed by any number

An example of a comple

type in the English word

identified as VCC or VV

3.1.2. The metrical app

In the metrical app

McCarthy (1979a; 197

Hayes (1980; 1982;19

structure of the metr

building of metrical t

each level, there are

account for the varia

levels are: rhyme pro

and labelling.

string of syllabic and non-syllabic segments. In STGP, neither the syllable structure nor the syllable boundary are involved in the formulation of the stress rules. In Arabic, the stress rules seem to be sensitive to the kind of clusters vowels and consonants make. Clusters are identified as either strong or weak. A "weak cluster" is defined as a string consisting of a single vocalic nucleus followed by no more than one consonant. A "strong cluster" is identified as a string consisting of either a vocalic nucleus followed by two or more consonants or a complex vocalic nucleus followed by any number of consonants (Chomsky and Halle,1968: 29). An example of a complex vocalic nucleus is the part written in bold type in the English words "**paint**". In Arabic, a strong cluster is identified as VCC or VV (Abdo, 1969; Brame, 1971).

3.1.2. The metrical approach to stress assignment

In the metrical approach as evidenced in the analysis of McCarthy (1979a; 1979b) and the modifications introduced into it by Hayes (1980; 1982;1985), stress assignment is based on the structure of the metrical tree in a word. According to McCarthy, the building of metrical tree of a word is realized in four levels. In each level, there are parametric variations which are supposed to account for the variations between different languages. The four levels are: rhyme projection, foot assignment, word-level structure, and labelling.

3.1.2.1. Rhyme projection:

In the first step, rhym
of a word are projected.
selected, or identified. T
basis of their having a W
formally defined the rhy
root (McCarthy, 1979b: 7
the syllable nucleus, wh
to the right of it, if any
syllable nucleus is labe
syllable onset and coda
less than or equal to th
syllable nucleus, which
reference to the syllab
rhyme of a heavy sylla
rhyme of a light syllab
σ dominates the sylla
(W). In both MSA and
is schematically illus

3.1.2.1. Rhyme projection:

In the first step, rhyme projection, the rhymes in the syllables of a word are projected. "Projected" is used in the sense of selected, or identified. The selection of the rhymes is done on the basis of their having a well defined characteristic. McCarthy formally defined the rhyme as the right branch of ω, the syllable root (McCarthy, 1979b: 7, 8, 42). The right branch of ω dominates the syllable nucleus, which must be a vowel, and any other segments to the right of it, if any, which could be a vowel or a consonant. The syllable nucleus is labeled strong (s), and the other segments, the syllable onset and coda, are labeled weak (w) since their sonority is less than or equal to that of the nucleus (McCarthy, 1979b: 7). The syllable nucleus, which is always a vowel, is labeled as strong in reference to the syllable onset or coda. On the other hand, the rhyme of a heavy syllable is labeled strong in reference to the rhyme of a light syllable which is labelled weak. The left branch of ω dominates the syllable onset which must be [-syll] and is labeled (w). In both MSA and JA, syllables do not begin with a vowel. This is schematically illustrated in (1).

(1):

W

The rhymes of a syll

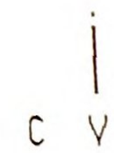
rhyme consists of a sho

VV, or VC, or, word fin

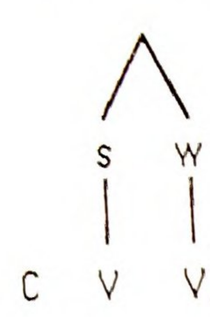
structures are the rhym

The types of rhyme are

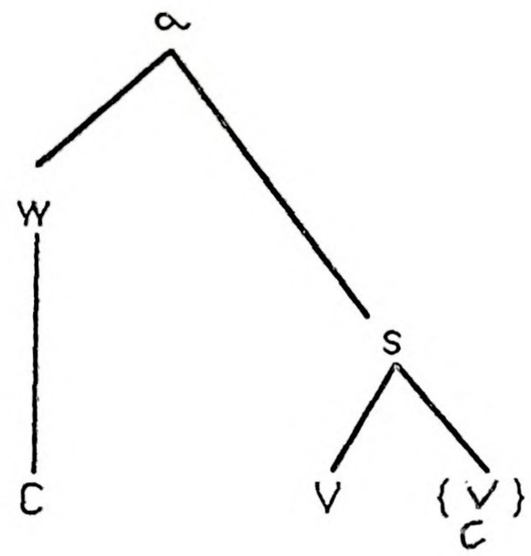
(2. A): Weak Rhyme



(2.B): Strong Rhymes



(1):

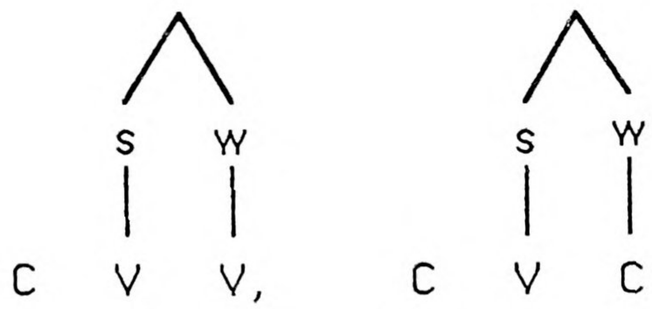


The rhymes of a syllable may be either weak or strong. A weak rhyme consists of a short vowel. A strong rhyme consists of either VV, or VC, or, word finally either VVC or VCC. The latter structures are the rhymes of what are termed superheavy syllables. The types of rhyme are illustrated in (2. A-C).

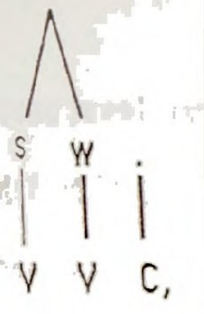
(2. A): Weak Rhyme



(2.B): Strong Rhymes



(2.C): Double Rhymes



Double rhymes appea

"superheavy syllables ha

second nonbranching. Th

with heavy penults and

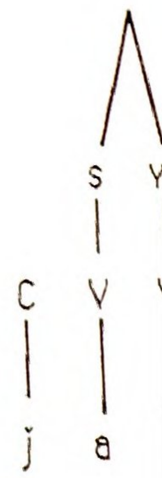
The types of rhyme

the rhymes in words su

contrasts with *jaarhu*

(3).

(3):



The third conson

rhyme structures (2

problems for the co

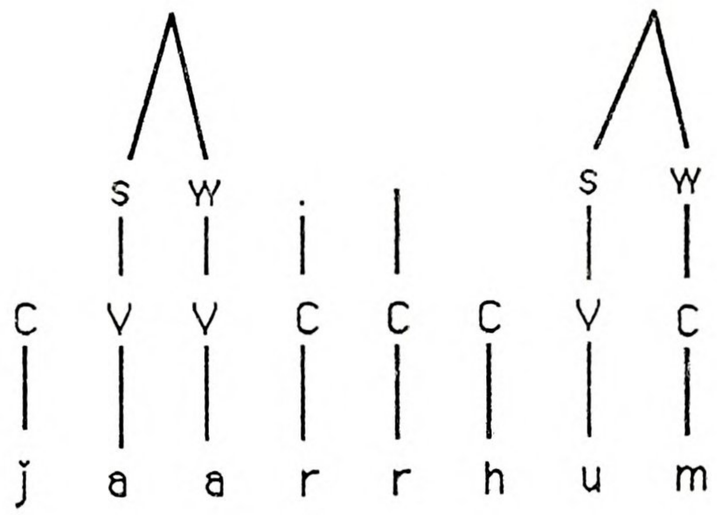
(2.C): Double Rhymes



Double rhymes appear in what is termed "superheavy syllables. "superheavy syllables have two rhymes, the first branching and the second nonbranching. This makes them formally equivalent to words with heavy penults and light ultimas..." (McCarthy, 1979b: 59)

The types of rhyme postulated in (2.A-C) do not accommodate the rhymes in words such as *jaarrhum* "(he) pulling them" which contrasts with *jaarhum* "their neighbour". This is illustrated in (3).

(3):



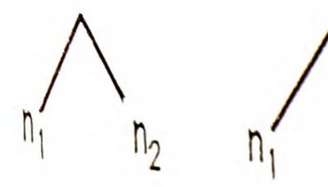
The third consonant of *jaarrhum* is not considered in the rhyme structures (2.A-C). We will see later that this creates problems for the correct asignment of stress in such words.

3.1.2.2. Foot assignment:

In the second level, fo
rhymes identified in the
allows a great deal of pa
respect to size, direction
assignment, and the kind

In respect to size, fe
These types are schemat
(McCarthy, 1979b: 45). E
syllables (McCarthy, 19

(4.A): binary



In (4), n stands fo

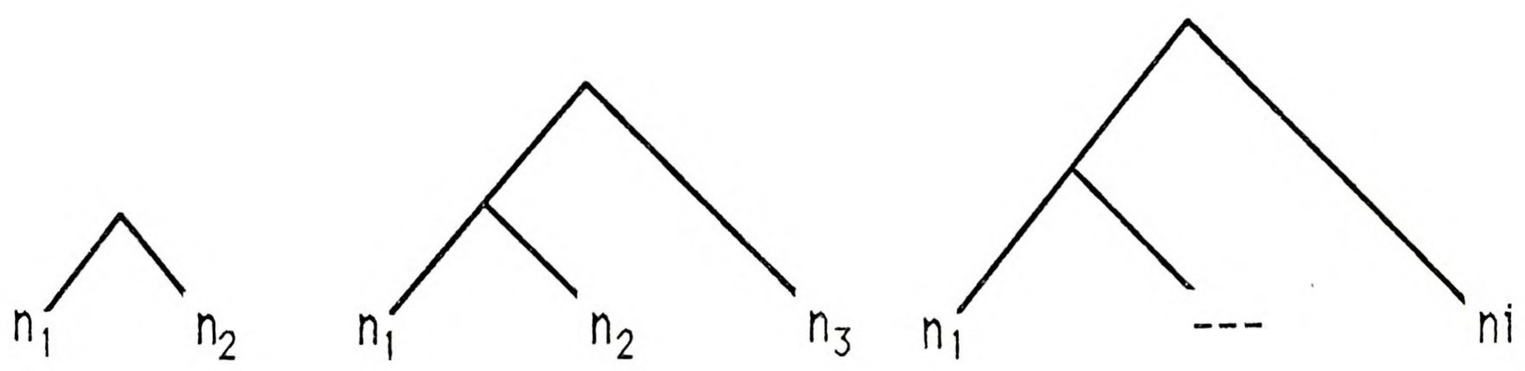
In respect to dire
left or to the right.
(4'.A'-C') illustrate r

3.1.2.2. Foot assignment:

In the second level, foot assignment, feet are assigned to the rhymes identified in the first step. The foot assignment level allows a great deal of parametric variation. Here feet could differ in respect to size, direction of branching, direction of foot assignment, and the kind of head and tail the foot could have.

In respect to size, feet are either binary, ternary, or n-ary. These types are schematically illustrated in (4.A-C) , respectively (McCarthy,1979b: 45). Binary feet are assigned to pairs of light syllables (McCarthy, 1979b: 55, 57, 64).

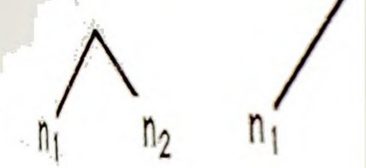
(4.A): binary (B): ternary (C): n-ary



In (4), n stands for a vowel or a consonant in the syllable rhyme.

In respect to direction of branching, feet branch either to the left or to the right. (4. A-C) illustrate left branching feet and (4'.A'-C') illustrate right-branching ones.

(4'.A'): binary



Feet can differ in r

could be [-head, -tail], [

A foot is [+head] if its h

branching. This means

rhyme of a heavy syllab

the different types of

(5.A): [-head, -tail]



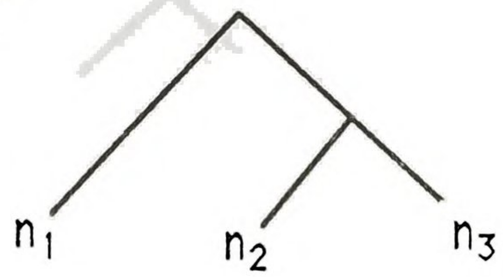
(5.B): [+head, -tail]



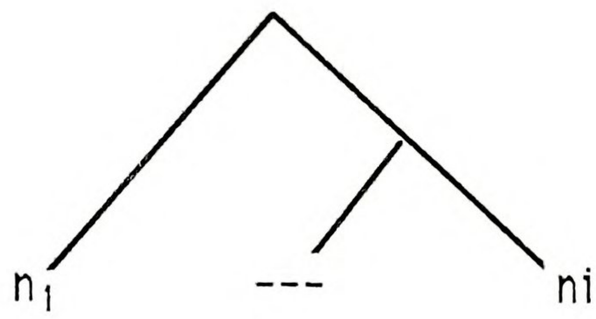
(4'.A'): binary



(B'): ternary

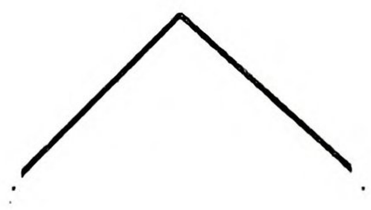


(C'): n-ary

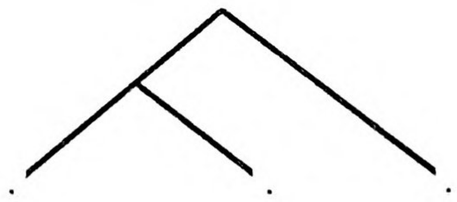


Feet can differ in respect to the features of [head, tail]. A foot could be [-head, -tail], [+head, -tail], [-head, +tail], or [+head, +tail]. A foot is [+head] if its head is branching, and [+tail] if its tail is branching. This means that a branching head or tail must be the rhyme of a heavy syllable. In (5.A-D) we schematically illustrate the different types of branching a binary foot may have.

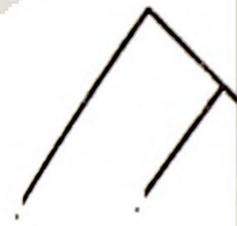
(5.A): [-head, -tail]



(5.B): [+head, -tail]



(5.C): [-head, +tail]



(5.D): [+head, +tail]



Binary feet which ar

to ternary feet. This s

Accordingly, feet have

However, in his analys

and assumed that tern

represent a marked ty

-tail] are considered

3.1.2.3. Building the

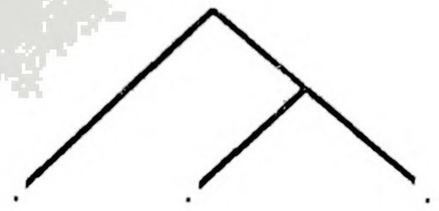
In the third level

gather the feet assig

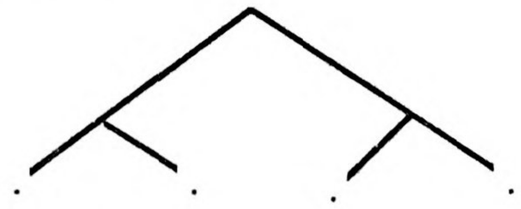
stray rhymes which

rhyme is the light o

(5.C): [-head, +tail]



(5.D): [+head, +tail]



Binary feet which are [+head, -tail] or [-head, +tail] are identical to ternary feet. This subsumes the need for a ternary foot category. Accordingly, feet have to be classified as either binary or n-ary. However, in his analysis, McCarthy maintained three types of feet and assumed that ternary feet are derivative in the sense that they represent a marked type of binary feet. Binary feet that are [-head, -tail] are considered more basic and represent the unmarked form.

3.1.2.3. Building the metrical tree superstructure:

In the third level, the building of the tree superstructure, we gather the feet assigned to the rhymes in the earlier level and the stray rhymes which are not assigned to feet. An example of a stray rhyme is the light one which is not assigned to feet in (6).

(6):



In (6), the penultima
binary feet which are a
left to right. It cannot
because the ultimate is
this ultimate branchin
that word-final heavy
Accordingly, the rhyme

In building the tree
know whether the tree
illustrates a left-bra
which are assigned fr
a right-branching one

(7.A): left-branching

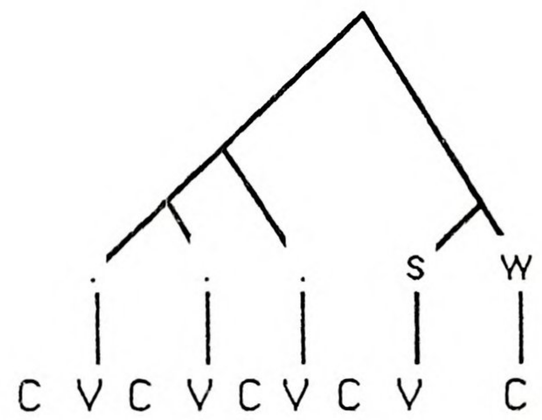
(6):



In (6), the penultimate is a stray rhyme in a language that has binary feet which are assigned over pairs of light syllables from left to right. It cannot pair with the ultimate to form a binary foot because the ultimate is a branching rhyme of a heavy syllable. But this ultimate branching rhyme is labeled weak. McCarthy assumes that word-final heavy syllables function as light syllables. Accordingly, the rhyme of a heavy syllable is labeled weak.

In building the tree superstructure at the word level, we have to know whether the tree branches to the right or to the left. (7.A) illustrates a left-branching tree of a word which has binary feet which are assigned from the left to the right, while (7.B) illustrates a right-branching one.

(7.A): left-branching



(7.B): right-branching

C

The choice between

This means that the cho

choice between types o

has n-ary feet if it allo

number of syllables as

(McCarthy, 1979a; 197

assignment of stress t

number of syllables a

stress to the initial s

Arabic. Knowing whe

as,for example, in JA

the antepenultimate

In our analysis of

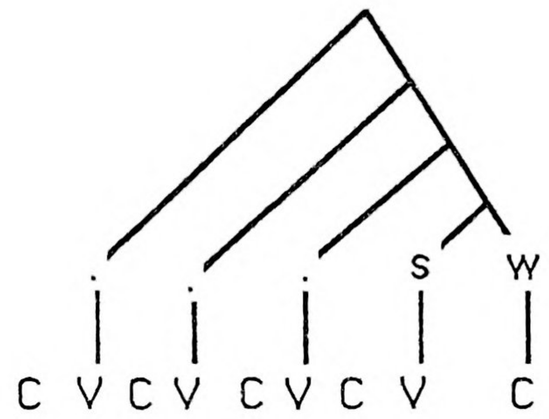
binary. This assumpt

varieties does not re

assumption that ter

from binary feet.

(7.B): right-branching



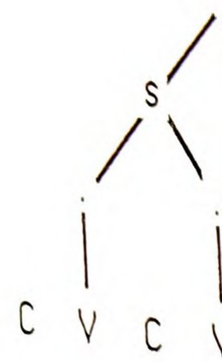
The choice between right and left branching is experimental. This means that the choice is based on trial and error. In respect to choice between types of feet, it is possible to tell that a language has n-ary feet if it allows the retraction of stress to an unlimited number of syllables as it has been assumed for Classical Arabic (McCarthy, 1979a; 1979b). This means that n-ary feet allow the assignment of stress to the initial syllable, regardless of the number of syllables a word has. This accounts for the assignment of stress to the initial syllable in multi-syllabic words in Classical Arabic. Knowing whether a language has binary or ternary feet as,for example, in JA and MSA where stress does not retract beyond the antepenultimate is also a matter of experimental testing.

In our analysis of JA and MSA, we assume that their feet are binary. This assumption is based on the fact that stress in these varieties does not retract beyond the antepenultimate, and the assumption that ternary feet represent a form which is derivative from binary feet.

3.1.2.4. Labeling:

At the fourth level, l
we have built at the thir
branching node and all th
(strong). All the other n
McCarthy applies the Le
which says "... of a pair
strong (s) if and only if
he adds, "If the tree is
terminal, the terminal
will mark the stress-b
"the designated termin
syllable dominated by
the trees in (7.A-B).

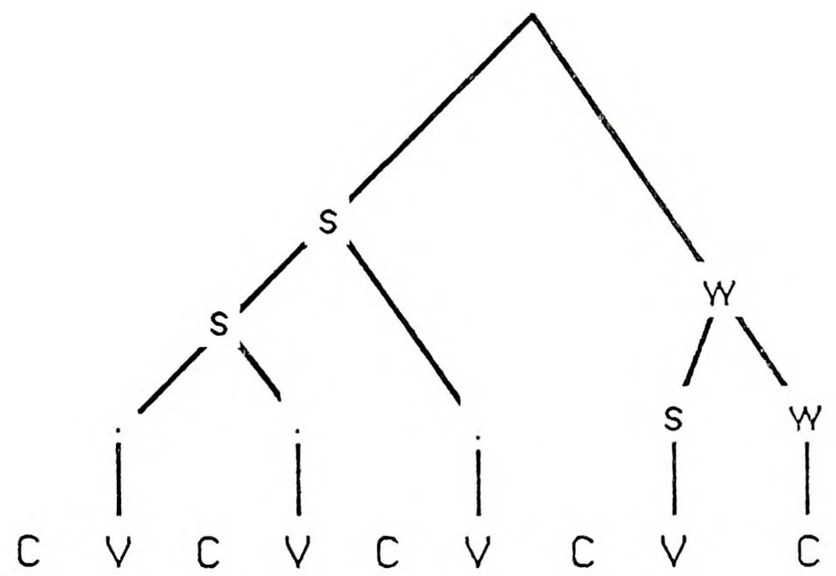
(8.A):



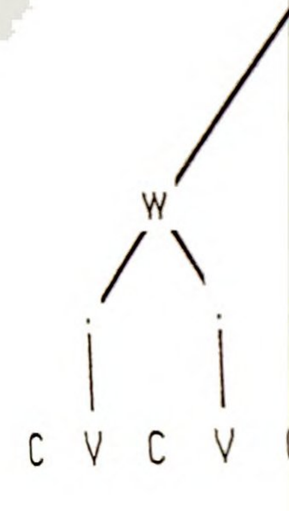
3.1.2.4. Labeling:

At the fourth level, labeling, we label the tree superstructure we have built at the third level. In labelling, the right most branching node and all the nodes dominating it are labelled "s" (strong). All the other nodes are labelled "w" (weak). In labeling, McCarthy applies the Lexical Category Prominence Rule (LCPR) which says "... of a pair of sister nodes, the right one is labeled strong (s) if and only if it branches". (McCarthy, 1979b: 48). Then, he adds, "If the tree is assembled in this way, the designated terminal, the terminal node of the tree that is dominated only by s's, will mark the stress-bearing syllable." (McCarthy, 1979b: 56). By "the designated terminal element" he means the nucleus of the syllable dominated by s's. McCarthy, 1979b: 7). In (8.A-B), we label the trees in (7.A-B).

(8.A):



(8.B):



McCarthy's analysi

explicit. He assumes t

light one. Accordingly,

labeled weak. This ra

weak rhymes at the fo

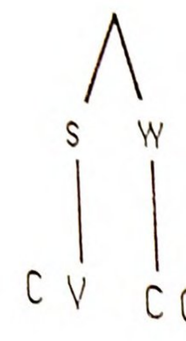
Given a word which ha

assuming that it has b

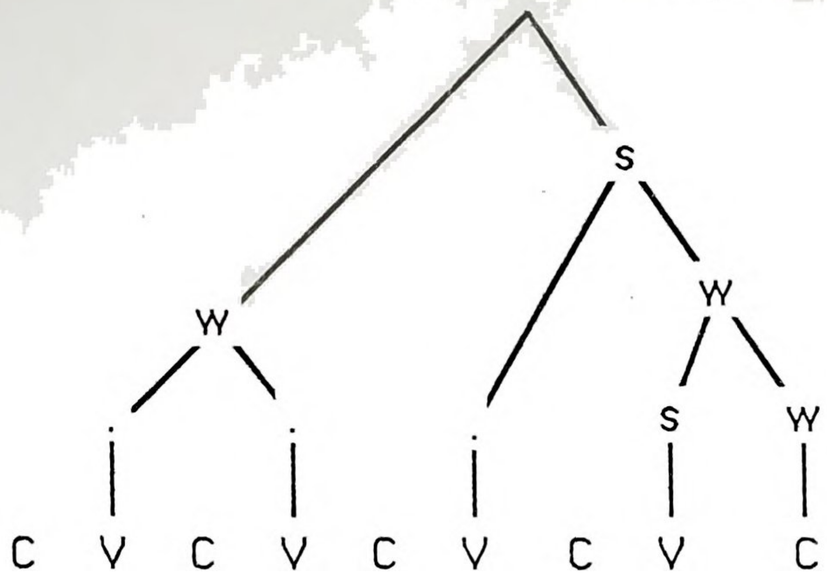
right, we would assig

(9.B).

(9.A):

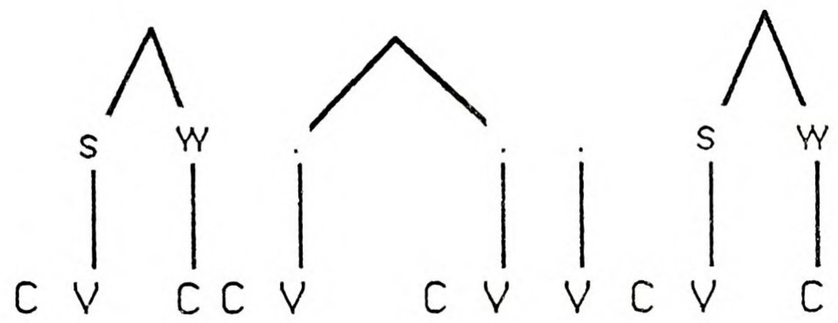


(8.B):



McCarthy's analysis of heavy rhymes word-finally is not explicit. He assumes that a word-final heavy syllable functions as a light one. Accordingly, the rhyme of a word-final heavy syllable is labeled weak. This raises the question of whether they function as weak rhymes at the foot assignment level or at the labeling level. Given a word which has a CVC. CV. CV. CV. CVC structure, and assuming that it has binary feet that are assigned from left to right, we would assign it either the foot structure in (9.A) or that in (9.B).

(9.A):

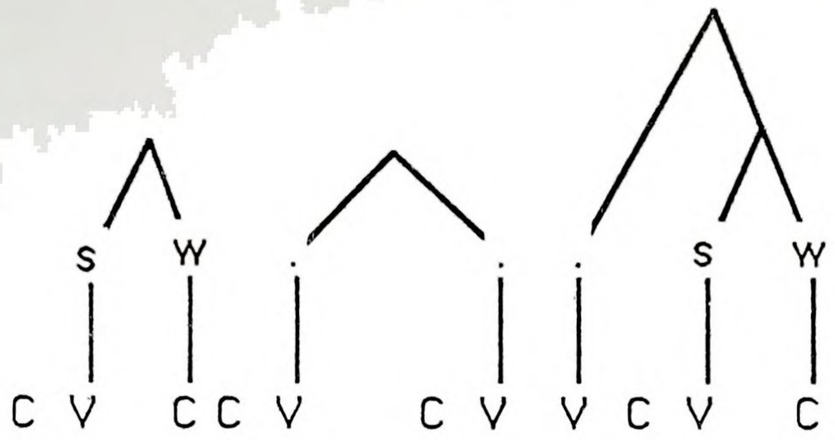


(9.B):



In (9.B), the penulti
in (8.A) they do not bec
light rhyme at the labe
Accordingly, this inexp
different metrical tre
two different position
branching metrical tr
(9.A'-B').

(9.B):

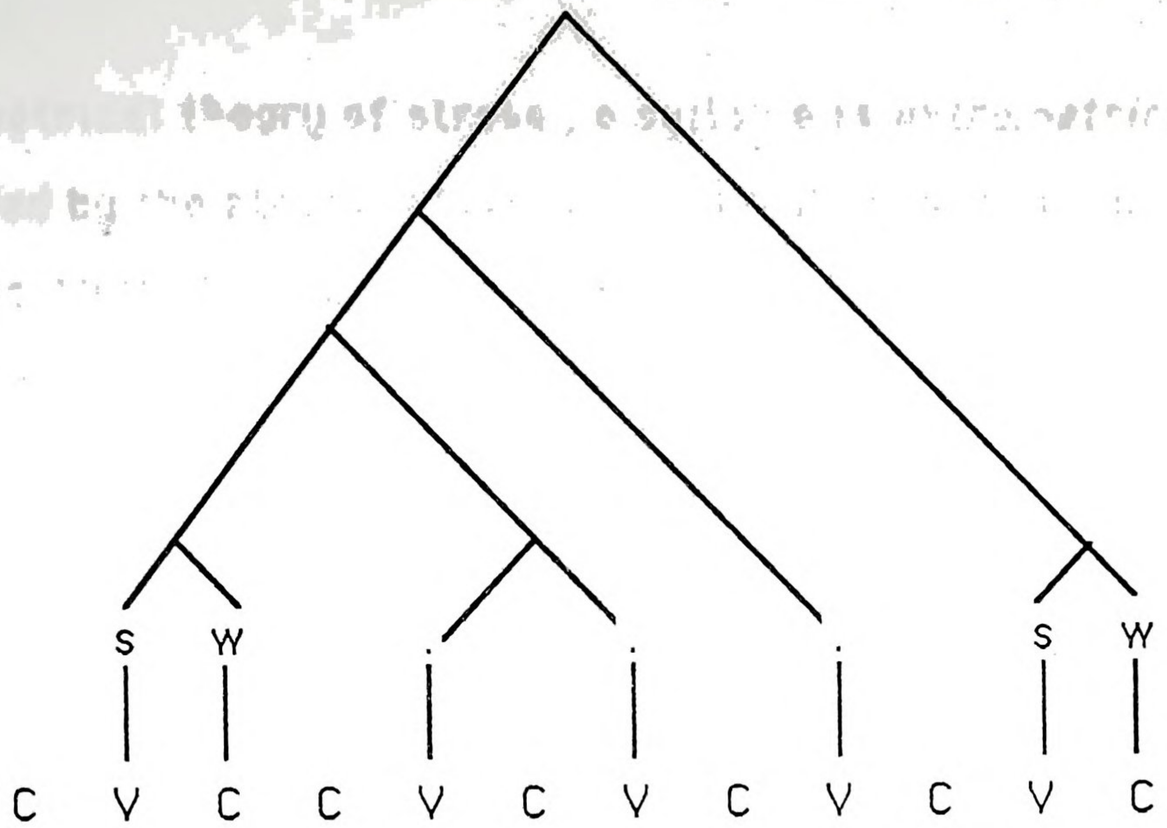


In (9.B), the penultimate and the ultimate form a binary foot, but in (8.A) they do not because the ultimate is assumed to function as a light rhyme at the labelling level, not the foot assignment one. Accordingly, this inexplicitness will allow the building of two different metrical trees, and finally the assignment of stress to two different positions. This problem arises in building left branching metrical tree to the structures in (9.A-B) as illustrated in (9.A'-B').

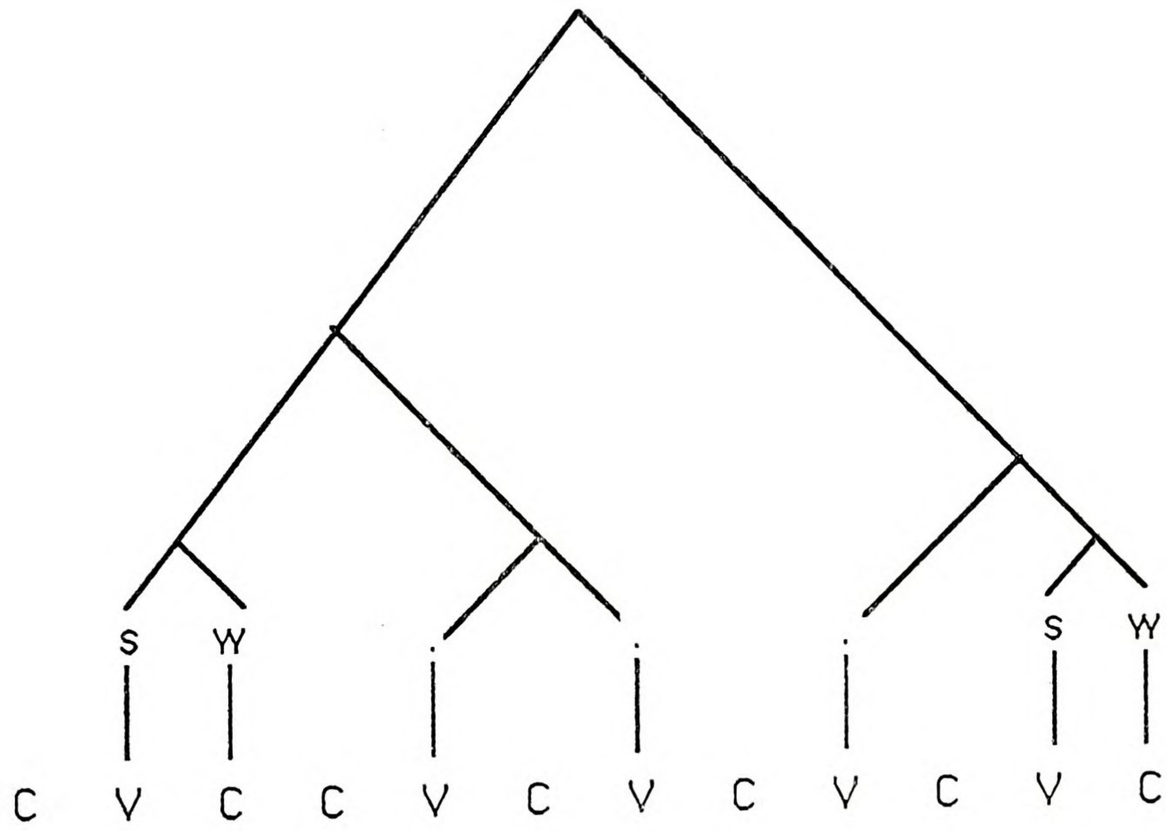
(9.B'):

(9.A'):

(9.A'):



(9.B'):



3.1.2.5. The principle of

"In the metrical theo
if it is ignored by the st
there." (Hayes 1982: 22
constituent such as rhy
domain of the stress ru
Following, we consider
metrical model of Bruc
is similar to McCarthy
extrametricality. In o
MSA, we will see that
McCarthy's assumptio
syllable functions as
rhymes. In reference
229) says: "... word-fi
the hierarchy of sylla
heavy, while heavy s
will be seen to have
for the JA and MSA d
metrical parameters

3. 2. 1. Stress assig

In this section, v
sets of data in (10.
structures and vary

3.1.2.5. The principle of extrametricality:

"In the metrical theory of stress , a syllable is *extrametrical* if it is ignored by the stress rules; that is, treated as if it were not there." (Hayes 1982: 227). For Hayes, a single phonological constituent such as rhyme, segment, consonant, or suffix in the domain of the stress rules can be extrametrical (Hayes, 1982: 228). Following, we consider the assignment of stress in reference to the metrical model of Bruce Hayes (1980; 1982; 1985). Hayes's model is similar to McCarthy's except for the principle of extrametricality. In our analysis of stress assignment in JA and MSA, we will see that this principle comes as an alternative to McCarthy's assumption according to which the rhyme of the ultimate syllable functions as light and that superheavy syllables have double rhymes. In reference to word-final syllables in CA, Hayes (1982: 229) says: "... word-final syllables are demoted one position down the hierarchy of syllable weight: superheavy syllables are treated as heavy, while heavy syllables are treated as light." These principles will be seen to have a significant role in building the metrical trees for the JA and MSA data, and will be considered one of the different metrical parameters.

3. 2. 1. Stress assignment in MSA (Linear Approach):

In this section, we consider the assignment of stress to the MSA sets of data in (10.A-D) which include MSA words of varying structures and varying number of syllabic segments.

(10.C): Tri-syllabic

kátaba

šajarát

mádrasah

lima	"wh
bálad	"co
kátib	"w
harcbáat	"s
iaasúun	"d
jawád	"h
maqárr	"t
rihlah	"
darást	"
minšár	

(10.A): Mono-syllabic wo

wa	"and"
can	"about"
qalb	"heart"
laa	"no"
jaar	"neighbo
jaarr	"prepos

(10.B): Bi-syllabic wor

(10.A): Mono-syllabic words

wa	"and"
ʕan	"about"
qalb	"heart"
laa	"no"
ǰaar	"neighbor"
ǰaarr	"prepositional, pulling"

(10.B): Bi-syllabic words

líma	"why"
bálad	"country"
káatib	"writer"
ħarʕbáat	"spears"
ṭaaʕúun	"disease"
ǰawáad	"horse"
maqárr	"headquarters"
ríħlah	"journey"
darást	"I studied"
minšáar	"saw"

(10.C): Tri-syllabic words

kátaba	"he wrote"
šaǰaráat	"trees"
mádrasah	"school"

máktabun	"off
ṭáalibun	"stu
ṭálabun	"app
makáatib	"des
musaawáah	"ec
jaaráatun	"n
mumtáazun	"e
mustáqbal	"

(10.D): Words of four o

katábaka	
katábakum	
šajarátuka	
mamlákatun	
mustasmáratiy	
mustasmarátul	
mazrasátukum	
faʔídatun	
saasadátka	
mustáwdasun	
mustawdásuka	
mustawdasáat	
mustawdasáa	
mustawdasáa	
makaatíbuhur	
kitaabáahuma	

máktabun	"office"
ṭáalibun	"student"
ṭálabun	"application"
makáatib	"desks"
musaawáah	"equality"
jaaráatun	"neighbors, f."
mumtáazun	"excellent"
mustáqbal	"future"

(10.D): Words of four or more syllabic segments

katábaka	"he wrote you"
katábakum	"he wrote you (plural)"
šajarátuka	"your tree"
mamlákatun	"kingdom"
mustaʕmáratiy	"my colony"
mustaʕmarátuka	"your colony"
mazraʕátukum	"your farm"
faaʔídatun	"benefit"
saaʕadátka	"she helped you"
mustáwdaʕun	"a store"
mustawdáʕuka	"your store"
mustawdaʕáat	"stores"
mustawdaʕáatun	"stores"
mustawdaʕáatuka	"your stores"
makaatíbuhum	"their offices"
kitaabáahuma	"their (dual) book"

The mono-syllabic wo
mono-syllables that are
and CVVCC. Some of the
contexts, and some of th
example, CVCC, CVVC,
These types are identic
in his study of the sylla
CVVCC type, they are a
(1979b) in his study of

In (10.B), the word
ultimate vowel if it is
followed by a consona
penultimate. In (10.C)
to the ultimate if it i
not it is assigned to t
consonant cluster; ot

In (10.D), the wor
Considering the data
to the preantepenult
it. In other words, s
matter what the que

Stress assignme
accounted for by ru

(11):

V ---> [+ stre

The mono-syllabic words of (10.A) illustrate the types of mono-syllables that are allowed in SA: CV, CVC, CVCC, CVV, CVVC, and CVVCC. Some of these syllables are restricted to specific contexts, and some of them are more frequent than the others. For example, CVCC, CVVC, and CVVCC syllables occur only word finally. These types are identical to those postulated by Al-Ani (1978: 117) in his study of the syllable structure in Arabic. Except for the CVVCC type, they are also identical to those analysed by McCarthy (1979b) in his study of Clasical Arabic.

In (10.B), the words are bi-syllabic. Stress is assigned to the ultimate vowel if it is long and followed by a consonant or short but followed by a consonant cluster; otherwise stress is assigned to the penultimate. In (10.C), the words are trisyllabic. Stress is assigned to the ultimate if it is long or followed by a consonant cluster; if not it is assigned to the penultimate if it is long or followed by a consonant cluster; otherwise it is assigned to the antepenultimate.

In (10.D), the words have more than three syllablic segments. Considering the data in (10.D), we see that stress is never assigned to the preantepenultimate or any other syllabic segment preceding it. In other words, stress does not go beyond the antepenultimate no matter what the quality of the vowels and the following segment is.

Stress assignment for the monosyllabic words in (10.A) can be accounted for by rule (11).

(11):

$$V \longrightarrow [\ +\ \text{stress}\ ] \ /\ \_\_\_\ C_0\ \#$$

Stress assignment fo

accounted for by rule (

(12):

V ---> [+ stress] / _

The words in (10.B) s

rule (12) makes the wr

precludes that of rule

the ultimate in *kaatí

structures as such, we

. Such a constraint is

Halle,1968: 29-30). T

Inclusion Precedence

applies if the SD of a

rule takes precedenc

between rules (11) a

collapsed as (13).

(13):

V ---> [+ str

It has to be not

two short vowels.

In (10.C), the w

that stress falls o

the penultimate is

Stress assignment for the bisyllabic words in (11.B) can be accounted for by rule (12).

(12):

$$V \longrightarrow [\,+\,\text{stress}\,] \,/\, \_\_\_\; C_0 V C_0^1 \;\#$$

The words in (10.B) satisfy the SD of both rules(11) and (12). But rule (12) makes the wrong prediction unless its application precludes that of rule (11). Rule (11) incorrectly assigns stress to the ultimate in **kaatíb* "writer." To avoid getting ill-formed structures as such, we have to constrain the application of rule (11) . Such a constraint is the principle of rule collapsing (Chomsky and Halle,1968: 29-30). This is consistent with the principle of Proper Inclusion Precedence (Koutsoudas et al, 1974: 8). This principle applies if the SD of a rule is included in another rule; the including rule takes precedence. This is the kind of relation that exists between rules (11) and (12) which makes it possible for them to be collapsed as (13).

(13):

$$V \longrightarrow [\,+\,\text{stress}\,] \,/\, \_\_\_\; C_0 (V C_0^1) \;\#$$

It has to be noted that long vowels are considered sequences of two short vowels.

In (10.C), the words consist of trisyllabic words which show that stress falls on the antepenultimate if neither the ultimate nor the penultimate is a long vowel or followed by a consonant cluster.

Rule (14) accounts for t

(14):

V ---> [+ stress

But rule (13) rather
penultimate in words
the principles of Prop
and rules (13) and (14
which apply disjuncti

(15):

V ---> [+ stre

Rule (15) assigns
long vowel. In actua
long vowel make one
and VV' are equivale
equivalent to [a:']. I
vowel of a phonolog

Rule (15) is iden
formulated for whe
stress rules postul
stress assignment
which are not assi
marked [+stress] a

Rule (14) accounts for this.

(14):

$$V \longrightarrow [+\text{stress}] \;/\; \_\_\_\; C_0 V C' V C'_0 \#$$

But rule (13) rather than (14) incorrectly assigns stress to the penultimate in words such as **madrásah* "school." Again we invoke the principles of Proper Inclusion Precedence, and rule collapsing, and rules (13) and (14) can be collapsed into one rule the parts of which apply disjunctively: rule (15) .

(15):

$$V \longrightarrow [+\text{stress}] \;/\; \_\_\_\; C_0((V C')\ V C'_0)\ \#$$

Rule (15) assigns stress to the second of two short vowels of a long vowel. In actuality, the two short vowels of a phonological long vowel make one unanalyzable phonetic unit. That is both V'V and VV' are equivalent to [V:']. This means that <u>áa</u> and <u>aá</u> are equivalent to [a:']. In writing data, I always mark stress on the first vowel of a phonological long vowel.

Rule (15) is identical with the rule which Brame (1971: 560) formulated for what he calls Classical Arabic in his review of the stress rules postulated by Abdo (1969) to be the general rule of stress assignment in MSA. Here, it has to be noted that vowels which are not assigned stress by the stress rules and are not marked [+stress] are considered [-stress].

There are some data

rule (15). Some of thes

These data will be disc

data in reference to ep

Problematic data in re

Chapter 7. In this chap

a long vowel and those

In MSA, long vowe

dual morpheme. Exam

(dual)" and *mazraṣat*

respect to *mazraṣat*

speakers of MSA tend

words. It is only in

long, and in this case

mazraṣatuhumáa. M

follows rule (15): *m*

that such words are

stress assignment.

(16).

Rule (16):

VV ---->

Rule (16) appl

(dual) farm", yield

Some problematic data to rule (15):

There are some data which are potential counter evidence to rule (15). Some of these data involve epenthesis and gemination. These data will be discussed in the following chapters. Problematic data in reference to epenthesis will be discussed in Chapter 5. Problematic data in reference to geminates will be discussed in Chapter 7. In this chapter, we will deal with words which end with a long vowel and those which end with CVCVC.

In MSA, long vowels show up word-finally as the marker of the dual morpheme. Examples of this are *katab+aa* "(they) wrote-they (dual)" and *mazraʕat+u+humaa* "farm-nom.-their (dual)". In respect to *mazraʕatuhuma(a),* it has to be pointed out that speakers of MSA tend to shorten long vowels word-finally in such words. It is only in a careful speech style that they pronounce them long, and in this case the final long vowel receives stress: *mazraʕatuhumáa.* More typically the vowel is shortened and stress follows rule (15): *mazraʕatúhuma.* On these grounds, we can say that such words are not counter evidence to the general rule of stress assignment. Final vowel shortening is accounted for by rule (16).

Rule (16):

VV ---> V / ____ #

Rule (16) applies to words such as *mazraʕatuhumaa* "their (dual) farm", yielding *mazraʕatuhuma* and the application of rule

(15) correctly assigns s

arises in verbs such as

The final vowel of *k*

to stylistic variations;

The asymmetry in the b

on the one hand, and *m*

fact that the rule of fi

ultimate in *katabáa*,

constrained. This is a

Rule (17):

VV] dual verb

Rule (17) properly

relation to it.

If rule (15) of str

application of rule (

kátaba, which is ho

rule (16) of ultimat

because rule (17) pr

like *katabáa* are

verbs such as *katab*

non-duals so rule (

homophonies do no

(15) correctly assigns stress to the antepenultimate. But a problem arises in verbs such as *katabaa* "they (dual) wrote".

The final vowel of *katabáa* "they (dual) wrote", is not sensitive to stylistic variations; it is pronounced long and is assigned stress. The asymmetry in the behaviour of the ultimate vowels in *katabáa* on the one hand, and *mazraʕatúhuma(a)* , on the other, is due to the fact that the rule of final vowel shortening does not apply to the ultimate in *katabáa,* apparently because it is morphologically constrained. This is accounted for by rule (17).

Rule (17):

$$VV]_{\text{dual verb}} \text{ ---> } VV \ / \ \_\_\_ \ \#$$

Rule (17) properly includes rule (16) and applies disjunctively in relation to it.

If rule (15) of stress assignment applied to *katabaa* after the application of rule (16) of vowel shortening, the result would be *kátaba,* which is homophonous with *kátaba* "(he) wrote". But rule (16) of ultimate vowel shortening does not apply to *katabaa* because rule (17) properly includes it and takes precedence. Words like *katabáa* are consistent with rule (15). The shortened dual of verbs such as *katabaa* would typically be homophonous with non-duals so rule (17) preserves a morphological distinction. Such homophonies do not arise in the case of the shortened dual of nouns.

3.2.2. Stress assignment

Now we consider th
framework of metrical
reference to two metri
McCarthy (1979a; 1979
1985).

In metrical phonolo
relation among syllabl
within the framework
the metrical structur
variations which may
order to build the me
first to identify thos
that language.

McCarthy's mode
basis of the parame

18.a. Feet are binar
i. left to righ
ii. right to le

18.b. Metrical tree
i. left brano
ii. right bra

3.2.2. Stress assignment in MSA (Non-linear Approach):

Now we consider the assignment of stress in MSA within the framework of metrical phonology. Here the analysis will be done in reference to two metrical models. The first model is developed by McCarthy (1979a; 1979b), and the second by Hayes (1980; 1982; 1985).

In metrical phonology, stress is identified as a prominence relation among syllables (Hayes, 1985: 4). This relation is defined within the framework of a metrical tree structure. The building of the metrical structure is determined by different parametric variations which may differ from one language to another. Thus in order to build the metrical trees of a particular language, we have first to identify those parameters which fit into the analysis of that language.

McCarthy's model allows the building of metrical trees on the basis of the parameters in (18.a-d).

18.a. Feet are binary and are assigned from

i. left to right.

ii. right to left.

18.b. Metrical trees are

i. left branching.

ii. right branching.

18.c. The ultimate sylla

i. foot level.

ii. labelling **level**

The parameters in (
different metrical tre
the parameters in (18)
in (19).

(19): a. katábaka

b. katábakum

c. mazraṣátuka

d. mazraṣátukur

e. šajarátuka

f. šajarátukum

The possible cho

18.a-i, b-i, c-i 18.

18.a-ii, b-i, c-i 18

Each of the eight c
the incorrect assi
(19).

Under the assu
following metric
assignment of st

18.c. The ultimate syllable functions as a light one at the

i. foot level.

ii. labelling level.

The parameters in (18) allow the possibility of building 8 different metrical trees for each word (2x2x2=8). Now, we apply the parameters in (18) to building metrical trees for the MSA words in (19).

(19): a. katábaka "he wrote you"

b. katábakum "he wrote you (plural)"

c. mazraʕátuka "your farm"

d. mazraʕátukum "your farm (plural)"

e. šaǰarátuka "your tree"

f. šaǰarátukum "your tree (plural)"

The possible choices among the parameters in (18) are:

18.a-i, b-i, c-i 18.a-i, b-i, c-ii 18.a-i, b-ii, c-i 18.a-i, b-ii, c-ii
18.a-ii, b-i, c-i 18.a-ii, b-i, c-ii 18.a-ii, b-ii, c-i 18.a-ii, b-ii, c-ii

Each of the eight choices among the parameters in (18) results in the incorrect assignment of stress to one or more of the words in (19).

Under the assumptions of (18.a-i, b-i, c-i), construction of the following metrical trees in (20.a-d) results in the wrong assignment of stress.

(20.a):



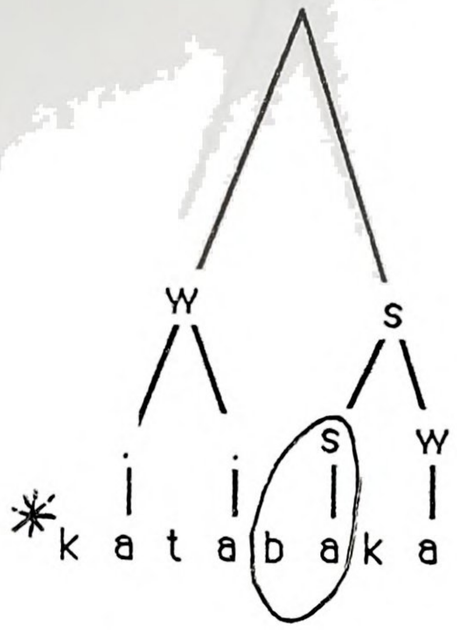
(20.c):



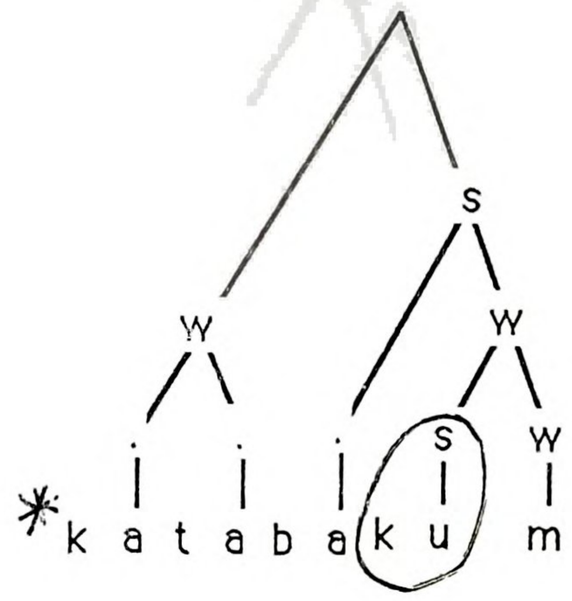
The correct str
katábakum, mazr

Under the assu
following metrice
assignment of str

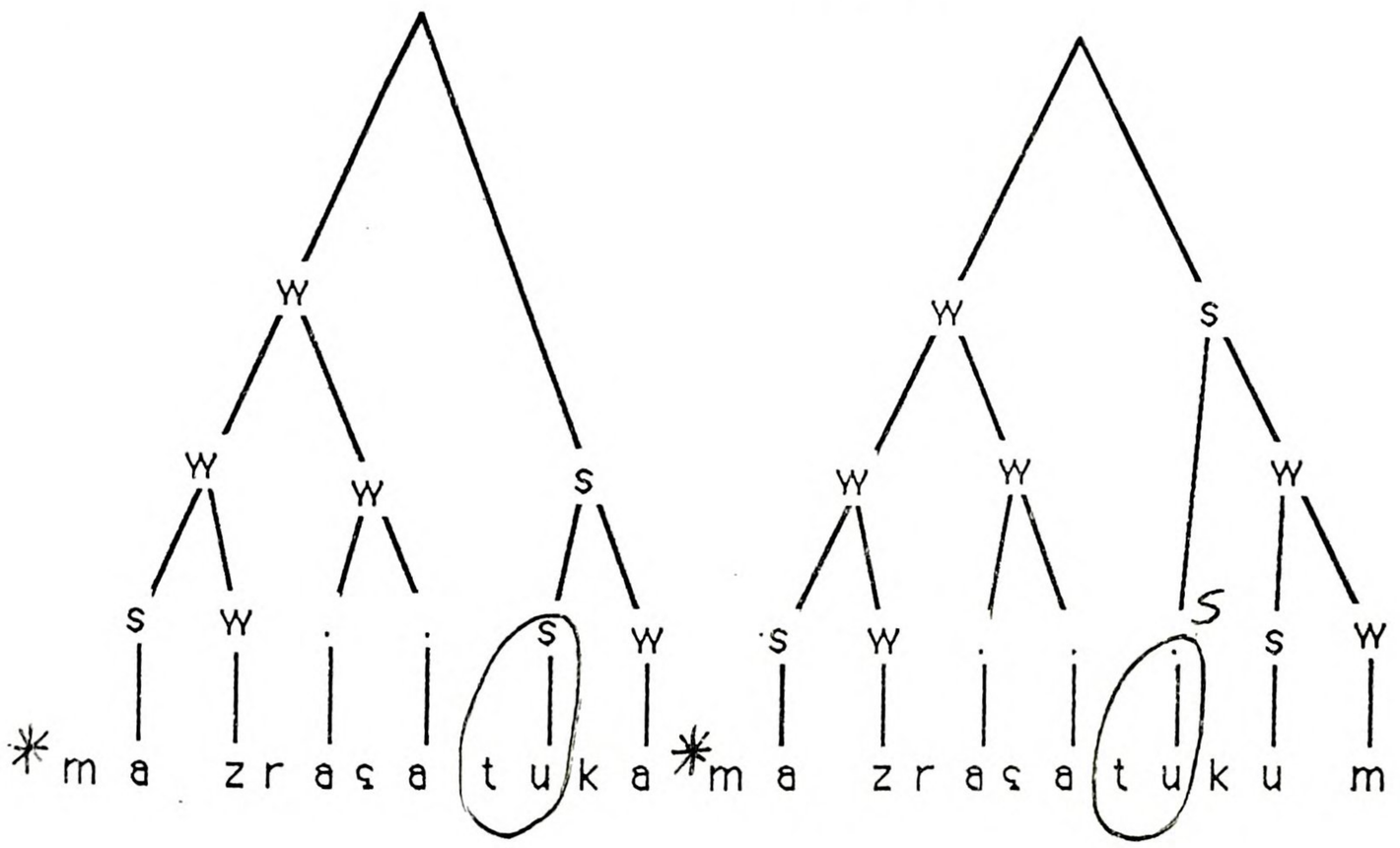
(20.a):



(20.b):



(20.c):



(20.d):

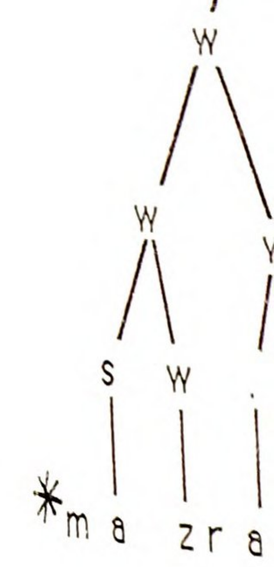
The correct stress assignment to these words is: *katábaka, katábakum, mazraçátuka,* and *mazraçátukum.*

Under the assumptions of (18.a-i, b-i, c-ii), construction of the following metrical trees in (21.a-d) results in the wrong assignment of stress.

(21.a):



(21.c):



The correct str

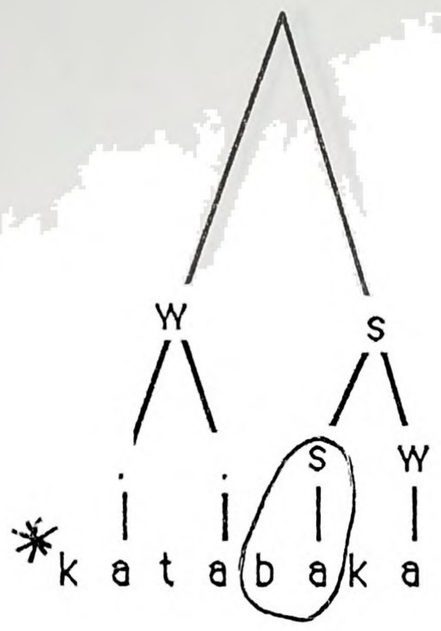
katábakum, mazr

Under the assu

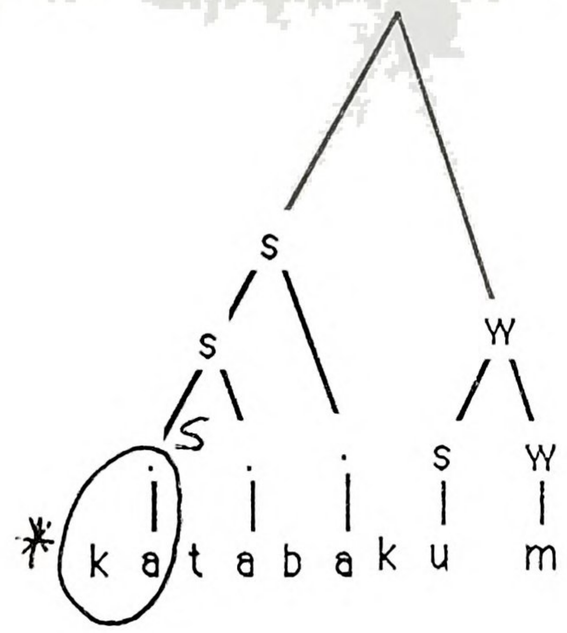
following metrice

assignment of str

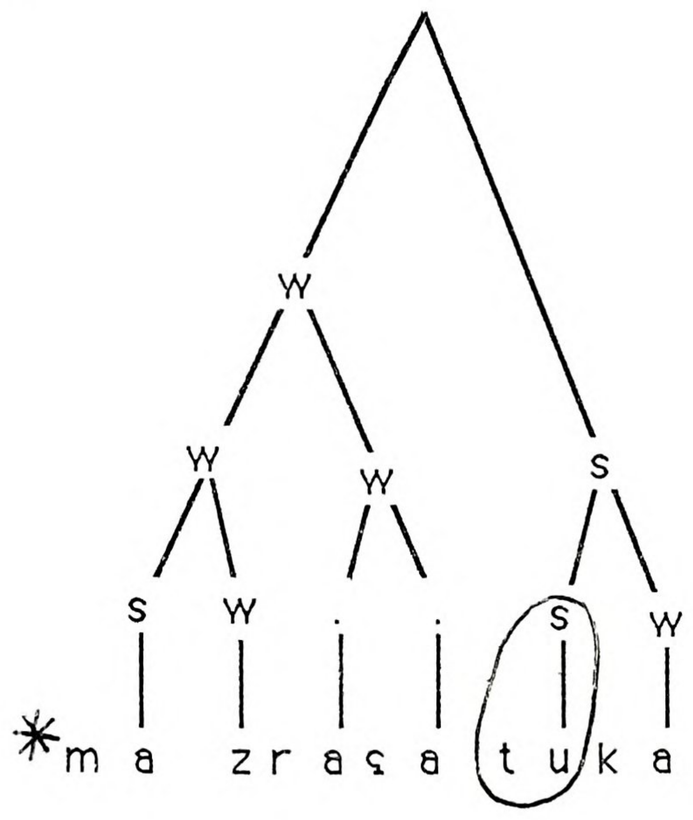
(21.a):



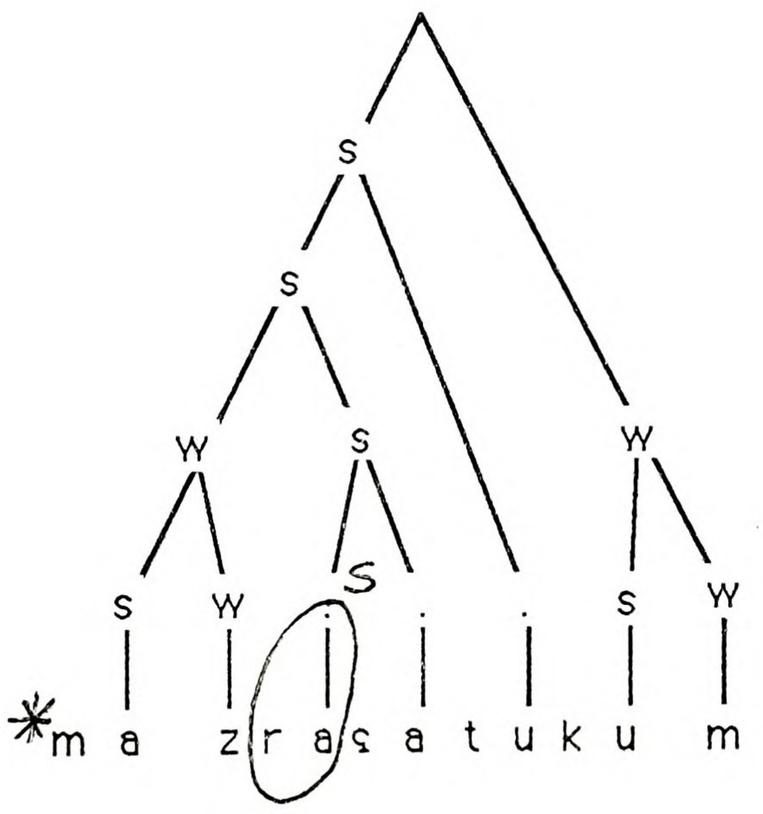
(21.b):



(21.c):



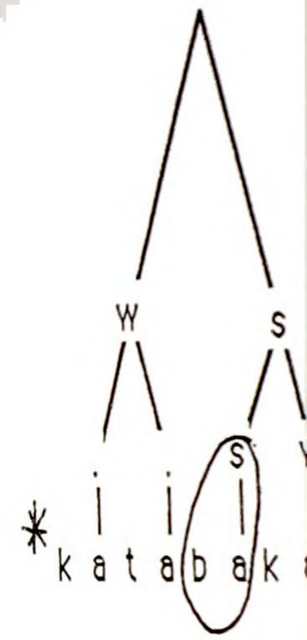
(21.d):



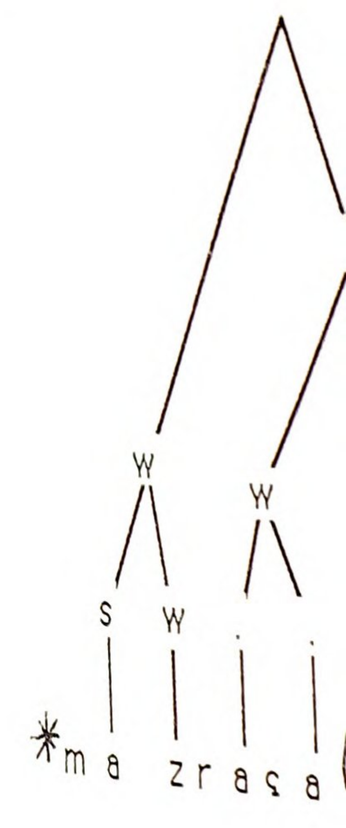
The correct stress assignment to these words is: *katábaka, katábakum, mazraçátuka,* and *mazraçátukum.*

Under the assumptions of (18.a-i, b-ii, c-i), construction of the following metrical trees in (22.a-d) results in the wrong assignment of stress.

(22.a):

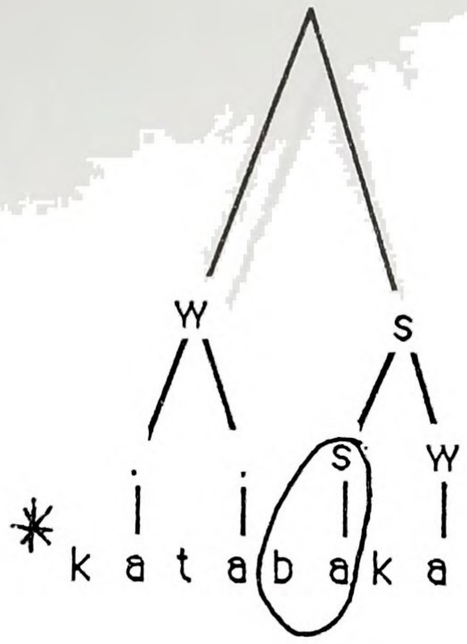


(22.c):

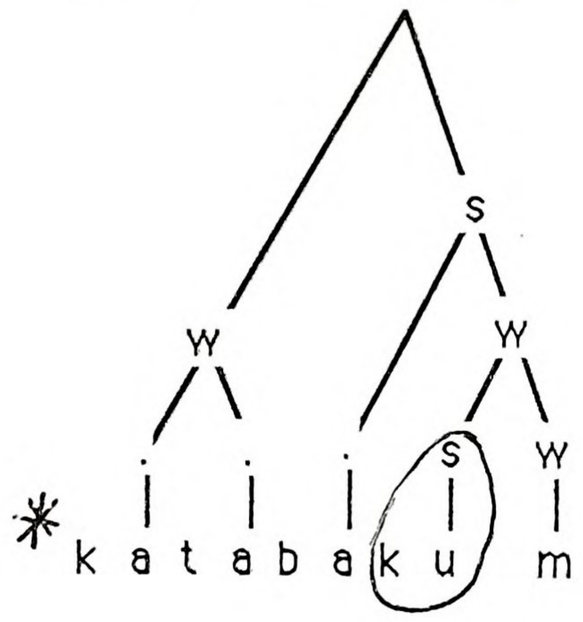


The correct stress
katábakum, mazracátu
Under the assumptio
following metrical tre
assignment of stress.

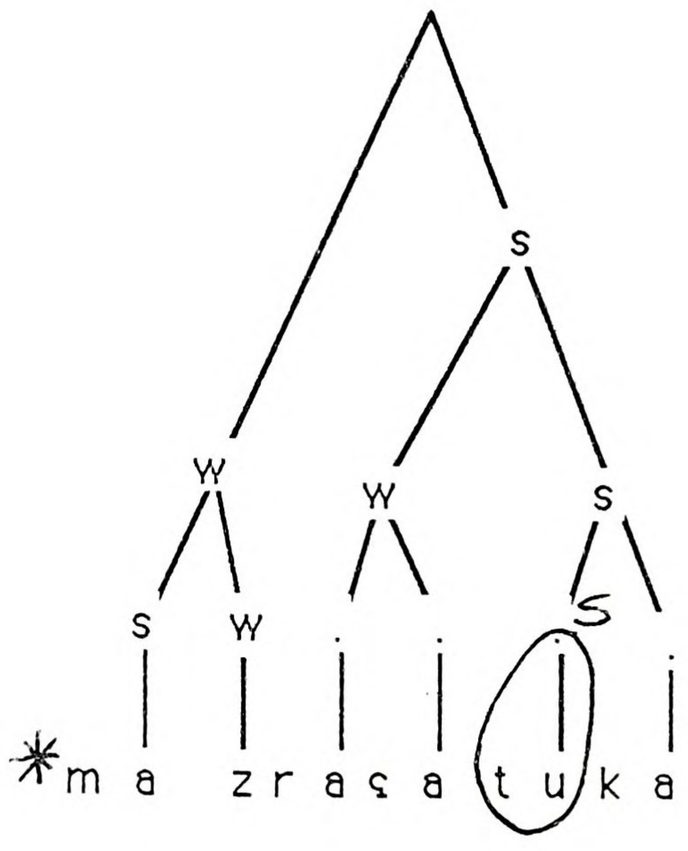
(22.a):



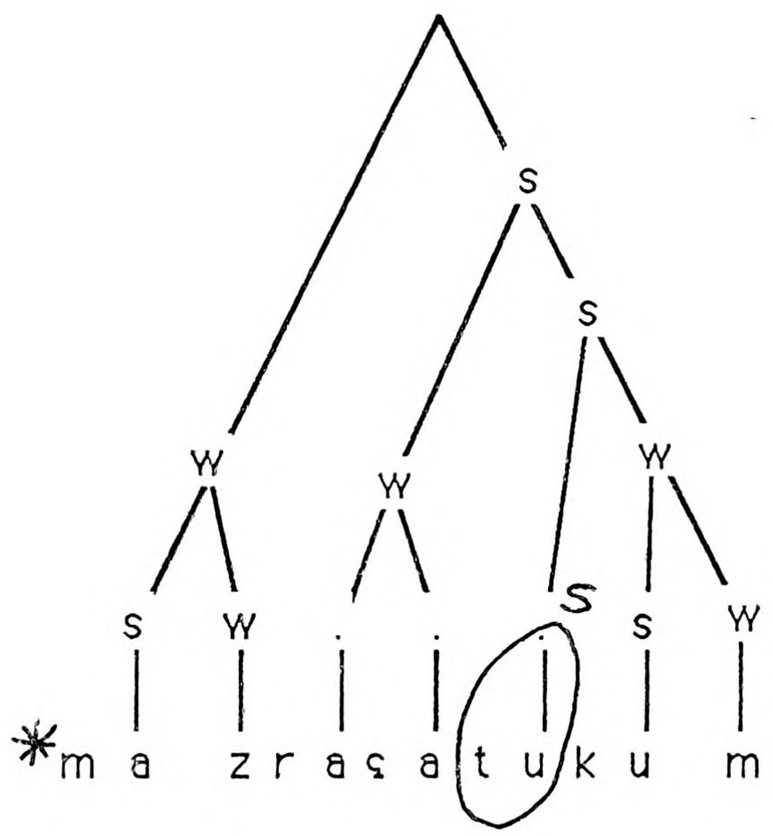
(22.b):



(22.c):



(22.d):



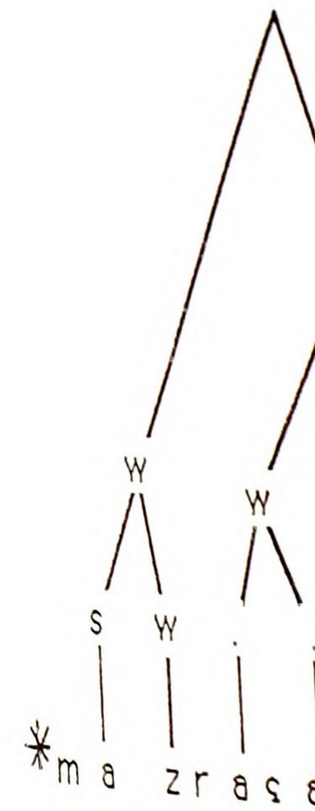
The correct stress assignment to these words is: *katábaka, katábakum, mazraçátuka,* and *mazraçátukum.*

Under the assumptions of (18.a-i, b-ii, c-ii), construction of the following metrical trees in (23.a-d) results in the wrong assignment of stress.

(23.a):

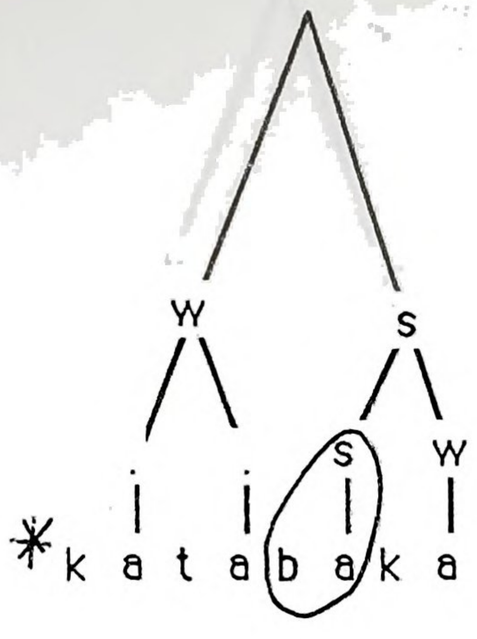


(23.c):

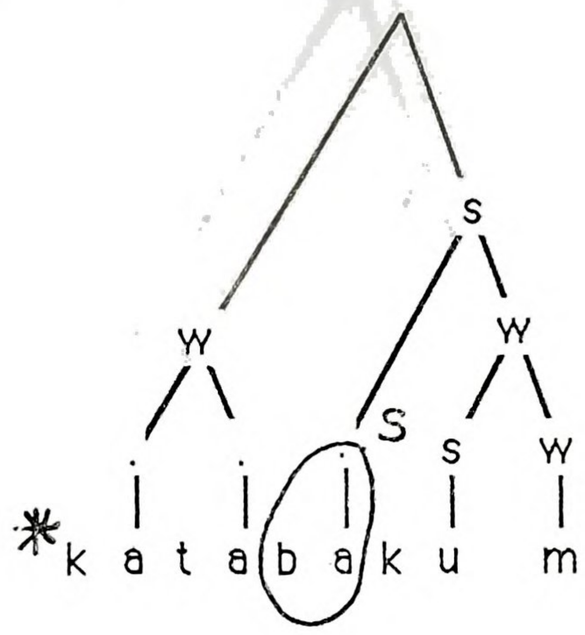


The correct stres
katábakum, mazrasá
Under the assump
following metrical t
of stress.

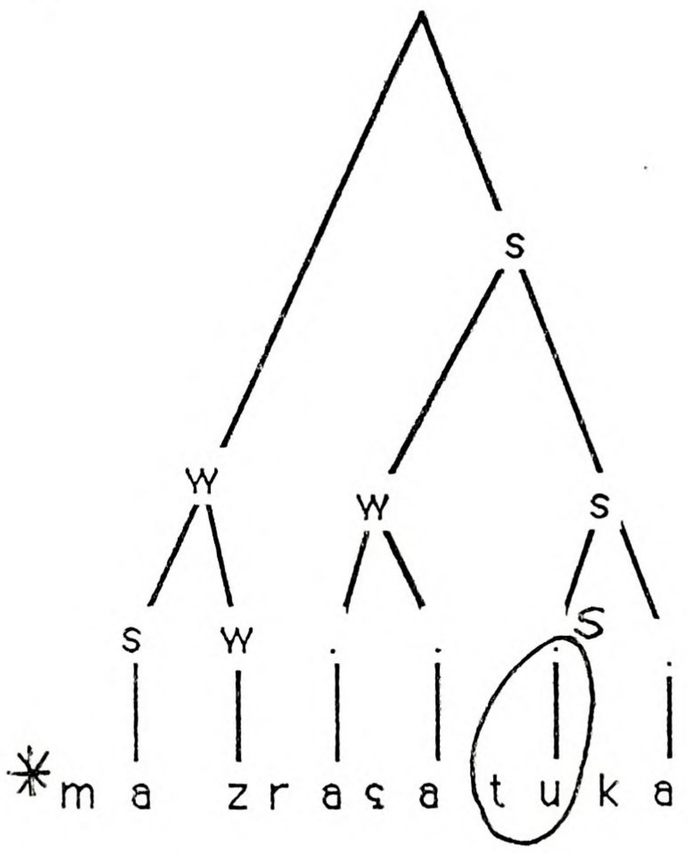
(23.a):



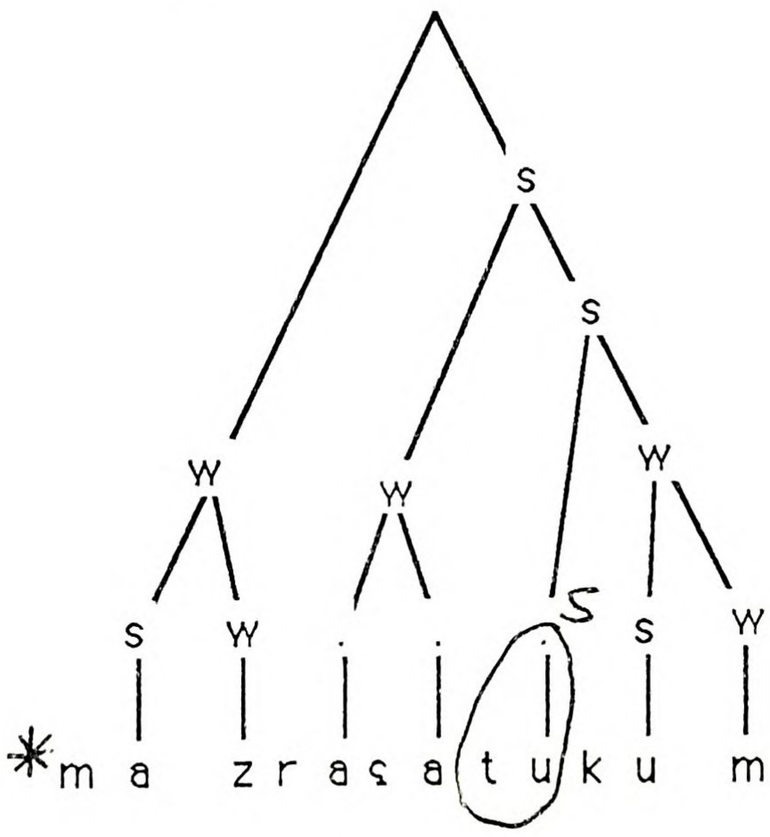
(23.b):



(23.c):



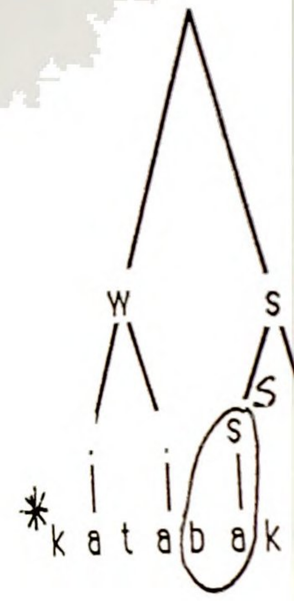
(23.d):



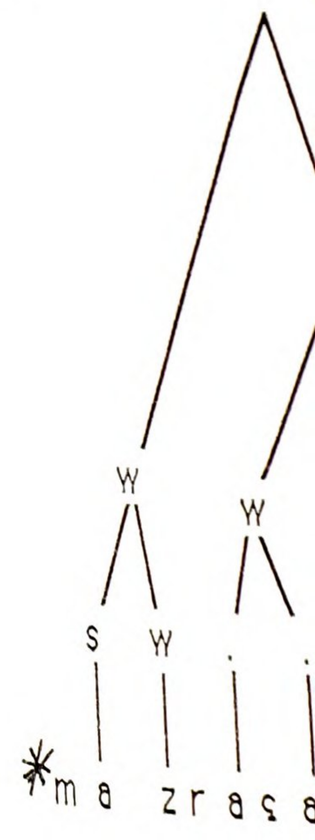
The correct stress assignment to these words is: *katábaka, katábakum, mazraçátuka,* and *mazraçátukum.*

Under the assumptions of (18.a-ii, b-i, c-i), construction of the following metrical trees in (24.a-f) results in the wrong assignment of stress.

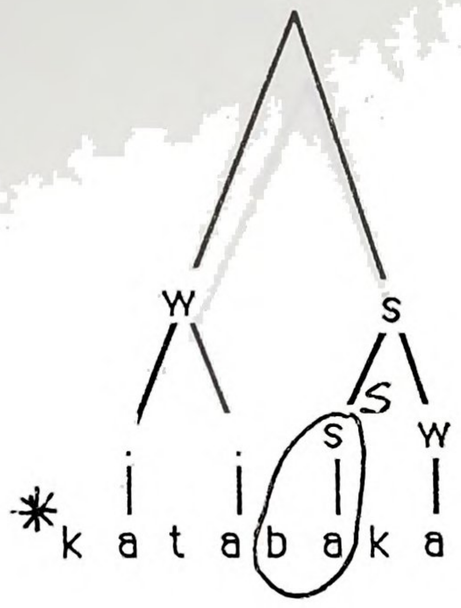
(24.a):



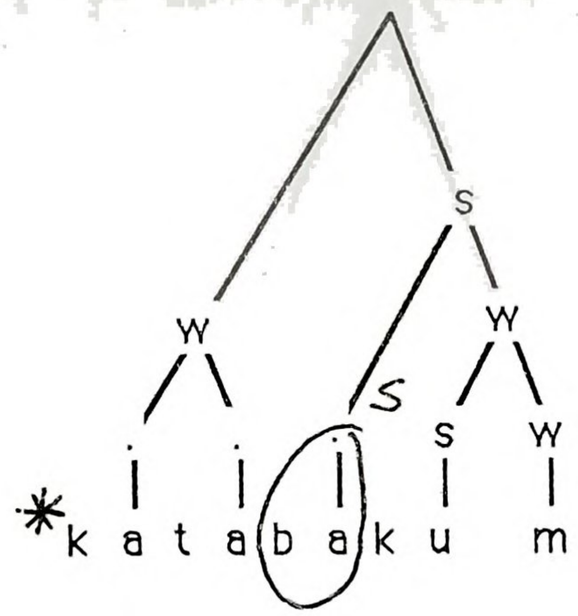
(24.c):



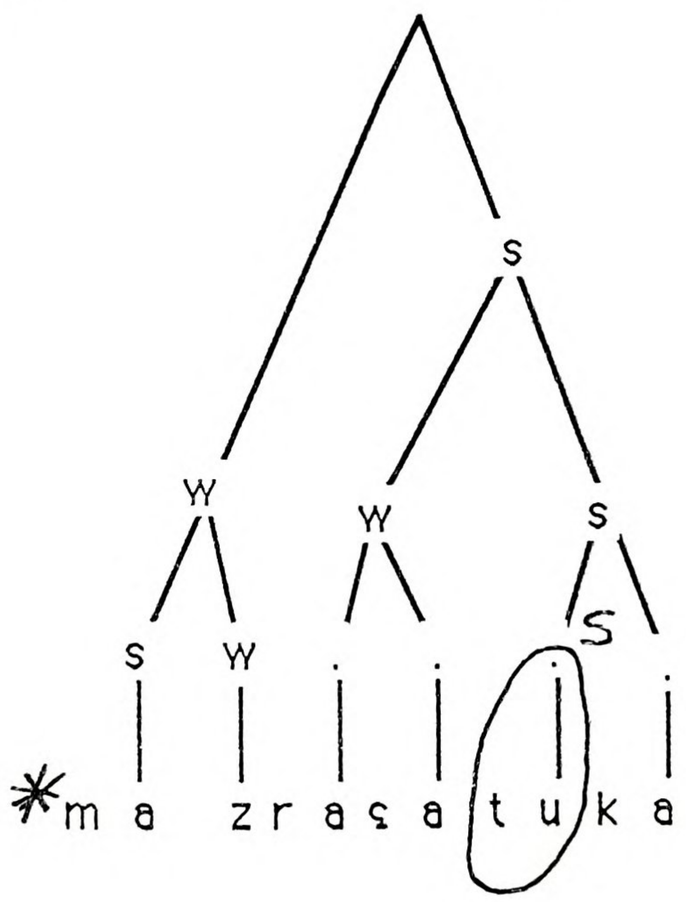
(24.a):



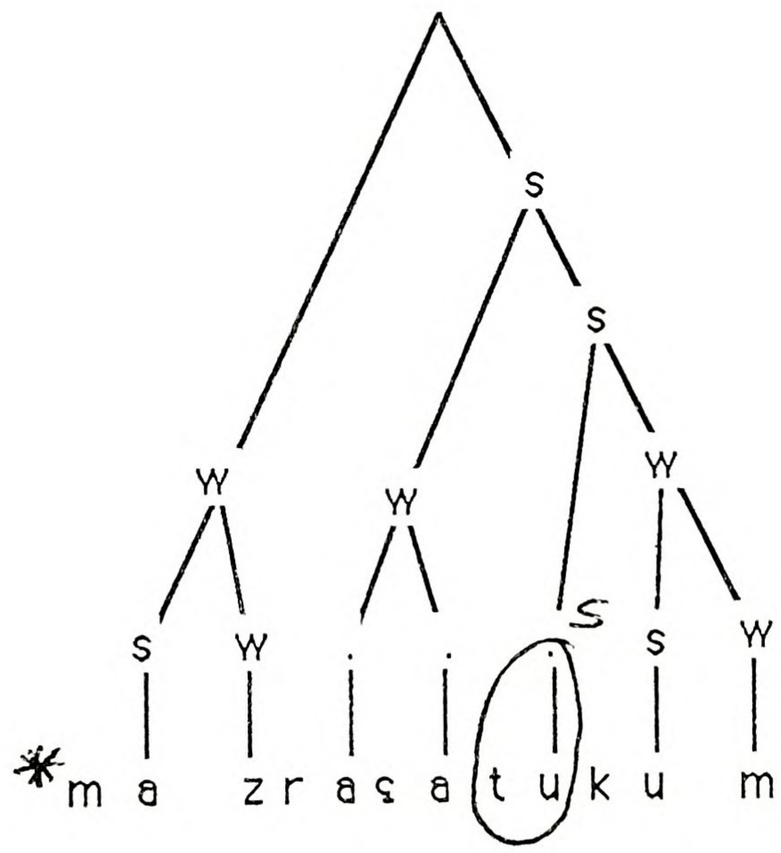
(24.b):



(24.c):



(24.d):



(24.e):



The correct stress a

katábakum, mazraṣátu

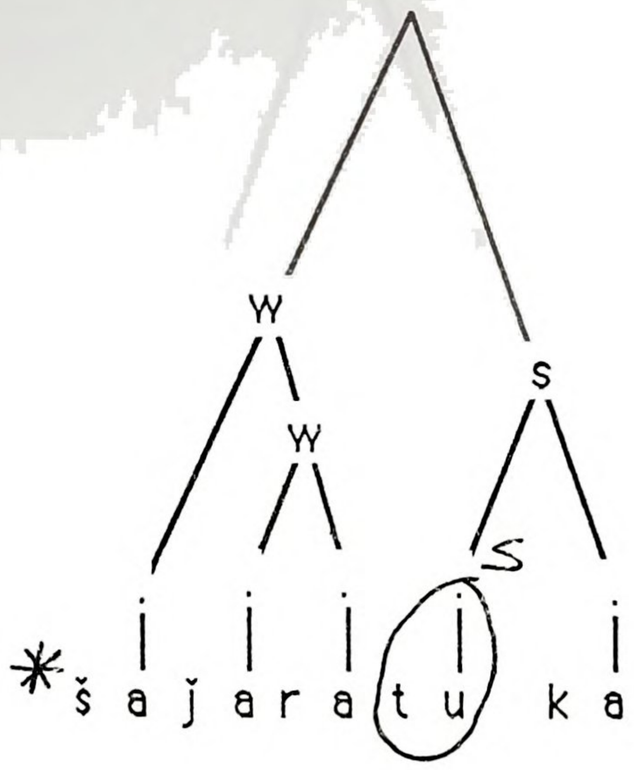
šajarátukum.

Under the assumptio

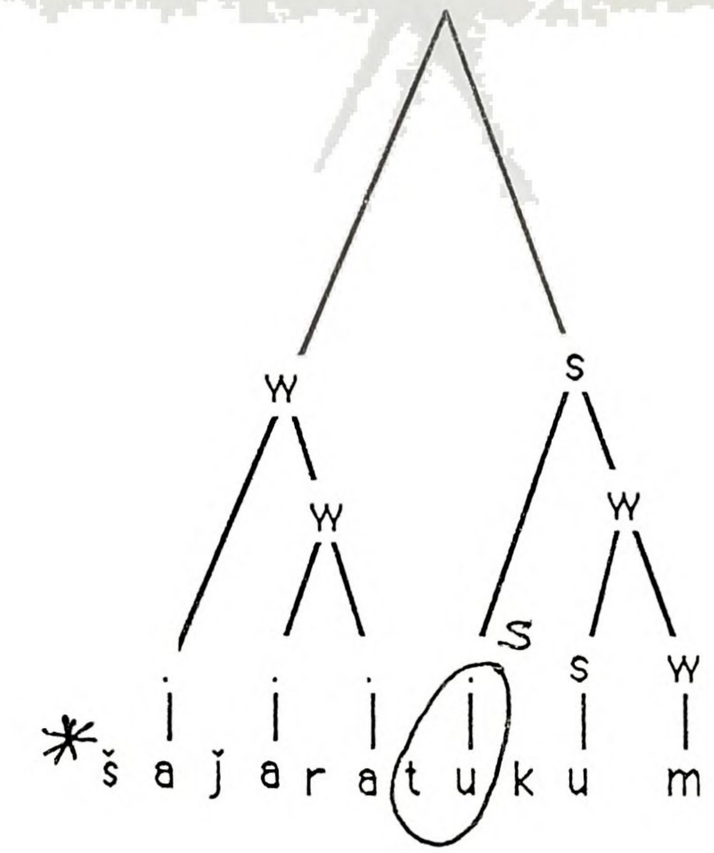
following metrical tre

assignment of stress.

(24.e):



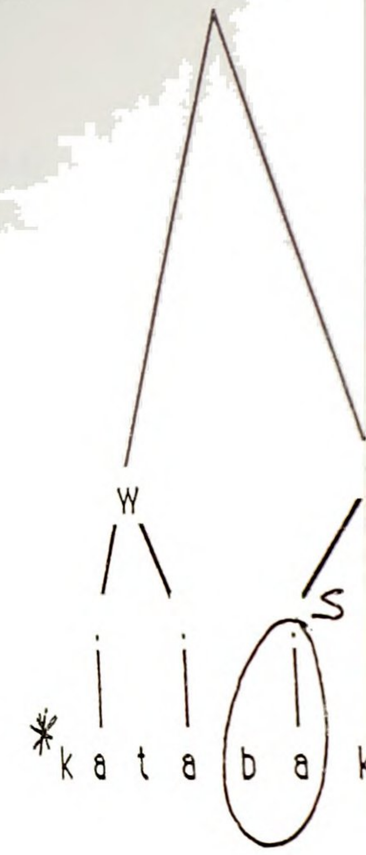
(24.f):



The correct stress assignment to these words is: *katábaka, katábakum, mazraʕátuka, mazraʕátukum, šaǰarátuka,* and *šaǰarátukum.*

Under the assumptions of (18.a-ii, b-i, c-ii), construction of the following metrical trees in (25.a,c,e,f) results in the wrong assignment of stress.

(25.8):



(25.e):



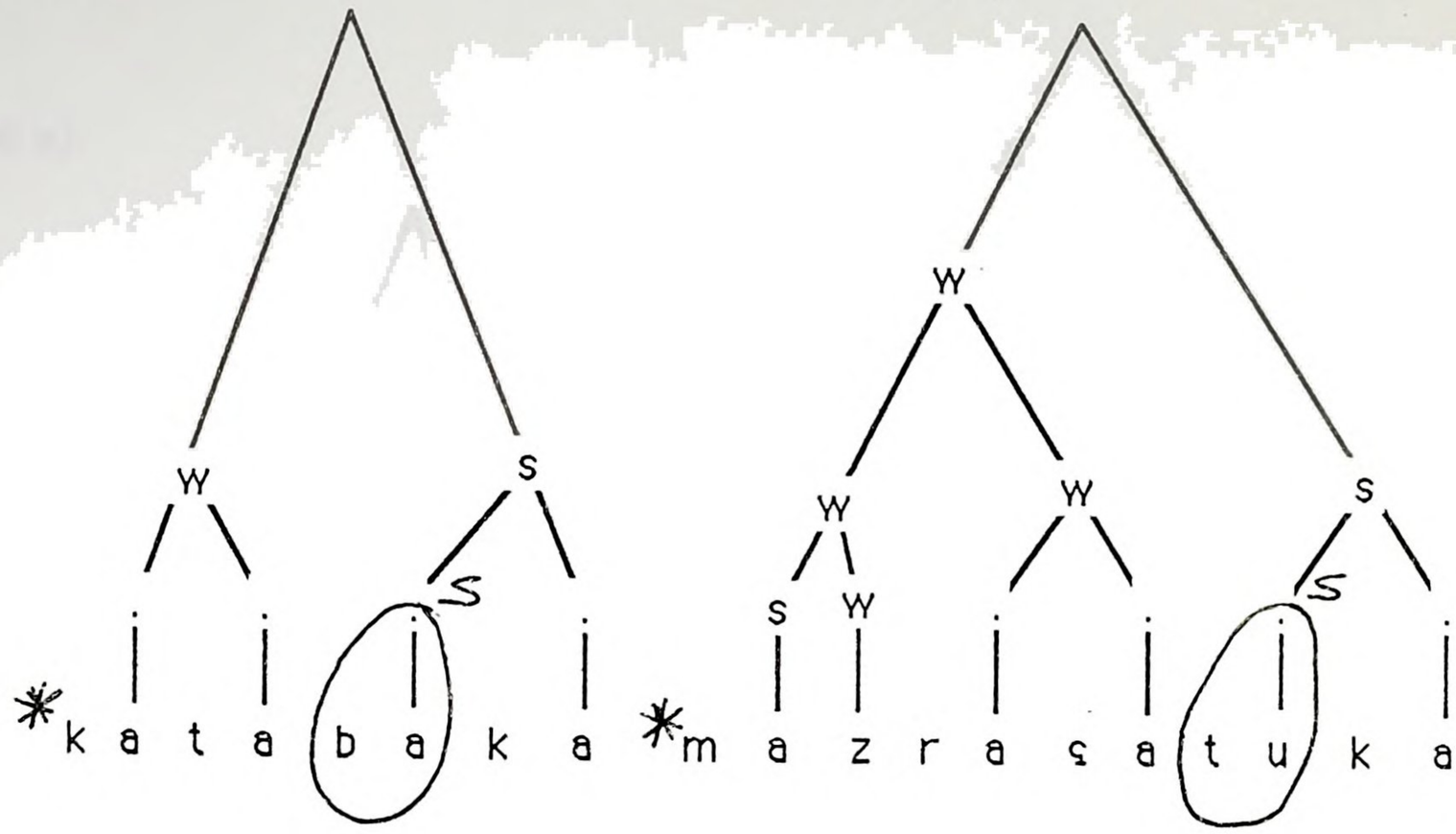
The correct stres

mazrasátuka, šajará

Under the assump

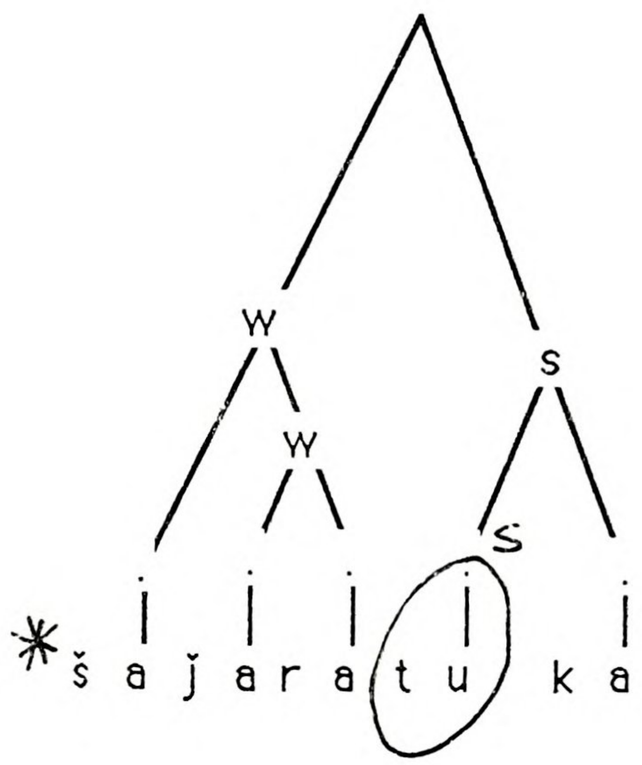
following metrical t

(25.a):

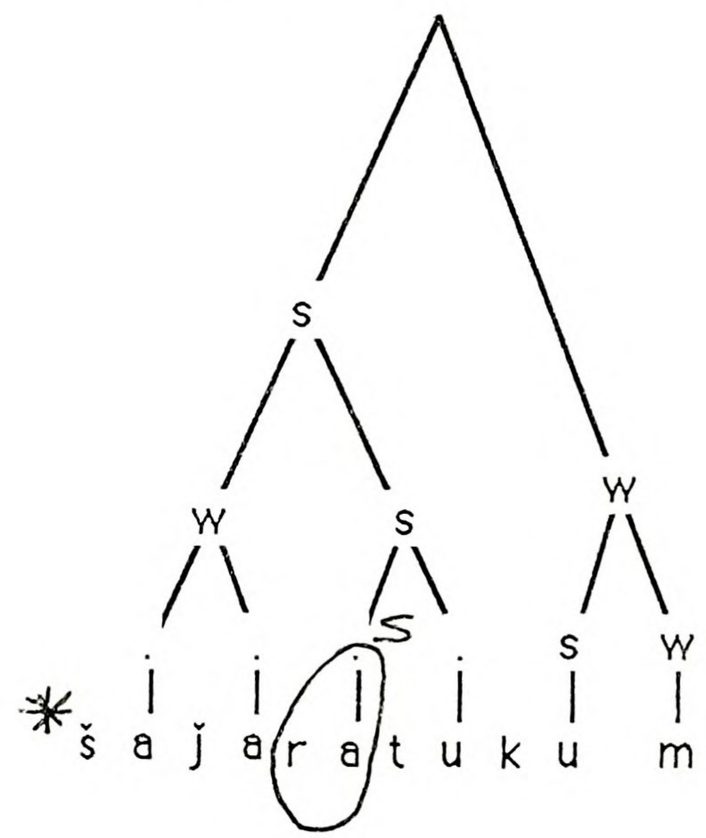


(25.c):

(25.e):



(25.f):

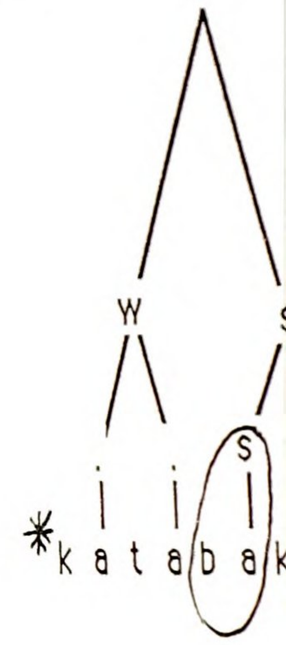


The correct stress assignment to these words is: *katábaka, mazraçátuka, šajarátuka,* and *šajarátukum.*

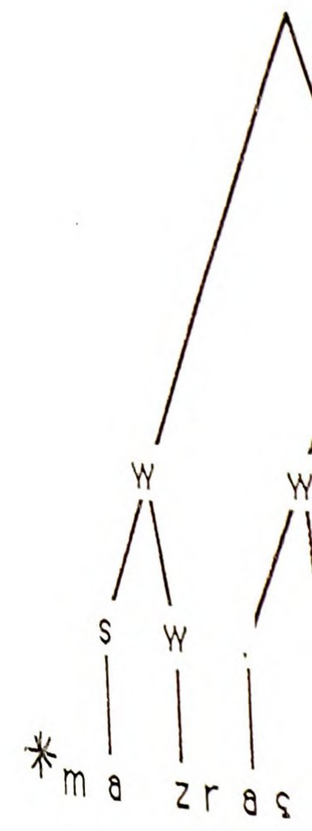
Under the assumptions of (18.a-ii, b-ii, c-i), construction of the following metrical trees in (26.a-f) results in the wrong assignment

of stress.

(26.a):

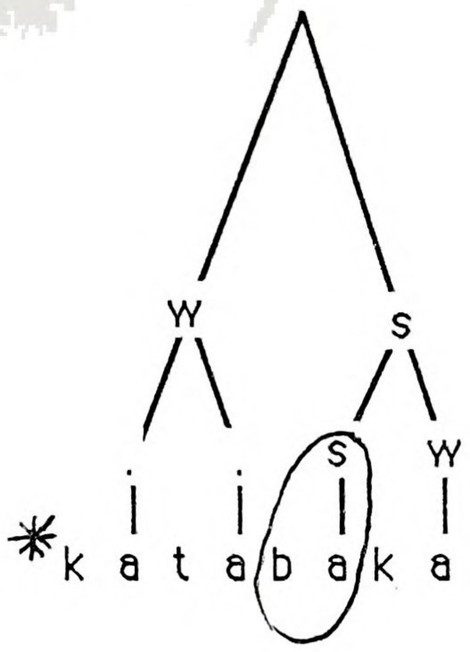


(26.c):

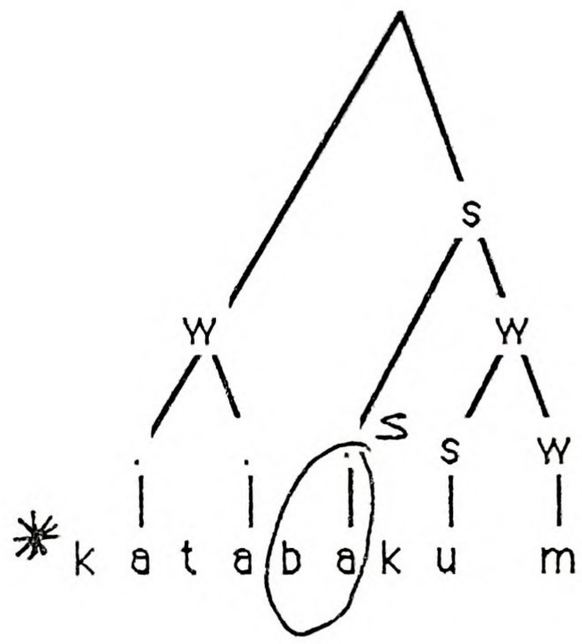


of stress.

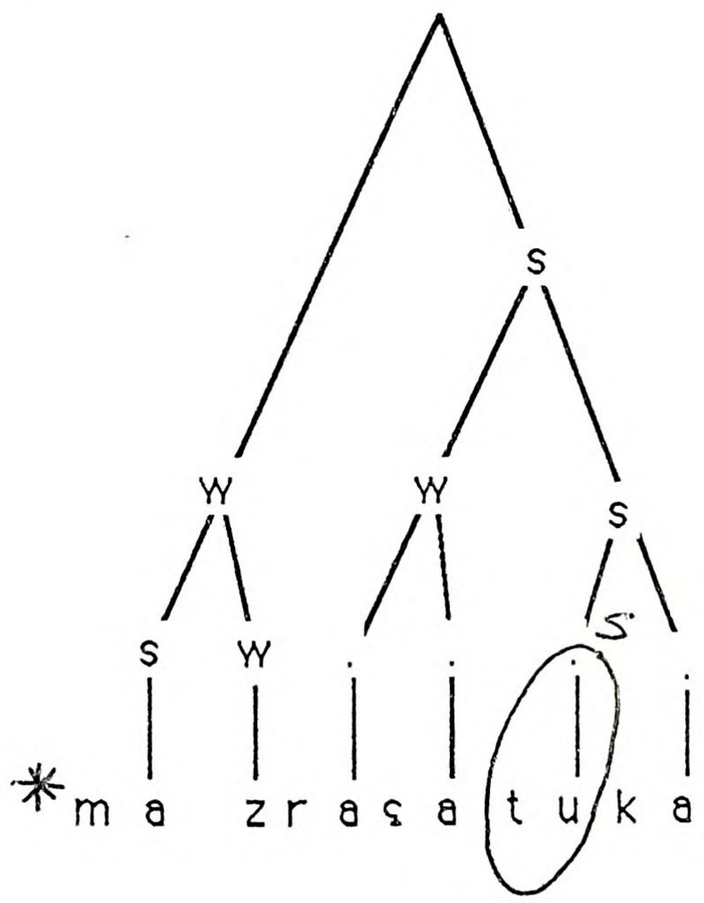
(26.a):



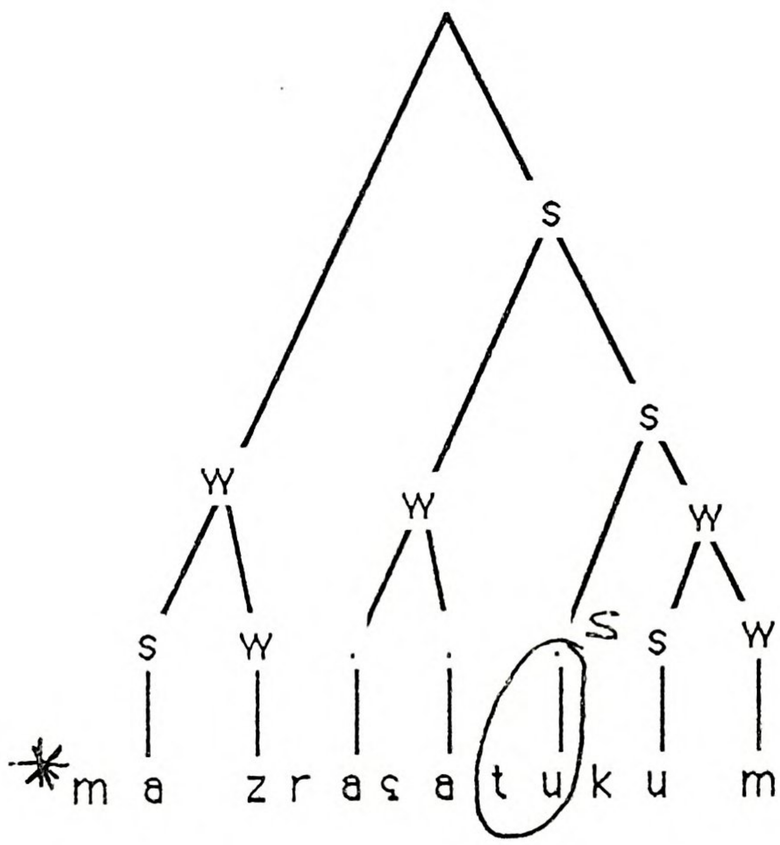
(26.b):



(26.c):



(26.d):



(26.e):



The correct stress a

katábakum, mazraṣátu

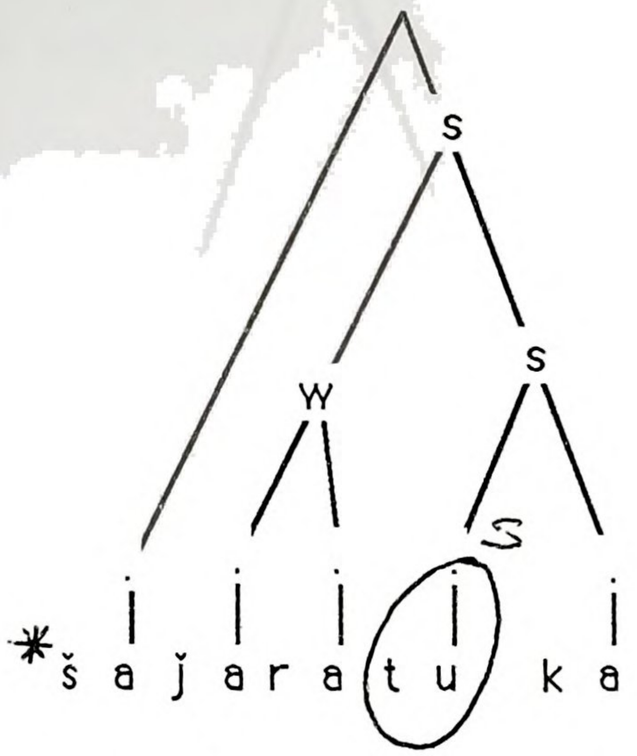
šajarátukum.

Under the assumptio

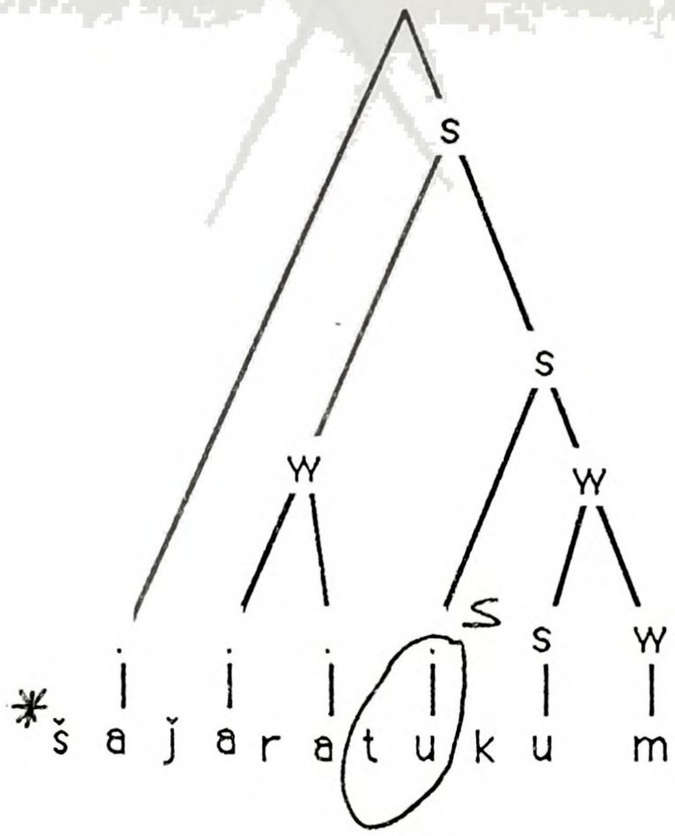
following metrical tre

assignment of stress.

(26.e):



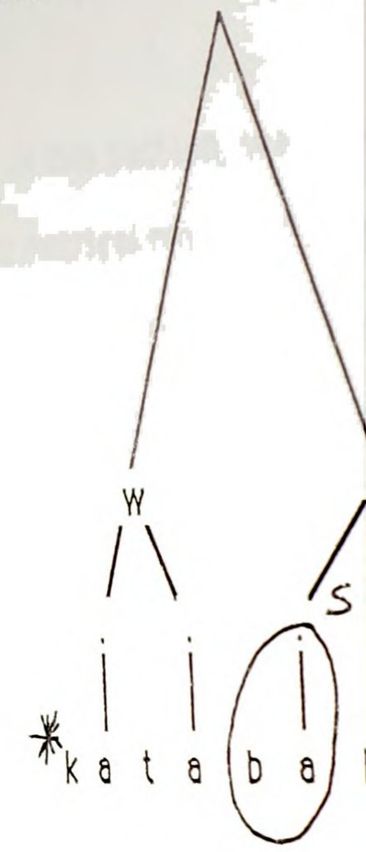
(26.f):



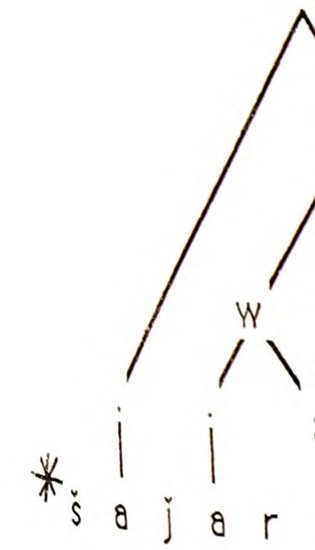
The correct stress assignment to these words is: *katábaka, katábakum, mazraʂátuka, mazraʂátukum, šaǰarátuka,* and *šaǰarátukum.*

Under the assumptions of (18.a-ii, b-i, c-ii), construction of the following metrical trees in (27.a,c,e) results in the wrong assignment of stress.

(27.d):



(27.e):



The correct stres

mazrasátuka, and *šaj*

It is clear that all

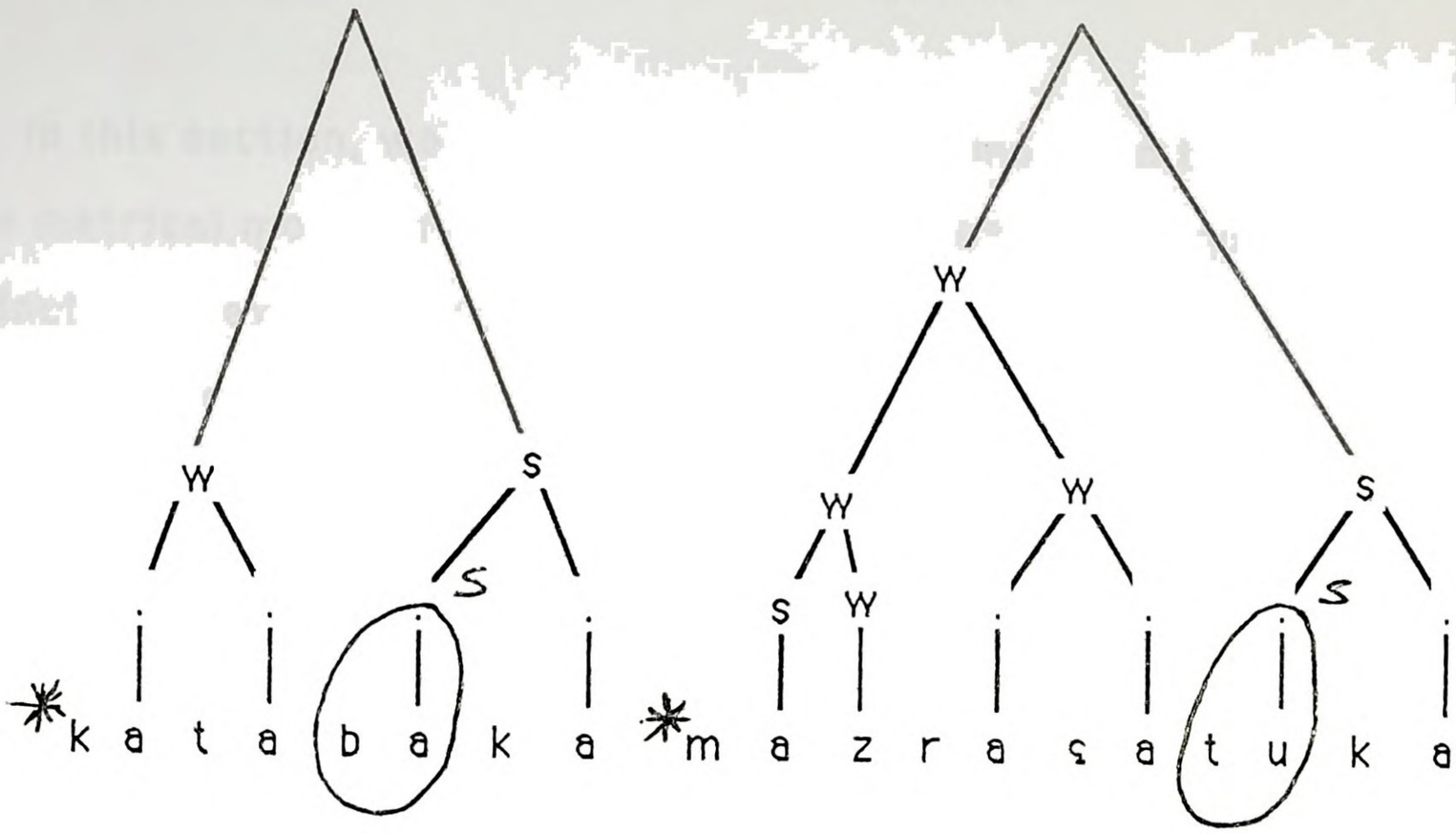
variation provided in

prediction. On these

its 1979 form does

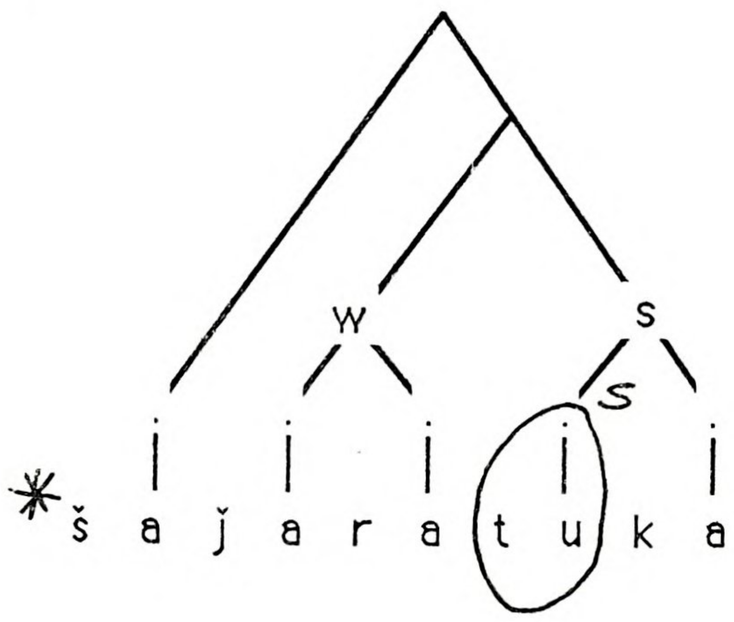
Accordingly, it has

(27.a):



(27.c):

(27.e):



The correct stress assignment to these words is: *katábaka, mazraçátuka,* and *šaǰarátuka.*

It is clear that all the possible choices among the parametric variation provided in McCarthy's model fail to make the correct prediction. On these grounds, we conclude that McCarthy's model in its 1979 form does not fit the analysis of stress in MSA. Accordingly, it has to be modified.

3.2.3. Hayes' metrical mode

In this section, we rec
the metrical model of Hay
principle of extrametrica
of which the metrical tre
parametric variations in

28.a. Feet are binary and
i. left to right.
ii. right to left.

28.b. Metrical trees are
i. left branching.
ii. right branchin

28.c. The final syllable

The parameters in
different metrical tre
the parameters in (28
in (19), repeated here

(19): a. katábaka
b. katábakum
c. mazracátuka
d. mazracátuku

3.2.3. Hayes' metrical model:

In this section, we reconsider McCarthy's model in the light of the metrical model of Hayes (1980; 1982;1985) who proposed the principle of extrametricality as one of the parameters on the basis of which the metrical trees are built. Accordingly, we modify the parametric variations in (18) into (28).

28.a. Feet are binary and are assigned from
  i. left to right.
  ii. right to left.

28.b. Metrical trees are
  i. left branching.
  ii. right branching.

28.c. The final syllable is extametrical

The parameters in (28) allow the possibility of building 4 different metrical trees for each word (2x2x1=4). Now, we apply the parameters in (28) to building metrical trees for the MSA words in (19), repeated here for convenience.

(19): a. katábaka "he wrote you"
  b. katábakum "he wrote you (plural)"
  c. mazraʕátuka "your farm"
  d. mazraʕátukum "your farm (plural)"

e. šajarátuka "you

f. šajarátukum "you

The possible choices a

28.a-i, b-i, c 28.a-i, b-

Two of the four choices
incorrect assignment of
The other two of the fou
of stress.

Under the assumptio
following metrical tree
assignment of stress.

(29.a):



e. šajarátuka "your tree"

f. šajarátukum "your tree (plural)"

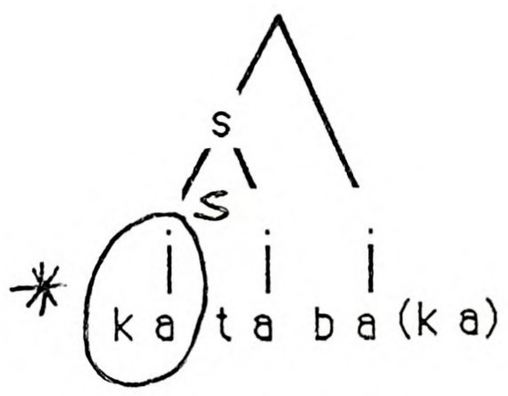
The possible choices among the parameters in (18) are:

28.a-i, b-i, c 28.a-i, b-ii, c 28.a-ii, b-i, c 28.a-ii, b-ii, c

Two of the four choices among the parameters in (28) result in the incorrect assignment of stress to one or more of the words in (19). The other two of the four choices result in the correct assignment of stress.

Under the assumptions of (28.a-i, b-i, c), construction of the following metrical trees in (20.a-d) results in the wrong assignment of stress.

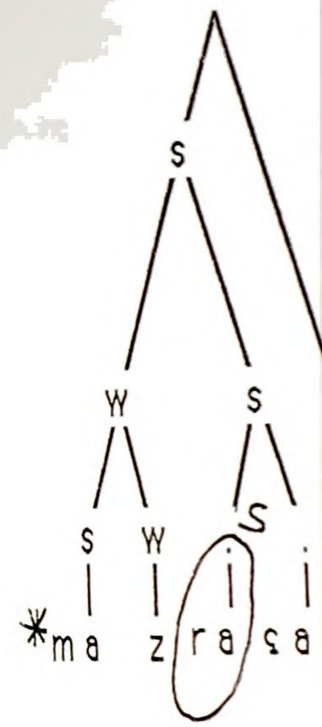
(29.a):



(29.b):

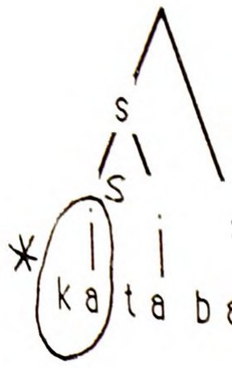


(29.c):

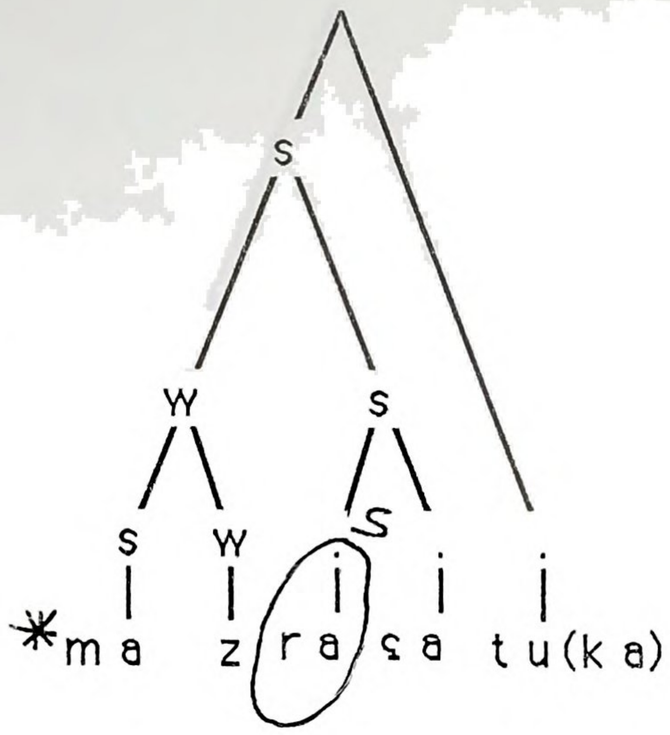


The correct stress
mazrasátuka, and *šajar*
Under the assumptio
following metrical tree
assignment of stress.

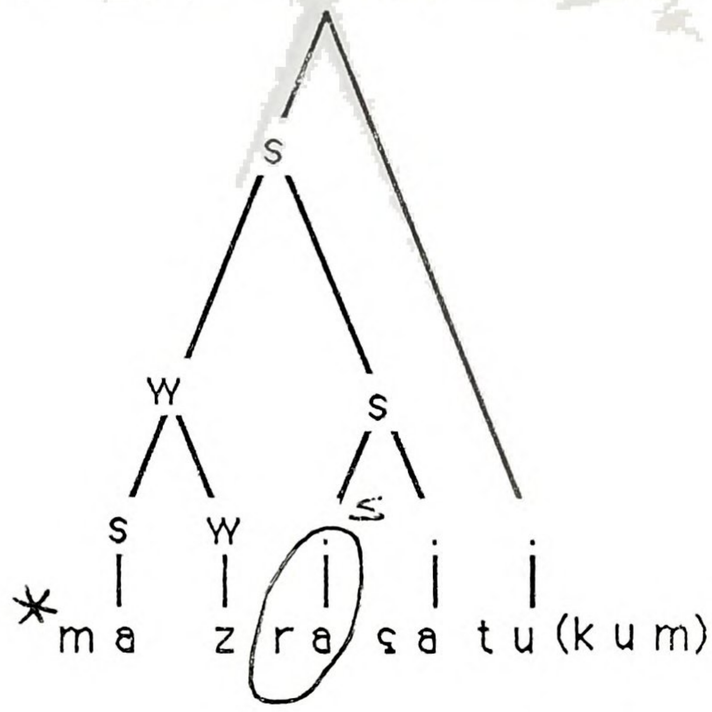
(30.a):



(29.c):



(29.d):



The correct stress assignment to these words is: *katábaka, mazraʂátuka,* and *šajarátuka.*

Under the assumptions of (28.a-i, b-ii, c), construction of the following metrical trees in (30.a-d) results in the wrong assignment of stress.

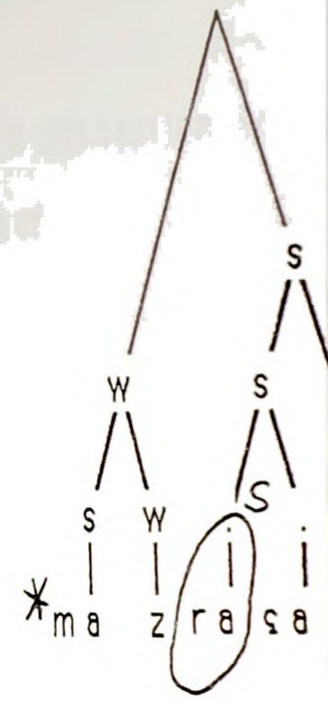
(30.a):



(30.b):



(30.c):



The correct stress a

mazrašátuka, and *šajar*

Construction of the r

(28.a-ii, b-i, c), and (28

assignment of stress. T

overgenerates. More th

We conclude that th

MSA yields the correct

are binary and that the

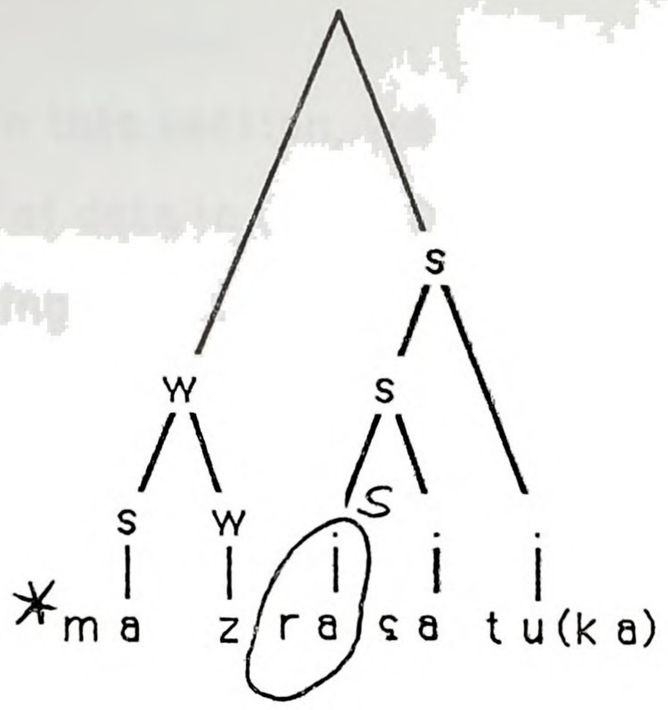
analysis dealing with t

superheavy syllables w

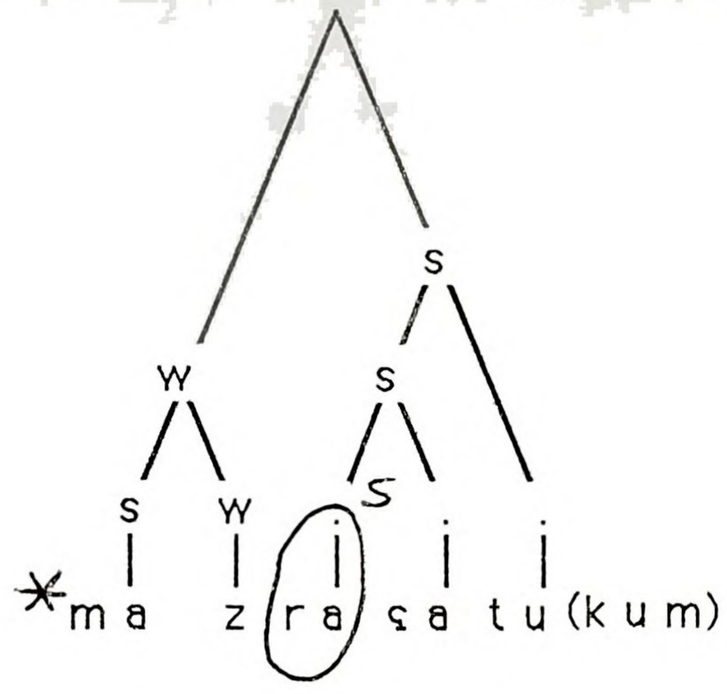
furnished in the follow

analysis of JA.

(30.c):



(30.d):



The correct stress assignment to these words is: *katábaka, mazraçátuka,* and *šajarátuka.*

Construction of the metrical trees under the assumptions of both (28.a-ii, b-i, c), and (28.a-ii, b-ii, c) results in the correct assignment of stress. This means that the system is faulty; it still overgenerates. More than one choice works.

We conclude that the metrical approach to stress assignment in MSA yields the correct prediction under the assumptions that feet are binary and that the ultimate syllable is extrametrical. Further analysis dealing with the principle of extrametricality in respect to superheavy syllables word-finally and word-medially will be furnished in the following sections of the chapter, mainly in the analysis of JA.

3.2. 4. Stress assignment

In this section, we co

sets of data in (31.A-D).

varying structures and v

assignment to these dat

STGP. Consider the JA c

(31.A): Mono-syllabic w

wa	"and"
laa	"no"
ʕan	"abou
darb	"road
ǰaar	"neig
ǰaarr	"prep
štigt	"beca
nhaar	"day
nharr	"was
nšadd	"wa

(31.B): Bi-syllabic w

dáwa	"m
ħájar	"s
mačárr	"t
daməar	"d

3.2. 4. Stress assignment in JA (Linear Approach):

In this section, we consider the assignment of stress to the JA sets of data in (31.A-D). The data in (31.A-D) includes words of varying structures and varying number of syllabic segments. Stress assignment to these data will be considered in reference to the STGP. Consider the JA data in (31.A-D).

(31.A): Mono-syllabic words

wa	"and"
laa	"no"
ʕan	"about"
darb	"road"
ǰaar	"neighbor"
ǰaarr	"prepositional, dragging"
štigt	"became eager"
nhaar	"day time"
nharr	"was spilled"
nšadd	"was tightened"

(31.B): Bi-syllabic words

dáwa	"medecine"
ħáǰar	"stone"
mačárr	"traces of pulling"
damáar	"destruction"

maláan	"full"
mismáar	"nail"
lámlam	"gathe
xtálaf	"differ
dáawa	"he ga
xáatim	"wri
ṭaasúun	"dise
stárjas	"res
ntáha	"en
tsáawa	"be
xáalha	"h
xáalhum	"t
xaayfáat	"t

(31.C): Tri-syllabic w

šájara(h)	
šajaráat	
mistásjil	
xaatímhum	
mšaawaráat	
msáawamah	
sawáalif	
mistásjil	
múhtaram	
mitḍáayig	

maláan "full"

mismáar "nail"

lámlam "gathered"

xtálaf "differed"

dáawa "he gave medical treetment"

xáatim "wring"

ṭaaʕúun "disease"

stárǰaʕ "restored"

ntáha "ended"

tsáawa "became equal"

xáalha "her uncle"

xáalhum "their uncle'

xaayfáat "they (fem.) are scared"

(31.C): Tri-syllabic words

šáǰara(h) "tree"

šaǰaráat "trees"

mistáʕjil "in a hurry"

xaatímhum "their ring"

mšaawaráat "consultations"

msáawamah "bargining"

sawáalif "stories"

mistáʕjil "in a hurry"

múħtaram "respectable"

mitḍáayig "he is under pressure"

(31.D): Words of more tha

mistaʂmáratiy

mizráʂatu(h)

mizraʂáthum

mištarayáat

mazaaríʂhum

mistáʂmara(h)

ʔistigbaaláathum

The data in (31.A)
allowed in JA: CV, CVC
CCVVC. Also notice th
tsaa.wa, provided in
restricted in their dis
monosyllabic words o
consonant clusters ar
with final clusters oc
CCVCC syllables occu
are restricted to hav

Considering the
assignment of stress
assignment in (10.A-
assignment in both

Here, it has to be
arise in the analysi
arise in the analysi

(31.D): Words of more than three syllabic segments

mistaʕmáratiy	"my colony"
mizráʕatu(h)	"his farm"
mizraʕáthum	"their farm"
mištarayáat	"purchases"
mazaaríʕhum	"their farms"
mistáʕmara(h)	"colony"
ʔistigbaaláathum	"their receptions"

The data in (31.A) show the types of mono-syllable that are allowed in JA: CV, CVC, CVCC, CCVCC, CVV, CVVC, CVVCC, and CCVVC. Also notice the CCV and CCVV syllable types of *xta.laf* and *tsaa.wa* , provided in (31.B). Some of these syllables are so restricted in their distribution that they appear only in monosyllabic words or initial position. Syllables with initial consonant clusters are restricted to word initial position and those with final clusters occur only in word final position. Therefore, CCVCC syllables occur only in monosyllabic words. CVVCC syllables are restricted to having a geminate cluster in the coda.

Considering the JA data in (31. A-D), we see that the assignment of stress follows the same pattern of MSA stress assignment in (10.A-D). Accordingly, we assume that stress assignment in both MSA and JA can be accounted for by rule (15).

Here, it has to be pointed out that some of the problems which arise in the analysis of MSA data in reference to rule (15) do not arise in the analysis of JA. JA does not have long vowels

word-finally. Long vowels in MSA do not show up in J conjugation. The JA form (dual) wrote" is *kátabuw* wrote".

Nor do long vowels wh JA; in JA the plural form JA word corresponding t (dual) farm" is *mizraṣá* plural) farm". In the JA the antepenultimate vo lost; JA has lost case m

As for epenthetic counter evidence to ru interaction with stres following chapters.

3.2.5. Stress assignm

In this section, w in (32.a-d) in referen illustrative and limi assignment in metri which take a consid

(32.a. mízraṣah "fa

b. mizraṣáthum

word-finally. Long vowels which mark verbs conjugated for the dual in MSA do not show up in JA, since JA has lost this type of conjugation. The JA form corresponding to MSA *katabáa* "they (dual) wrote" is *kátabuw* "they (referring to both dual and plural) wrote".

Nor do long vowels which mark MSA nouns for the dual show up in JA; in JA the plural form refers to both the dual and the plural. The JA word corresponding to the MSA word *mazraʕatúhuma(a)* "their (dual) farm" is *mizraʕáthum* "their (referring to both dual and plural) farm". In the JA word, the ultimate long vowel is short and the antepenultimate vowel *-u-* which marks the noun for case is lost; JA has lost case markers.

As for epenthetic vowels and geminates, they raise potential counter evidence to rule (15). Their phonlogical status and interaction with stress assignment will be discussed in the following chapters.

3.2.5. Stress assignment in JA (Non-linear Approach):

In this section, we consider stress assignment to the JA words in (32.a-d) in reference to metrical phonology. Here we consider an illustrative and limited set of data because rules of stress assignment in metrical phonology are represented in metrical trees which take a considerable amount of space.

(32.a. mízraʕah "farm"

b. mizraʕáthum "their farm"

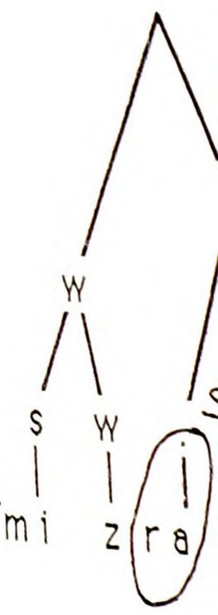
c. mistóodaʂuh "his

d. mistaʂmáratak "y

The parameters in (1
different metrical trees
4 different trees for ea

Under the assumpti
metrical trees in (33.a,
stress.

(33.a):



The correct stre
mistóodaʂuh.

Construction of
(18.a-i, b-i, c-ii), r

Under the assum
metrical trees in (

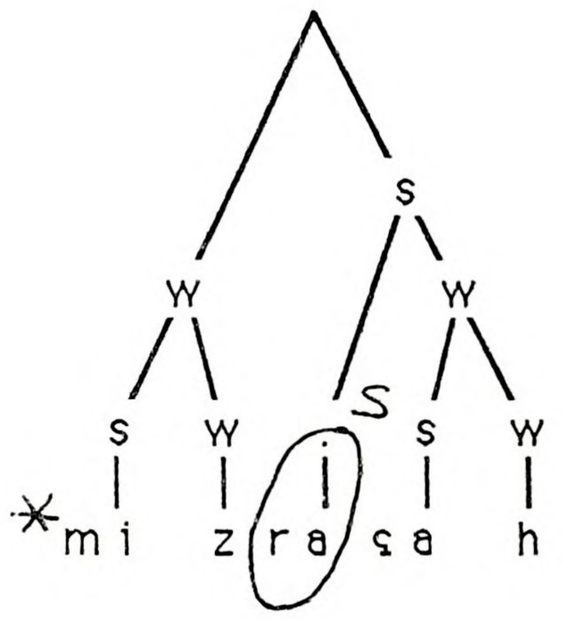
c. mistóodaʂuh "his sore"

d. mistaʂmáratak "your colony"

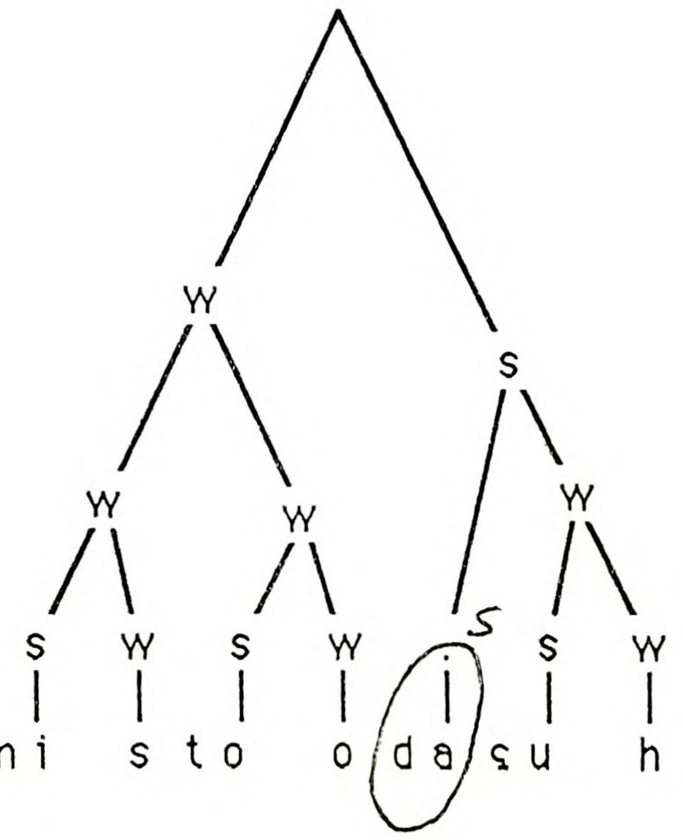
The parameters in (18) allow the possibility of building 8 different metrical trees for each word (2x2x2=8), and those in (28) 4 different trees for each word (2x2x1=4).

Under the assumptions of (18.a-i, b-i, c-i), construction of the metrical trees in (33.a, c) results in the wrong assignment of stress.

(33.a):



(33.c):

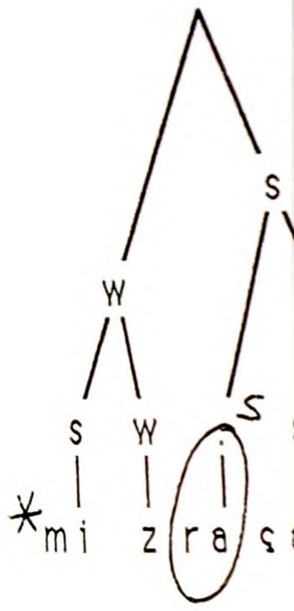


The correct stress assignment to these words is: *mízraʂah,* and *mistóodaʂuh.*

Construction of the metrical trees under the assumptions of (18.a-i, b-i, c-ii), results in the correct assignment of stress.

Under the assumptions of (18.a-i, b-ii, c-i), construction of the metrical trees in (34.a,c) results in the wrong assignment of stress.

(34.8):



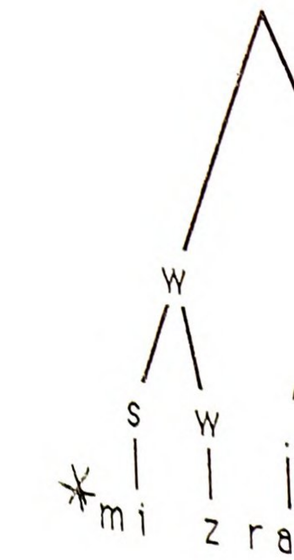
The correct stress

mistóodaʂuh.

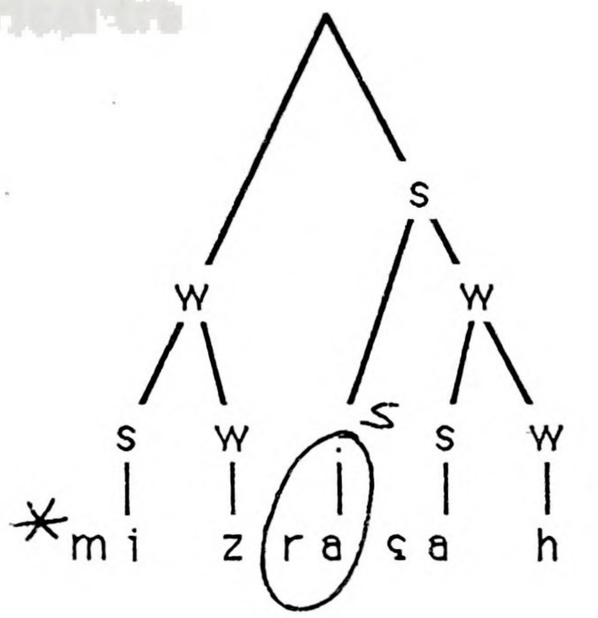
Under the assumpt

metrical trees in (35.

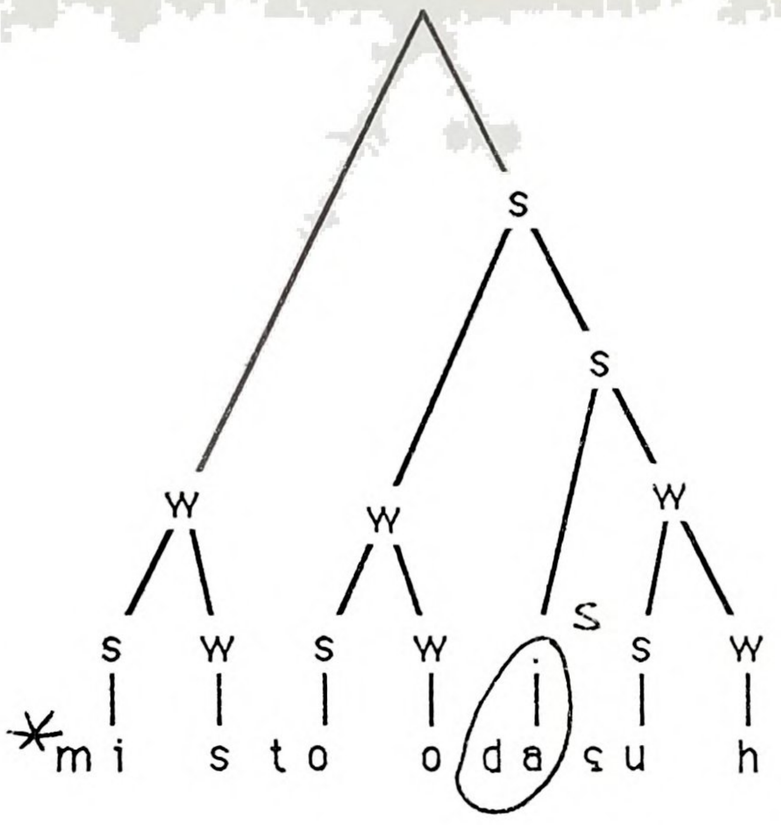
(35.a):



(34.a):



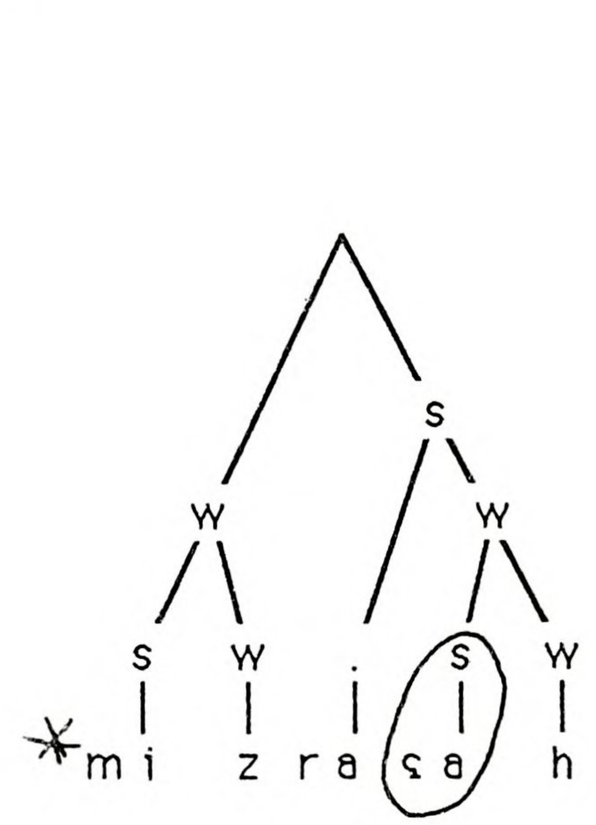
(34.c):



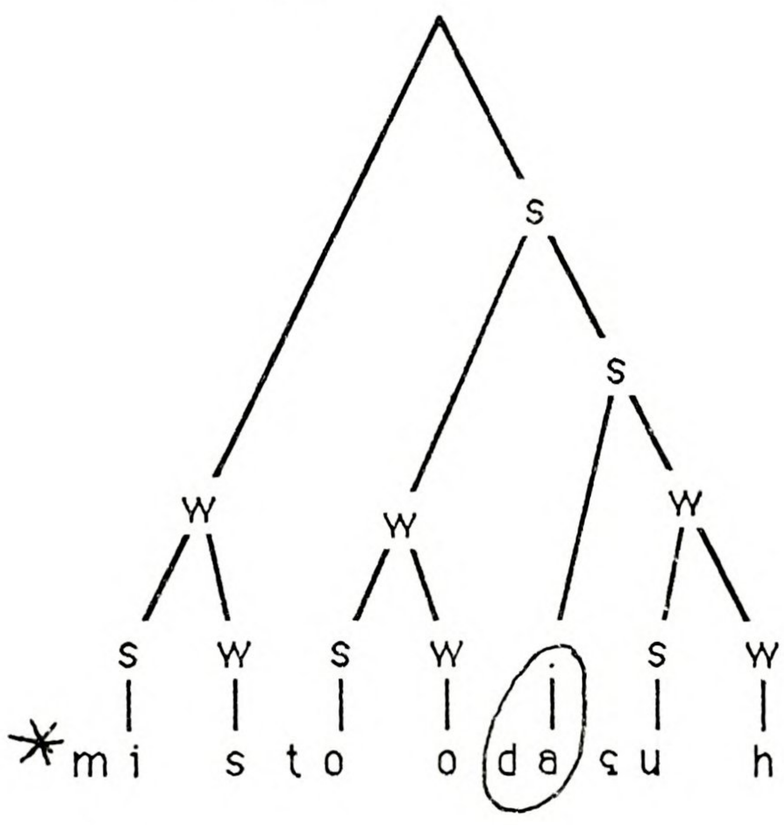
The correct stress assignment to these words is: *mízraʕah,* and *mistóodaʕuh.*

Under the assumptions of (18.a-i, b-ii, c-ii), construction of the metrical trees in (35.a,c) results in the wrong assignment of stress.

(35.a):



(35.c):



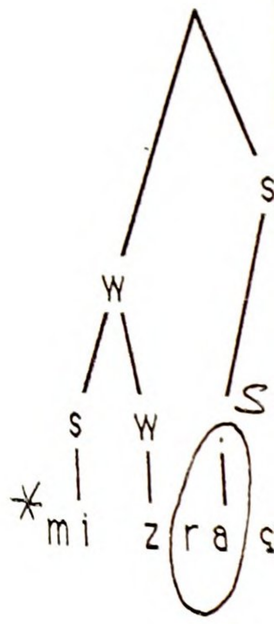
The correct stress a

mistóodasuh.

Under the **assumptio**

metrical trees in (36.a,

(36.a):



The correct stres

mistóodasuh.

Construction of t

(18.a-ii, b-i, c-ii), r

Thus, construction

both (18.a-i, b-i, c-

assignment of stre

overgenerates.

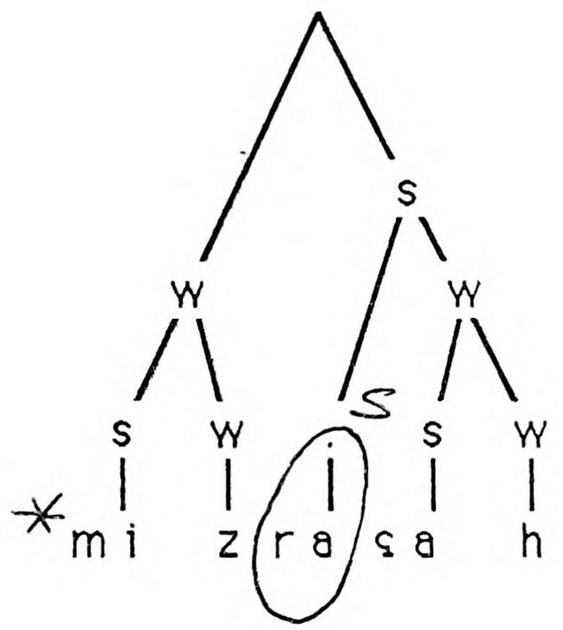
Under the assu

metrical trees in (

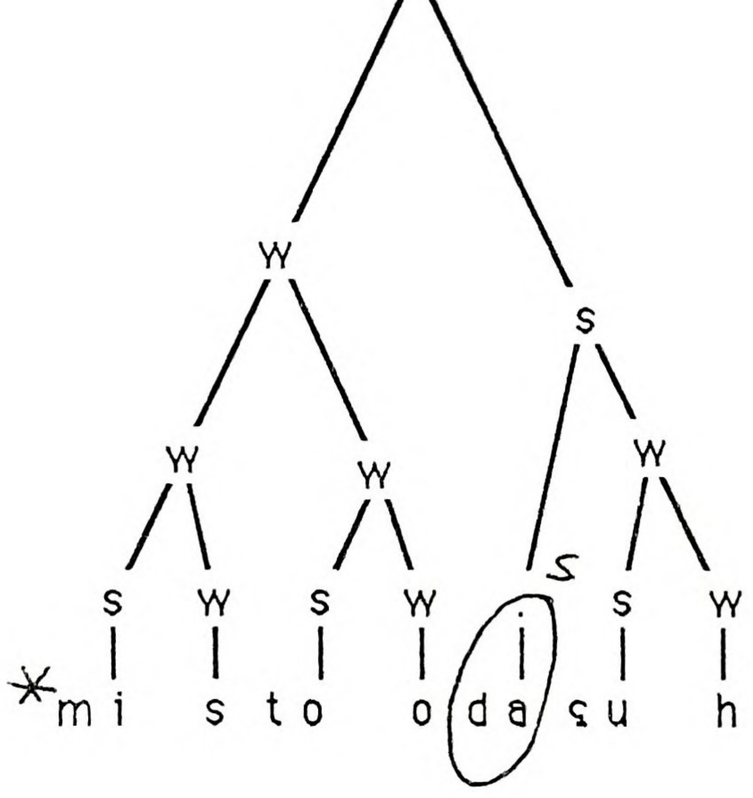
The correct stress assignment to these words is: *mízraʂah,* and *mistóodaʂuh.*

Under the assumptions of (18.a-ii, b-i, c-i), construction of the metrical trees in (36.a,c) results in the wrong assignment of stress.

(36.a):



(36.b):

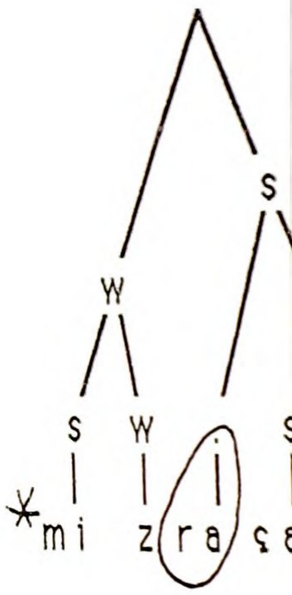


The correct stress assignment to these words is: *mízraʂah,* and *mistóodaʂuh.*

Construction of the metrical trees under the assumptions of (18.a-ii, b-i, c-ii), results in the correct assignment of stress. Thus, construction of the metrical trees under the assumptions of both (18.a-i, b-i, c-ii) and (18.a-ii, b-i, c-ii) result in the correct assignment of stress. This means the system is faulty; it still overgenerates.

Under the assumptions of (18.a-ii, b-ii, c-i), construction of the metrical trees in (37.a,c) results in the wrong assignment of stress.

(37.a):



The correct stress

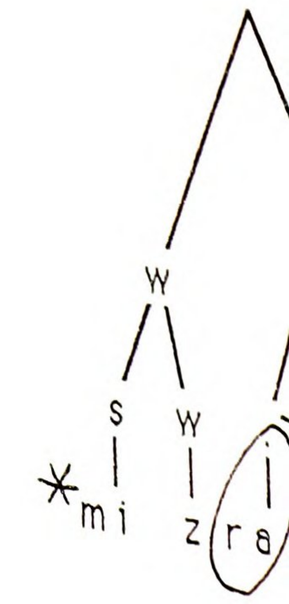
mistóodaʂuh.

Under the assumpt

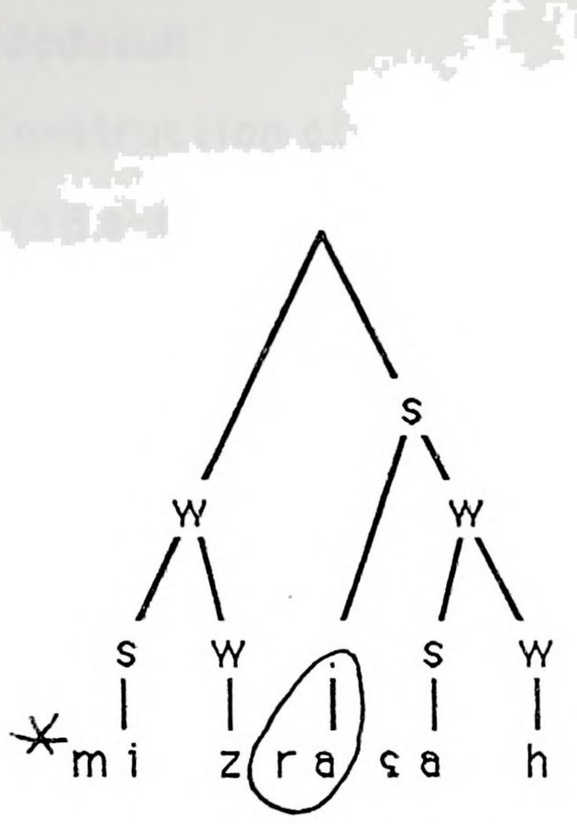
the metrical trees in

stress.

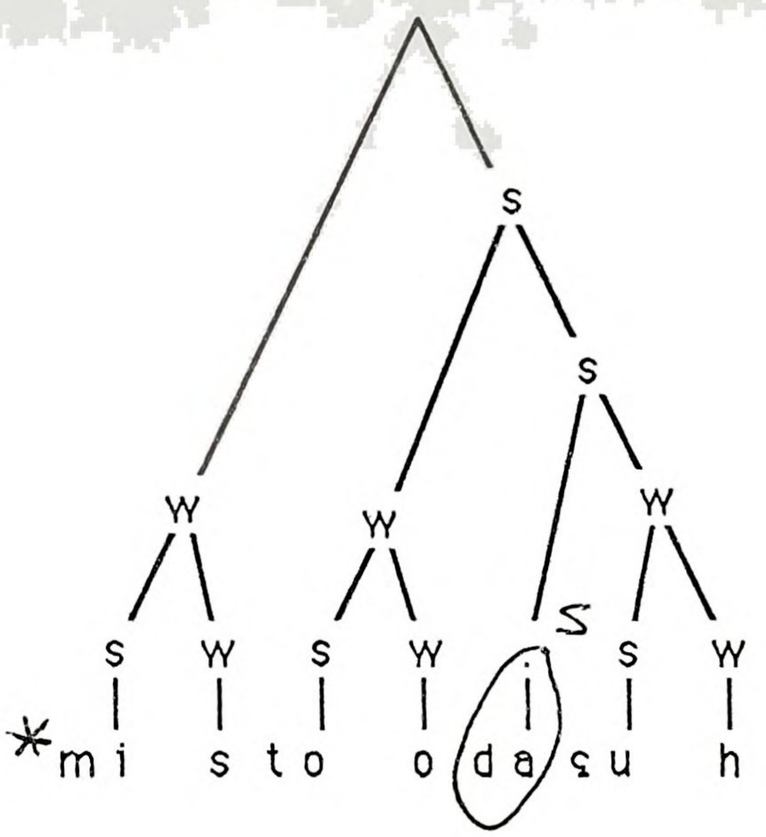
(38.a):



(37.a):



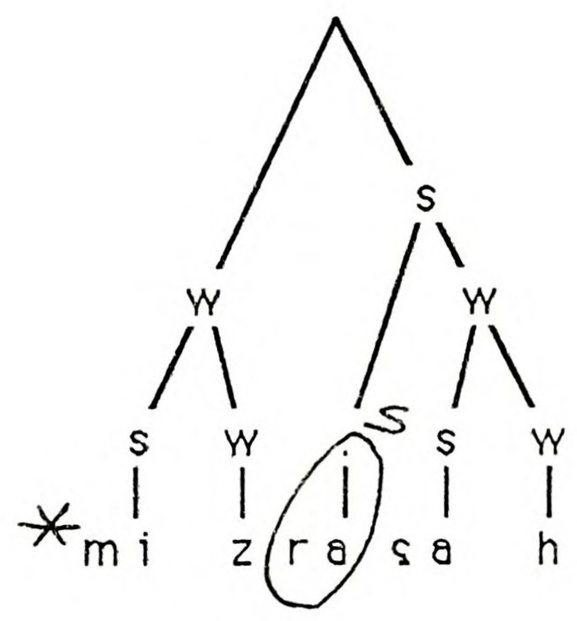
(37.c)



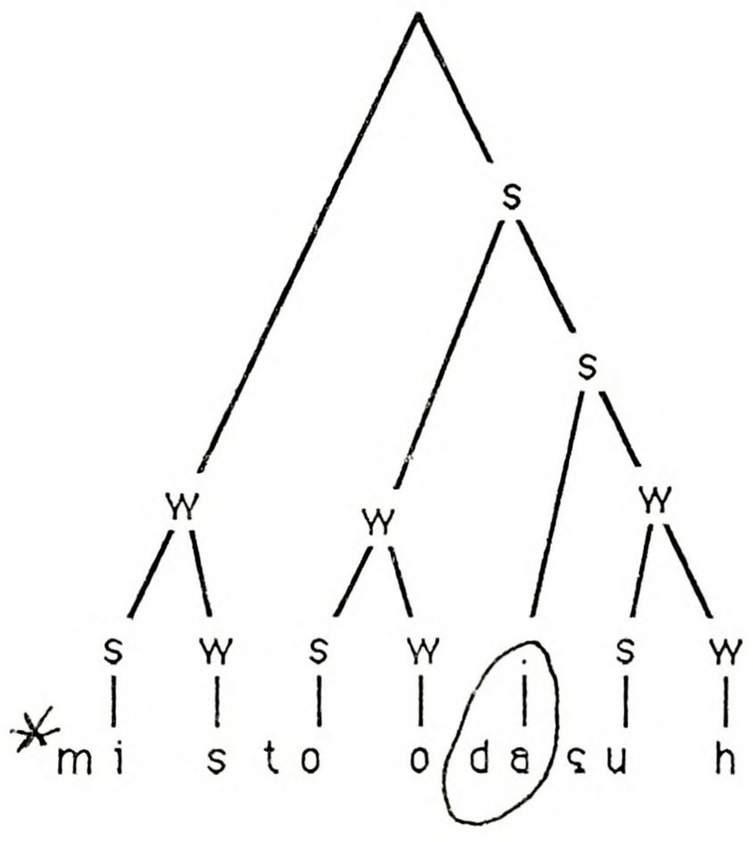
The correct stress assignment to these words is: *mízraʕah,* and *mistóodaʕuh.*

Under the assumptions of (18.a-ii, b-ii, c-ii), construction of the metrical trees in (38.a, c) results in the wrong assignment of stress.

(38.a):



(38.c):



The correct stress a

mistóodaʂuh.

Construction of the

both (18.a-i, b-i, c-ii) a

assignment of stress. T

overgenerates. Accordi

Hayes' model and stres

Now, we consider t

the parameters in (28

variations in (28) yie

(2x2x1=4). Construct

assumptions of all of

assignment. Again, t

overgenerates. All o

possible choices of t

correct prediction.

foot assignment nor

the correct predicti

to direction of foot

equivalently. That

insignificant for JA

The assumptio

(does not count in

assigned to the pe

antepenultimate i

The correct stress assignment to these words is: *mízraʂah,* and *mistóodaʂuh.*

Construction of the metrical trees under the assumptions of both (18.a-i, b-i, c-ii) and (18.a-ii, b-i, c-ii) result in the correct assignment of stress. This means the system is faulty; it still overgenerates. Accordingly, it has to be modified.

Hayes' model and stress assignment in JA (non-linear approach):

Now, we consider the assignment of stress in accordance with the parameters in (28). Here the possible choices of the parametric variations in (28) yield four different metrical trees for each word (2x2x1=4). Construction of the metrical trees under the assumptions of all of these choices results in the correct stress assignment. Again, this shows that the system is faulty; it still overgenerates. All of the possible choices work. We see that all the possible choices of the parametric variations in (28) yield the correct prediction. This gives evidence that neither the direction of foot assignment nor that of tree branching play any role in getting the correct prediction. That is, the parametric variations in respect to direction of foot assignment and tree branching apply equivalently. That is, distinctions within these parameters is insignificant for JA.

The assumption that the ultimate syllable is extrametrical (does not count in stress assignment) means that stress has to be assigned to the penultimate if it is a heavy syllable or to the antepenultimate if it is heavy. If both the penultimate and the

antepenultimate are ligh

left branch of which is t

will arise if both the an

are light; the rhyme of e

the right branch of whic

stress will be incorrect

JA does not have light s

problem will not arise.

have a sequence of mor

as *ka.tá.ba.ka* "(he) w

that binary feet are as

right to the left.

3.2.6. Superheavy Syll

McCarthy (1979b:

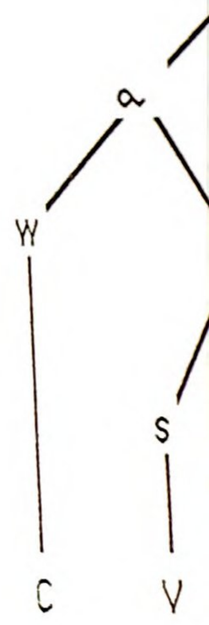
in (39).

antepenultimate are light, they will be assigned a binary foot the left branch of which is to be labelled "strong". However, a problem will arise if both the antepenultimate and the preantepenultimate are light; the rhyme of each syllable will be assigned a binary foot the right branch of which has to be labeled "strong'. Accordingly, stress will be incorrectly assigned to the preantepenultimate. But JA does not have light syllables in these positions. Thus this problem will not arise. This problem arises in MSA where you can have a sequence of more than two light syllables. MSA words such as *ka.tá.ba.ka* "(he) wrote you" raise a problem unless we stipulate that binary feet are assigned over pairs of light syllables from the right to the left.

3.2.6. Superheavy Syllables and Stress Assignment:

McCarthy (1979b: 11) assigns superheavy syllables the structure in (39).

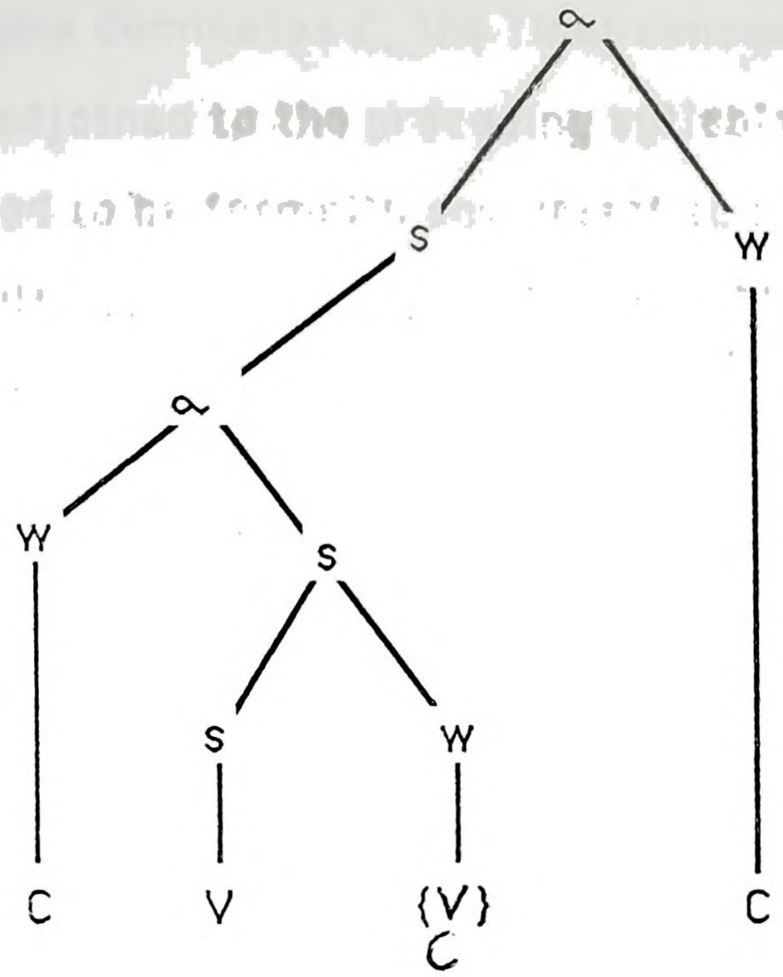
(39):



In (39), the final
preceding syllable w
heavy syllable struct
syllable,

presents its
phenomena l
superordinar
out to have
accentual pr
in "(39)" yie
of σ, with
non-branch

(39):



In (39), the final consonant is Chomsky-adjoined to the preceding syllable with the indicated structure which represents a heavy syllable structure. McCarthy claims that a superheavy syllable,

> presents itself as to surface representation and phenomena like meter as a single syllable, the superordinant σ in "(39)" and this property turns out to have no little significance in the operation of accentual processes... Specifically, the two σ-nodes in "(39)" yield two rhymes, if defined as the right branch of σ, with the first rhyme branching and the second non-branching(McCarthy, 1979b:11).

The first branching rhy
second rhyme dominates
Chomsky-adjoined to th
are assumed to be form
and light ultimas (McCa
superheavy syllable is
the penultimate "stron

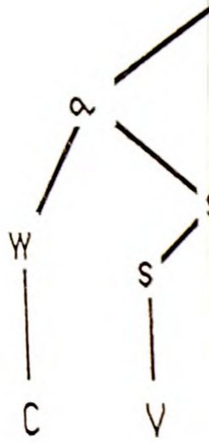
This assumption ma
superheavy syllables a
into the analysis of a
syllables appear both
not analyze the struc
Nor did he analyze CV
probably other Arabic
super-superheavy so

In line with McCarth
word-finally, we mi
have a triple rhyme.
application of Chom
also have to assume
syllables is Chomsk
which the precedin
preceding heavy sy

The first branching rhyme in (39) dominates VV or VC and the second rhyme dominates C, the final consonant which is Chomsky-adjoined to the preceding syllable. Superheavy syllables are assumed to be formally equivalent to words with heavy penults and light ultimas (McCarthy, 1979b: 59). The ultimate rhyme of the superheavy syllable is labeled "weak" since it is non-branching and the penultimate "strong" since it is branching.

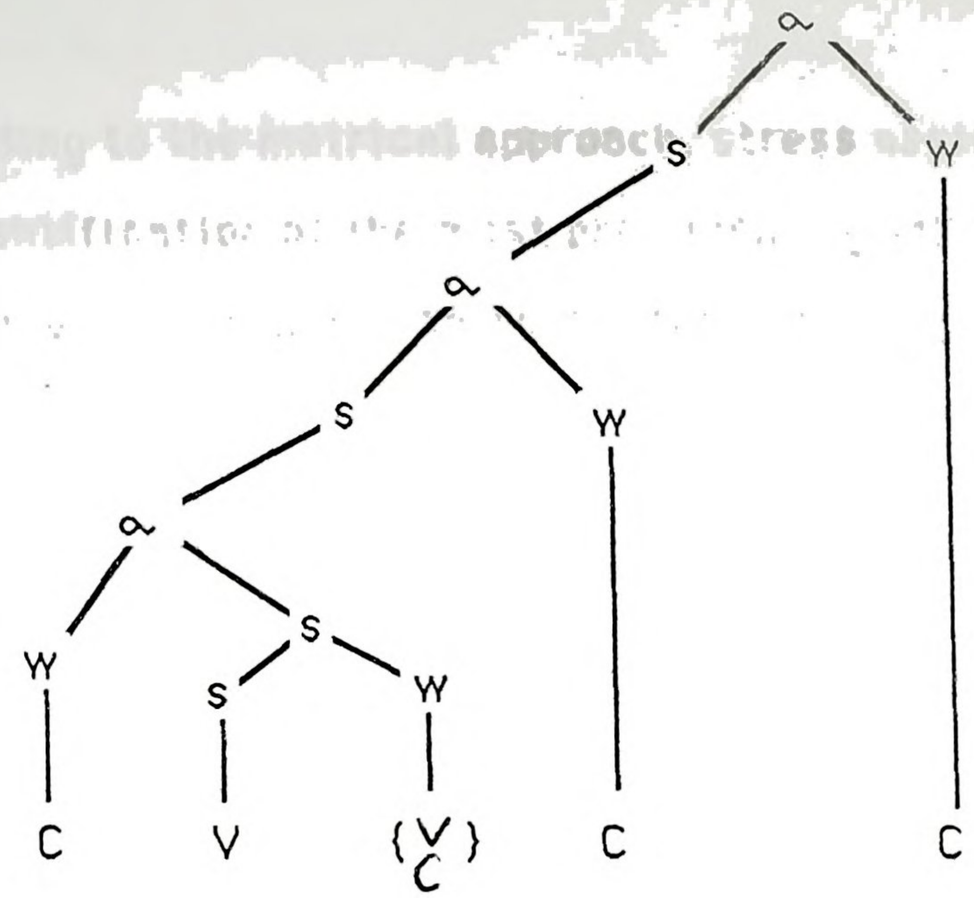
This assumption may fit into the analysis of MSA where superheavy syllables appear only word-finally. But it does not fit into the analysis of a language such as JA where superheavy syllables appear both word-finally and word-medially. McCarthy did not analyze the structure of superheavy syllables word-medially. Nor did he analyze CVVCC syllable structures which appear in JA and probably other Arabic dialects. We might call this type of syllable super-superheavy so as to distinguish it from superheavy syllables. In line with McCarthy's analysis of superheavy syllables word-finally, we might assume that super-superheavy syllables have a triple rhyme. Under this assumption we have to extend the application of Chomsky-adjunction to word-medial positions. We also have to assume that the final segment in super-superheavy syllables is Chomsky-adjoined to a preceding superheavy syllable in which the preceding consonant is also Chomsky-adjoined to the preceding heavy syllable. This is illustrated in (40).

(40):



In (40), under the
superheavy syllables
segments in a super-
establish a binary fo
then we will have to
syllable structure ir
binary foot. In this
syllable which is a
phonology where st
syllables, not parts
assumption that th
presents itself as
the STGP model.

(40):



In (40), under the assumption that the ultimate segment in superheavy syllables functions as a light syllable, the ultimate two segments in a super-superheavy syllable could be paired togather to establish a binary foot. If this type of analysis is to be accepted, then we will have to assign the last two segments of the CVVCC syllable structure in the JA word *jaarr.hum* "(he) dragging them" a binary foot. In this case, stress will be assigned to part of the syllable which is a violation of the basic principles of metrical phonology where stress is viewed as a relation of prominence among syllables, not parts of syllables. This also contradicts McCarthy's assumption that the janus-like character of superheavy syllables presents itself as a single syllable. None of this is a problem with the STGP model.

3.3.1. Evaluation of the

According to the me

on the identification of

evaluation of the metr

according to which the

the capacity of the me

on the other.

The principles on t

include the projectio

direction of branchin

and the principle of e

The rhyme projec

rhymes of the syllab

structures and boun

not provide us with

us with some syllab

syllabification. Th

of a language whic

onset, and which m

syllable coda. The

constitute the syl

syllable structure

with tree structu

which the ultima

dominating the p

show up word-m

3.3.1. Evaluation of the metrical approach to stress:

According to the metrical approach, stress assignment is based on the identification of the most prominent syllable. In our evaluation of the metrical approach, we will examine the principles according to which the metrical trees are built, on the one hand, and the capacity of the metrical model to make the correct predictions, on the other.

The principles on the basis of which the metrical trees are built include the projection principle, the assignment of feet, the direction of branching at both foot and tree superstructure levels, and the principle of extrametricality.

The rhyme projection principle involves the recognition of the rhymes of the syllables in a word. This implies that the syllable structures and boundaries are already identified. But McCarthy did not provide us with syllable boundary rules. However, he provided us with some syllable tree structures which he considers rules of syllabification. These syllable tree structures fit into the analysis of a language which has one consonantal segment as a syllable onset, and which might have one consonantal or vocalic segment as a syllable coda. The coda and the preceding vocalic segment constitute the syllable rhyme. These analyses account for the syllable structures CV, CVV, and CVC. McCarthy also provided us with tree structures for CVVC and CVCC syllables word-finally in which the ultimate segment is Chomsky-adjoined to the node dominating the preceding syllable. CVVC, CVCC, and CVVCC, which show up word-medially in JA, are not accounted for. Thus we

cannot tell whether the
clusters as in the JA w
preceding or following
structures are illustra
structures are illustra
not know whether the
word-medially or not.
where the syllable str
explicitly identified,
rhymes.

Now we examine t
The assignment of fe
the size of the foot,
direction of foot ass
variations involve s
should not find in a
assigned from the l
or left. On the othe
type of foot which
-tail]. There is als
[+head, +tail] binar

In building the
assumed that the
McCarthy did not p
example, relate th
foot assignment c
determine the co

cannot tell whether the ultimate consonantal segment in CVVCC clusters as in the JA word *jaarr.hum,* syllabifies with the preceding or following vocalic segment. These types of syllable structures are illustrated in (39) and (40). CVVC and CVCC syllable structures are illustrated in (39), and CVVCC in (40). We also do not know whether the principle of Chomsky-adjunction applies word-medially or not. Following his procedures, in the contexts where the syllable structures or the syllable boundaries are not explicitly identified, we will be unable to predict the syllable rhymes.

Now we examine the assumptions related to foot assignment. The assignment of feet may involve several parametric variations: the size of the foot, the kind of head or tail it may have, the direction of foot assignment, and the direction of branching. These variations involve some redundancies and arbitrariness which we should not find in a good model. It is arbitrary that feet are assigned from the left or the right, or that they branch to the right or left. On the other hand, it is redundant to postulate a ternary type of foot which is identical with a binary foot which is [+head, -tail]. There is also a kind of redundancy between identifying a [+head, +tail] binary foot and a pair of consequtive binary feet.

In building the metrical tree superstructure, it is arbitrarily assumed that the trees branch either to the left or to the right. McCarthy did not provide us with a principle which might, for example, relate the direction of tree branching to the direction of foot assignment or foot branching. Such a principle would determine the correct parametric choices on the basis of which the

metrical trees are built.

Now we examine the

McCarthy's model, the u

assumed to function as

branching rhyme. McCa

syllables function as li

functions as a light syl

will be capable of mak

syllable. But if it func

then it will not pair w

binary foot. These two

building of two differ

of stress to two diffe

assumed to have doub

penultimate is heavy

consideration that s

The fact that Mc

variations means th

process. As I showe

principle have to be

parametric choices

model lacks a princ

appropriate parame

the metrical trees

Added to the p

fails to make the

illustrated by our

metrical trees are built.

Now we examine the analysis of the ultimate syllables. In McCarthy's model, the ultimate heavy syllable is arbitrarily assumed to function as a light syllable even though it has a branching rhyme. McCarthy did not specify the level at which heavy syllables function as light ones. If the ultimate heavy syllable functions as a light syllable at the foot assignment level, then it will be capable of making a binary foot with the preceding light syllable. But if it functions as a light syllable at the labeling level, then it will not pair with the preceding light syllable to make a binary foot. These two possible interpretations will result in the building of two different metrical trees, and finally the assignment of stress to two different positions. Superheavy syllables are assumed to have double rhymes: the ultimate is light and the penultimate is heavy. Furthermore these analyses fail to take into consideration that superheavy syllables show up word-medially.

The fact that McCarthy's model allows too many parametric variations means that the building of metrical trees is not a simple process. As I showed above, many attempts which lack a guiding principle have to be made in order to identify the appropriate parametric choices which yield the correct prediction. McCarthy's model lacks a principle on the basis if which we can choose the appropriate parameters when approaching the process of building the metrical trees.

Added to the problems we have pointed out, McCarthy's model fails to make the correct prediction in the analysis of MSA. This is illustrated by our analysis of the MSA data in (17) above. However,

it is possible to modify
principle of extrametri
assumption, McCarthy's
illustrated in (40-43).
against the principle o
underlying motivation
to the application of i

The variation in t
illustrated by applyin
Arabic. In Cairene Ar
appliction of the prin
make it possible to a
which, according to M
the rhyme of the ulti
problem arises in th
dialect spoken in Jo
penultimate of word
sinksárat "she got
the principle of ext
contrary to the fact
"sea" is assigned s
other Arabic variet
extrametrical; oth
correct prediction

To sum up, the
variations which
observational ade

it is possible to modify McCarthy's model by introducing into it the principle of extrametricality (Hayes,1982; 1985). Under this assumption, McCarthy's model yields the correct prediction as illustrated in (40-43). However, some arguments can be raised against the principle of extrametricality. The first relates to the underlying motivation for this principle, and the second one relates to the application of it to more than one variety of Arabic.

The variation in the application of this principle can be illustrated by applying it to a number of closely related varieties of Arabic. In Cairene Arabic, the principle does not apply. The appliction of the principle to words such as *ʔadwiyatúhu* will not make it possible to assign stress correctly to the penultimate which, according to McCarthy's analysis, forms a binary foot with the rhyme of the ultimate syllable (McCarthy, 1979b: 58). The same problem arises in the analysis of Bani Hasan Arabic, a Bedouin dialect spoken in Jordan. In this dialect, stress is assigned to the penultimate of words such as *msikátək* "she grabbed you", and *ʕinksárət* "she got broken" (Irshid, 1984: 41, 80). In Libyan Arabic, the principle of extrametricality cannot apply; its application is contrary to the fact that the ultimate in *ḍaráb* "he hit" and *baħár* "sea" is assigned stress (Abumdas, 1985: 99). In MSA, unlike the other Arabic varieties, the ultimate heavy syllable has to be extrametrical; otherwise McCarthy's model will fail to yield the correct prediction.

To sum up, the metrical model allows many parametric variations which are selected for the purpose of achieving observational adeqacy. The model lacks a general principle on the

basis of which we can
building the metrical t
be modified.

3.3.2. Evaluation of th

In the linear appro
assignment is based
the type of clusters
data has shown that
framework of the ST
the identification of

basis of which we can make the appropriate parametric choices for building the metrical trees. Accordingly, the metrical model has to be modified.

3.3.2. Evaluation of the linear approach to stress assignment:

In the linear approach which is based on the STGP, stress assignment is based on one guiding principle: the identification of the type of clusters in the word. The analysis of the JA and MSA data has shown that stress can be accounted for within the framework of the STGP on the basis of explicitly defined principles; the identification of weak and strong clusters.

In this chapter, the
phonological status of
of two consonants wo
consonants word-med
first hypothesis is th
second hypothesis is
first hypothesis is ev
involves the postulat
involves the analysis
with that of the oth
hypothesis is based
that it is contrastiv

The chapter is d
we present and ana
vowel in question i
alternation of the
of the vowel in res
low vowel [a]. In t
account for the pr
This includes a ru
In the third secti
structures of JA

Chapter 4

Alternating High Vowels

In this chapter, the main objective is the identification of the phonological status of the high vowel which shows up in the context of two consonants word-finally or word-initially, and three consonants word-medially in JA. We consider two hypotheses. The first hypothesis is that the vowel in question is epenthetic. The second hypothesis is that it is underlying. The argument for the first hypothesis is evidence that the vowel is predictable. This involves the postulation of rules which predict the vowel. It also involves the analysis of the behavior of the vowel in comparison with that of the other vowels. The argument for the second hypothesis is based on evidence that the vowel is unpredictable, and that it is contrastive.

The chapter is divided into seven sections. In the first section, we present and analyze some evidence which argue that the high vowel in question is epenthetic. This includes an analysis of the alternation of the vowel with zero, and an analysis of the behaviour of the vowel in respect to stress assignment in comparison with the low vowel [a]. In the second section, we postulate some rules to account for the presence and absence of the alternating high vowels. This includes a rule of epenthesis and a rule of high vowel deletion. In the third section, we analyze some aspects of the phonetic structures of JA and MSA. The analysis involves the identification

of the permissible cons

permissible consonant

scale of sonority. Here

phonotactic constraint

peaks of sonority. In t

Sonority Principle (PS

unpermissible consona

applies to break conso

fifth section consider

preceding high vowel.

account for the showi

vowel is a copy of th

analyzes the vowel i

argue that the qualit

context. Some rules

the vowel as either

findings of the chap

of the relation betw

application of these

of data. In the appl

Inclusion Preceden

specific constrain

the failure of the

of the permissible consonant clusters in both varieties. The permissible consonant clusters are discussed in reference to the scale of sonority. Here, we argue that epenthesis applies to satisfy phonotactic constraints which relate to the types of permissible peaks of sonority. In the fourth section, we introduce the Peak of Sonority Principle (PSP), which is postulated to account for the unpermissible consonant-clusters. Here, we argue that epenthesis applies to break consonant-clusters which violate the PSP. The fifth section considers the vowel in question in the context of a preceding high vowel. A rule of epenthesis will be postulated to account for the showing up of the vowel in the form of [u]. Here, the vowel is a copy of the preceding high vowel. The sixth section analyzes the vowel in the context of a preceding low vowel. Here, I argue that the quality of the vowel is determined by the consonantal context. Some rules are postulated to account for the appearance of the vowel as either [i] or [u]. In the seventh section, the main findings of the chapter are summarized. This involves consideration of the relation between the different rules of epenthesis and the application of these rules in the derivation of an illustrative sample of data. In the application of the rules, the principle of Proper Inclusion Precedence is invoked. We also consider some language specific constraints. This includes a constraint which accounts for the failure of the vowel in question to be assigned stress.

4.1. Evidence for epenth

Evidence for epenth
vowel in question in di
the other vowels. This
failure to be assigned

4.1.1. Vowel-initial su

In this section, w
question in the contex
that of low vowels ir
(1.A-B).

(1.A): náfiʕ "benefit"
nábiʕ "spring"
kásim "shape"
sábiʕ "lion"

(1.B): ʕáṭaš "thirst
gálam "penci
bálad "count
wárag "pape

In (1.A), the hi
vowel-initial suf
In (2.A-B), we

4.1. Evidence for epenthesis:

Evidence for epenthesis is based on the behaviour of the high vowel in question in different contexts in comparison with that of the other vowels. This includes its alternation with zero and failure to be assigned stress.

4.1.1. Vowel-initial suffixes:

In this section, we consider the behaviour of the high vowel in question in the context of a vowel-initial suffix in comparison with that of low vowels in similar contexts. Consider the JA data in (1.A-B).

(1.A):	náfiʕ "benefit"	náfʕ-ak "your benefit"
	nábiʕ "spring"	nábʕ-ak "your spring"
	kásim "shape"	kásm-ak "your shape"
	sábiʕ "lion"	sábʕ-ak "your lion"
(1.B):	ʕáṭaš "thirst"	ʕáṭaš-ak "your thirst"
	gálam "pencil"	gálam-ak "your pencil"
	bálad "country"	bálad-ak "your country"
	wárag "paper"	wárag-ak "your paper"

In (1.A), the high vowel alternates with zero in the context of a vowel-initial suffix. But in (1.B), the low vowel does not.

In (2.A-B), we consider the behavior of the high vowel in nouns

and verbs. Consider the

(2.A): náfiʂ "benefit"
nábiʂ "spring"
kásim "shape"
sábiʂ "lion"

(2.B): ʂírif "he knew"
símiʂ "he heard
šírib "he drank
kírih "he hated

In (2.A-B) the high vo
zero in the context o

The analyses of t
high vowels in nouns
alternate with zero
analyses of the data
vowel in nouns is s
vowel in both verbs
a vowel-initial suff

4.1.2. Stress in nou

In this section
of the high vowel
suffix in compari

and verbs. Consider the JA data in (2.A-B).

(2.A):	náfiʂ "benefit"	náfʂ-ak "your benefit"
	nábiʂ "spring"	nábʂ-ak "toyr spring"
	kásim "shape"	kásm-ak "your shape"
	sábiʂ "lion"	sábʂ-ak "your lion"

(2.B):	ʂírif "he knew"	ʂírf-ak "he knew you"
	símiʂ "he heard"	símʂ-ak "he heard you"
	šírib "he drank"	šírb-ak "he drank you"
	kírih "he hated"	kírh-ak "he hated you"

In (2.A-B) the high vowel in both nouns and verbs alternates with zero in the context of a vowel-initial suffix.

The analyses of the data in (1.A-B) argue that the behavior of high vowels in nouns contrasts with that of low vowels; high vowels alternate with zero while low vowels do not. On the other hand, the analyses of the data in (2.A-B) argue that the behavior of the high vowel in nouns is similar to that of high vowels in verbs; the high vowel in both verbs and nouns alternates with zero in the context of a vowel-initial suffix.

4.1.2. Stress in nouns and verbs:

In this section, we consider with regard to stress the behaviour of the high vowel in nouns in the context of a consonant-initial suffix in comparison with the high vowel in verbs in similar

contexts. Consider the

(3.A): náfiʕ-hum "thei

nábiʕ-hum "thei

kásim-hum "the

sábiʕ-hum "thei

(3.B): ʕiríf-hum "he k

simíʕ-hum "he

širíb-hum "he

kiríh-hum "he

The data in (3.A)
contrasts with that
(3.B). In (3.A), the v
contrary to the prec
to the right-most v
(3.B), the correspon
rules predict.

4.1.3. Alternating

In this section
the context of a p
data in (4.A,B).

(4.A): čálib~čálb

contexts. Consider the JA data in (3.A-B).

(3.A): náfiʕ-hum "their benefit"
nábiʕ-hum "their spring"
kásim-hum "their shape"
sábiʕ-hum "their lion"

(3.B): ʕiríf-hum "he knew them"
simíʕ-hum "he heard them"
širíb-hum "he drank them"
kiríh-hum "he hated them"

The data in (3.A) show that the high vowel in question in nouns contrasts with that of the corresponding high vowel in verbs as in (3.B). In (3.A), the vowel fails to be assigned stress, which is contrary to the prediction of the stress rules, which assign stress to the right-most vowel followed by a consonant cluster. But in (3.B), the corresponding high vowel is assigned stress as the stress rules predict.

4.1.3. Alternating high vowels preceding or following a sonorant:

In this section, we consider the behaviour of the high vowel in the context of a preceding or following sonorant. Consider the JA data in (4.A,B).

(4.A): čálib~čálb "dog"

ʕáriš~ʕárš "crown

xálif~xálf "behind

ʕílim~ʕílm "know

(4.B): ħábil~*ħábl "rop

ǰáhil~*ǰáhl "igno

ṣáħin~*ṣáħn "pl

fíkir~*fíkr "tho

The alternation of
alternation in (4.B) ca
sonority. On the basi
Vennemann 1972; Ho
proposed the scale o

(5): Sounds

low vowels

mid vowels

high vowels

flaps

laterals

nasals

voiced frica

voiceless fr

voiced stop

voiceless s

ʕáriš~ʕárš "crown"

xálif~xálf "behind"

ʕílim~ʕílm "knowldge"

(4.B): ħábil~*ħábl "rope"

ǰáhil~*ǰáhl "ignorance"

ṣáħin~*ṣáħn "plate"

fíkir~*fíkr "thought"

The alternation of the high vowel in (4.A) and the absence of the alternation in (4.B) can be explained in reference to the scale of sonority. On the basis of earlier studies (Saussure 1966: 44-62; Vennemann 1972; Hooper 1976: 203), Hogg and McCully (1987: 33) proposed the scale of sonority provided in (5).

(5):

Sounds	Sonority values	Examples
low vowels	10	/a/
mid vowels	9	/e/, /o/
high vowels	8	/i/, /u/
flaps	7	/r/
laterals	6	/l/
nasals	5	/n/
voiced fricatives	4	/ð/
voiceless fricatives	3	/θ/
voiced stop	2	/d/
voiceless stop	1	/t/

In (5), vowels and
between 10 for the mo
vowels are assigned th
lowest value. In this
either b, š, f, or m is
following consonant v
preceding one which i

The scale of sono
languages. There may
languages (Vennemar
voiceless fricatives
are stronger than fri
higher on the scale o
scale of sonority in
scale provided by Ho

The JA data in (
sonority in (5). In (
sonorant is higher
which is an obstru
alternates with ze
an obstruent is lo
consonant which i
does not alternate

Consider now

(6.A): basiθ~basθ

ħadif~ħadf

in (5), vowels and consonants are given values which range between 10 for the most sonorous and 1 for the least sonorous. Low vowels are assigned the highest value and voiceless stops the lowest value. In this scale, the final consonant in (4.A) which is either b, š, f, or m is less sonorous than l, or r. But in (4.B), the following consonant which is either l, n, or r is higher than the preceding one which is either b, h, ħ, or k.

The scale of sonority in (5) does not necessarily apply to all languages. There may exist considerable differences among languages (Vennemann, 1988: 9). Hooper (1976: 302) argues that voiceless fricatives are stronger than voiced fricatives and stops are stronger than fricatives. But in (5), voiced fricatives rank higher on the scale of sonority than voiced stops. Accordingly, the scale of sonority in JA may be different from the scale in (5) or the scale provided by Hooper.

The JA data in (4.A-B) support the predictions of the scale of sonority in (5). In (4.A), the preceding consonant which is a sonorant is higher on the scale of sonority than the following one which is an obstruent. Accordingly, the high front vowel freely alternates with zero. But in (4.B), the preceding consonant which is an obstruent is lower on the scale of sonority than the following consonant which is a sonorant. Accordingly, the high front vowel does not alternate with zero.

Consider now data of (6.A-F).

(6.A): basiθ~basθ "resurrection"

ħaðif~ħaðf "deletion"

(6.C): šəɛiɓ~šəɛɔb "pe

xəziɣ~xəzg "pu

nəbit~nəbt "

səbuk~səbk

šəbuk~šəbk

(6.D): nəbiɛ~*nəbɛ "

nəgiz~*nəgz

ləδiɣ~*ləδ "

nəbiδ~*nəbδ

(6.E): šəbit~šəbt "

nəsiš~nəsš "co

dəsič~dəsč "wri

(6.B): ləsiɛ~*ləsɛ "sti

nəfiɛ~*nəfɛ "se

wəxiz~*wəxz "

nəsiǰ~nəsǰ "we

(6.F): nətiɣ~*nətg

ɛətiɣ~*ɛətg

səkuɓ~*səkɓ

šətuɓ~*šətɓ

naʕiš~naʕš "coffin"

daʕič~daʕč "wrinkling"

(6.B): lasiʕ~*lasʕ "stinging"

nafiʕ~*nafʕ "self"

waxiz~*waxz "poking"

nasiǰ~nasǰ "weaving"

(6.C): šaʕib~šaʕb "people"

xazig~xazg "puncturing"

naǰid~našd "name of an are in Arabia"

waʕid~waʕd "promise"

(6.D): nabiʕ~*nabʕ "spring"

nagiz~*nagz "jumping"

ladiǒ~*ladǒ "biting"

nabiǒ~*nabǒ "abandoning"

(6.E): šabit~šabt "falling in a trance"

nabit~nabt "fully loaded"

sabuk~sabk "a method of treating iron"

šabuk~šabk "entangling"

(6.F): natig~*natg "vomitting"

ʕatig~*ʕatg "setting someone free"

sakub~*sakb "raining heavily"

šaṭub~*šaṭb "crossing out"

In (6.A), the preceding
higher on the scale of s
voiceless fricative. A
alternates with zero.
a voiceless fricative i
following consonant v
high front vowel does
preceding consonant
scale of sonority tha
Accordingly, the high
in (6.D), the precedi
the scale of sonorit
fricative. Accordin
zero. In (6.E), the p
higher on the scale
voiceless stop. Ac
with zero. But in (
stop is lower on th
which is a voiced
alternate with ze

To sum up, t
sonority in (5) in
place when the p
consonant on the
vowel alternatio
is higher on the

In (6.A), the preceding consonant which is a voiced fricative is higher on the scale of sonority than the following one which is a voiceless fricative. Accordingly, the high front vowel freely alternates with zero. But in (6.B), the preceding consonant which is a voiceless fricative is lower on the scale of sonority than the following consonant which is a voiced fricative. Accordingly, the high front vowel does not alternate with zero. In (6.C), the preceding consonant which is a voiced fricative is higher on the scale of sonority than the following one which is a voiced stop. Accordingly, the high front vowel freely alternates with zero. But in (6.D), the preceding consonant which is a voiced stop is lower on the scale of sonority than the following consonant which is a voiced fricative. Accordingly, the high front vowel does not alternate with zero. In (6.E), the preceding consonant which is a voiced stop is higher on the scale of sonority than the following one which is a voiceless stop. Accordingly, the high front vowel freely alternates with zero. But in (6.F), the preceding consonant which is a voiceless stop is lower on the scale of sonority than the following consonant which is a voiced stop. Accordingly, the high front vowel does not alternate with zero.

To sum up, the JA data in (4.A-B) and (6.A-F) are explained by sonority in (5) in the sense that in the data the alternation takes place when the preceding consonant is higher than the following consonant on the scale of sonority. The data also show that high vowel alternation does not take place when the following consonant is higher on the scale of sonority than the preceding one.

4.1.4. Concluding rema

The analyses of th
vowels contrast with
zero while some high
vowel-insertion suff
verbs (see (2)). With
contrast appears: in
does not receive str
Postponing further c
consider phonologic
to the scale of sono
preceded by a conso
consonant.

We will below
epenthetic while t
high front vowel o
epenthesis, and th
rules of deletion.
mainly concerned
first type.

4.2.1. Rules of ep

To account f
postulate rule (7

4.1.4. Concluding remarks:

The analyses of the data in (1-4) and (6) indicate that high vowels contrast with low vowels; low vowels do not alternate with zero while some high vowels in some contexts do (see (1)). With vowel-insertion suffixes this vowel alternates in both nouns and verbs (see (2)). With consonant-initial suffixes, however, a contrast appears: in nouns the vowel in the alternating contexts does not receive stress, whereas in verbs it does (see (3)). Postponing further discussion of the contrast of nouns and verbs, we consider phonological environments of alternation with reference to the scale of sonority of (5). Zero appears for the high vowel when preceded by a consonant lower in sonority than the following consonant.

We will below argue that the alternating high vowel of nouns is epenthetic while that of verbs is underlying. The appearance of the high front vowel of the first type has to be accounted for by rules of epenthesis, and the absence of the high vowel of the second type by rules of deletion. However, in our subsequent analyses, we will be mainly concerned with the appearance of the high vowels of the first type.

4.2.1. Rules of epenthesis:

To account for the alternating high vowels of the first type, we postulate rule (7) of epenthesis.

Rule (7):

Ø ---> V

[+high

[-back

In compliance wi

applies obligatorily i

is n, and that of the

applies in the contex

on the scale of sono

Rule (7) predicts th

of two consonants v

word-medially.

If it was possib

consonantal segme

rule (7').

Rule (7'):

Ø --->

[+

[-

However, som

epenthesis. The

vowel in the form

to this will be a

Rule (7):

$$\emptyset \text{ ---> } \begin{matrix} V \\ [+high] \\ [-back] \end{matrix} \; / \; C \_\_\_ C \; \{ \overset{C}{\#} \}$$

In compliance with the scale of sonority, rule (7) of epenthesis applies obligatorily if the sonority value of the preceding consonant is n, and that of the following consonant n+1. But it optionally applies in the contexts where the value of the preceding consonant on the scale of sonority is n and that of the following one is n-1. Rule (7) predicts the presence of a high front vowel in the context of two consonants word-finally and three consonants word-medially.

If it was possible that the word-final position functions as a consonantal segment, we could simplify rule (7) of epenthesis into rule (7').

Rule (7'):

$$\emptyset \text{ ---> } \begin{matrix} V \\ [+high] \\ [-back] \end{matrix} \; / \; C \_\_\_ C \; C$$

However, some questions can be raised against rule (7') of epenthesis. The rule does not account for the appearance of the vowel in the form of [u] in some contexts. Further evidence related to this will be analyzed in sections 6 and 7 in this chapter.

4.2.2. High vowel dele

To account for the

we postulate rule (8)

Rule (8):

V ---> Ø

[+high]

[-stress]

Rule (8) of high

vowels in the conte

is intrinsically ord

the stress rules. I

stress rules.

However, some

vowel deletion. R

some contexts. T

evidence to rule (

(9.A,B).

(9.A): zíhig "he g

fíhim "he

xísir "he

ʕírif "he k

ríbiħ "he

4.2.2. High vowel deletion:

To account for the absence of the high vowels of the second type, we postulate rule (8) of high vowel deletion.

Rule (8):

$$V \longrightarrow \emptyset \;/\; \_\_\_\; C\ V$$

[+high]

[-stress]

Rule (8) of high vowel deletion accounts for the absence of high vowels in the context of a vowel-initial suffix as in (1.C). Rule (7) is intrinsically ordered after the stress rule. That is, it is fed by the stress rules. It has the feature [-stress] which is fed by the stress rules.

However, some questions can be raised against rule (8) of high vowel deletion. Rule (8) of high vowel deletion fails to apply in some contexts. There are some data which are potential counter evidence to rule (8) of high vowel deletion. Consider the data in (9.A,B).

(9.A):	zíhig "he got bored"	zhíg-na "we got bored"
	fíhim "he understood"	fhím-na "we understood"
	xísir "he lost"	xsír-na "we lost"
	ʂírif "he knew"	ʂríf-na "we knew"
	ríbiħ "he won"	rbíħ-na "we won"

(9.B): ziʰig "he got bor

fiʰim "he unders

xisir "he lost"

ʂirif "he knew"

ribiɦ "he won"

In (9.A), the word

and the subject is no

marked for the first

applies to the words

unstressed high vow

words are transitiv

suffix -na. The sub

of rule (8) to the w

would result in for

corresponding intr

To account for

(9.B), we consider

the assumption th

Analysis within t

making some othe

the primary stres

and that later in

cyclic approach,

consists of the

second cycle wh

attached to it.

(9.B):	zíhig "he got bored"	zihíg-na "he got bored with us"
	fíhim "he understood"	fihím-na "he understood us"
	xísir "he lost"	xisír-na "he lost us"
	ʂírif "he knew"	ʂiríf-na "he knew us"
	ríbiħ "he won"	ribíħ-na "he won us over"

In (9.A), the words are intransitive verbs which take no object, and the subject is not marked for the third person singular. But it is marked for the first person plural by the suffix -na. Rule (8) applies to the words in the second column of (9.A), deleting the unstressed high vowel to yield the correct results . But in (9.B), the words are transitive verbs the subject of which is marked by the suffix -na. The subject, as in (9.A), is not marked. The application of rule (8) to the words in (9.B) would yield the wrong prediction; it would result in forms which are homophonous with the corresponding intransitive verbs.

To account for the failure of rule (8) to apply to the data in (9.B), we consider two approaches. The first approach is based on the assumption that phonological rules apply in a cyclic fashion. Analysis within the framework of this approach also involves making some other assumptions. This includes the assumption that the primary stress assigned on the first cycle becomes secondary and that later in the derivation it deletes (Alghazo: 22-3). In the cyclic approach, the rules first apply at the first cycle which consists of the verb and its subject prefix. Then rules apply at the second cycle which consists of the verb and the object suffixes attached to it. The second approach is based on the assumption that

some phonological rule

In his analysis of

(1987: 22-3) argues th

first cycle, he argues,

intransitive verb, ass

in *fíhim*. On the sec

stem and the object

penultimate vowel a

stresses are assigne

assumes, the stress

Then a rule of the f

(Alghazo, 1987: 22)

Rule (10):

`V ---> V

In (10), the syn

stress. Rule (10)

derived from a pr

In (11), we il

fhím-na "we und

understood us" w

some phonological rules are morphologically constrained.

In his analysis of JA and following Brame (1974), Alghazo (1987: 22-3) argues that rules apply in a cyclic fashion. On the first cycle, he argues, stress rules apply to the verb stem of the intransitive verb, assigning a primary stress to the first vowel as in *fíhim.* On the second cycle, stress rules re-apply to the verb stem and the object suffixes attached to it, assigning stress to the penultimate vowel as in *fíhímna.* In this way, two primary stresses are assigned to the stem of the verb. By convention, he assumes, the stress assigned on the first cycle becomes secondary. Then a rule of the form in (10) deletes the secondary stress (Alghazo, 1987: 22).

Rule (10):

$$\grave{V} \text{ ---> } V \;/\; \_\_\_\; C_0\; V'$$

In (10), the symbol [`] over the vowel stands for a secondary stress. Rule (10) deletes the secondary stress which has been derived from a primary stress by convention.

In (11), we illustrate the derivation of the intransitive verb *fhím-na* "we understand" and the transitive one *fihím-na* "he understood us" within the framework of the cyclic approach.

(11):

[fihim-na] "we unde

First Cycle	Second Cycle
fihím-na	---
fhím-na	---

	[fhím-na]

In (11), on firs
stress to the penu
which the suffix
stress to the pen
the subject is no
applies to the in
and yielding the
the second cycle
transitive form
assigning stres
a consonant clu

(11):

[fihim-na] "we understood" [[fihim]-na] "he understood us" UR

First Cycle

fihím-na	fíhim	Rule (15) in ch. 3: Stress
fhím-na	---	Rule (8): High vowel deletion

Second Cycle

---	fíhímna	Rule (15) in ch. 3: Stress
---	---	Rule (8): High vowel deletion
---	f`ihímna	By convention
---	fihímna	Rule (10): Secondary stress del.
[fhím-na]	[fihím-na]	PR

In (11), on first cycle, rule (15) of stress applies, assigning stress to the penultimate high vowel of the intransitive form in which the suffix -na is a subject marker. Rule (15) also assigns stress to the penultimate high vowel of the transitive verb in which the subject is not marked. Then rule (8) of high vowel deletion applies to the intransitive form, deleting the unstressed high vowel, and yielding the correct prediction, *fhím-na* "we understood". On the second cycle, rule (15) of stress assignment re-applies to the transitive form which has the suffix -na as an object marker, assigning stress to the penultimate high vowel which is followed by a consonant cluster. At this level, the transitive form is assigned

two primary stresse
penultimate on the f
the second cycle.

In the cyclic ap
deletion cannot appl
satisfied. Stress is
the the first cycle
way, the cyclic app
asssumptions are p
primary stress bec
secondary stress c
are ordered and ap
stress assigned to
secondary. Then r
yielding *fihím-n*
cannot apply. Rul
after rule (8) of
vowel deletion w
**fhím-na* "he u
intransitive form

The problem
that it resorts t
motivation of w
no independent
stress becomes
or that high vo
deletion.

two primary stresses. The first stress is assigned to the penultimate on the first cycle and the second to the penultimate on the second cycle.

In the cyclic approach, rule (8) of unstressed high vowel deletion cannot apply to the transitive form because its SD is not satisfied. Stress is assigned to first high vowel of the verb stem at the the first cycle and to the the second on the second cycle. In this way, the cyclic approach prevents homophony. Three arbitrary asssumptions are postulated. The first assumption is that a primary stress becomes secondary, the second one is that a secondary stress deletes by convention, and the third is that rules are ordered and apply only once per cycle. Accordingly, the primary stress assigned to the penultimate vowel on the first cycle becomes secondary. Then rule (10) of secondary stress deletion applies, yielding *fihím-na* "he understood us", to which high vowel deletion cannot apply. Rule (10) of secondary stress deletion must apply after rule (8) of high vowel deletion. Othersise, rule (8) of high vowel deletion will delete the unstressed high vowel, yielding **fhím-na* "he understood us" which is homophonous with the intransitive form *fhím-na* "we undersood".

The problem with this type of analysis as provided in (11) is that it resorts to three strictly analytic, arbitrary assumptions the motivation of which is achieving observational adequacy. We have no independent evidence to support the assumption that a primary stress becomes secondary and then deletes later in the derivation, or that high vowel deletion necessarily precedes secondary stress deletion.

An alternative ap

that rule (8) of high

form because it is m

transitive verbs. Th

to maintain contrast

Accordingly, we pos

applying to transiti

Rule (12):

V ---> V

[+high]

[-stress]

In (12), "Vt" st

effect of preventi

applies to intrans

yielding *fhím-na*

"he understood us

conditioned takes

(12) maintains th

and *fhím-na* "

without resortin

this approach, it

constraint appli

transitive verbs

morphological c

corresponding i

An alternative approach to the vowel is based on the hypothesis that rule (8) of high vowel deletion does not apply to the transitive form because it is morphologically constrained from applying to transitive verbs. The motivation for the morphological constraint is to maintain contrast between the transitive and intransitive forms. Accordingly, we postulate rule (12), which constrains rule (8) from applying to transitive verb stems which have high vowels.

Rule (12):

$$V \longrightarrow V \;/\; \underset{[+high]}{\underline{\quad}}\; C \;\; V \;\; C\,]_{Vt} \quad [+high],\ [-stress]$$

In (12), "Vt" stands for transitive verbs. Rule (12) has the effect of preventing homophony. Rule (8) of high vowel deletion applies to intransitive verbs such as *fihím-na* "we understand", yielding *fhím-na,* but not to transitive verbs such as *fihím-na* "he understood us" because rule (12) which is morphologically conditioned takes precednce. The morphological constraint on rule (12) maintains the contrast between *fihím-na* "he understood us" and *fhím-na* "we understand". Rule (12) yields the correct result without resorting to the three arbitrary assumptions. In support of this approach, it has to be pointed out that the morphological constraint applies to a very limited set of data represented only in transitive verbs with a high stem vowel, and without this morphological constraint, these transitive verbs and the corresponding intransitive verbs will be homophonous.

4.3.1. Consonant clus

In this section, v
clusters in JA. This
clusters word-final
consider the constr
reference to the sc

4.3.1.1. Consonant

Word-finally, J
consonant of the c
is non-sonorant. T

4.3.1.2. Consonant

Consider the

(13.A): súmur "a
šúðul "w
síʕir "pr
ħábil "ro
ʕálam "

(13.B): ʕírif "h
ríbiħ "h
šáraħ "

4.3.1. Consonant clusters in JA:

In this section, we identify the types of permissible consonant clusters in JA. This includes the identification of the permissible clusters word-finally, word-medially, and word-initially. We also consider the constraints on the permissible consonant clusters in reference to the scale of sonority.

4.3.1.1. Consonant clusters word-finally:

Word-finally, JA freely allows consonant clusters when the first consonant of the consonant cluster is a sonorant and the second one is non-sonorant. This is illustrated in (3.A).

4.3.1.2. Consonant-clusters word-medially:

Consider the JA data in (13.A,B,C,D).

(13.A):	ʕúmur "age"	ʕúmur-ha "her age"
	šúðul "work"	šúðul-ha "her work"
	síʕir "price"	síʕir-ha "its price"
	ħábil "rope"	ħábil-ha "her rope"
	ʕálam "flag"	ʕálam-ha "her flag"
(13.B):	ʕírif "he knew"	ʕiríf-ha "he knew it"
	ríbiħ "he won"	ribíħ-ha "he won it"
	šáraħ "he explained"	šaráħ-ha "he explained it"

kátab "he wrot

ʔákal "he ate"

(13.C): súmur "age"

šúðul "work"

físil "action"

sísir "price"

ħábil "rope"

(13.D): širib "he dran

sirif "he knev

ríbiħ "he wor

fíhim "he unc

xísir "he lost

In (13.A), the att

noun stem apparent

(13.B), the attachm

creates a cluster o

a vowel-initial suf

results in the abse

two-consonant clu

Here, it has to

second vowel of th

the attachment of

(13.A) creates a th

are not allowed in

	kátab "he wrote"	kataáb-ha "he wrote it"
	ʔákal "he ate"	ʔakál-ha "he ate it"
(13.C):	ʂúmur "age"	ʂúmr-ak "your age"
	šúðul "work"	šúðl-ak "your work"
	fíʂil "action"	fíʂl-ak "your action"
	síʂir "price"	síʂr-ak "your price"
	ħábil "rope"	ħábl-ak "your rope"
(13.D):	šírib "he drank"	šírb-ak "he drank you (metaphoric)"
	ʂírif "he knew"	ʂírf-ak "he knew you"
	ríbiħ "he won"	ríbħ-ak "he won you"
	fíhim "he understood"	fíhm-ak "he understood you"
	xísir "he lost"	xísr-ak "he lost you"

In (13.A), the attachment of a consonant-initial suffix to the noun stem apparently creates a cluster of two consonants. Also, in (13.B), the attachment of a consonant-initial suffix to the verb stem creates a cluster of two consonants. In (13.C,D), the attachment of a vowel-initial suffix to the noun or verb with a high vowel stem results in the absence or deletion of the second high vowel, and a two-consonant cluster is formed.

Here, it has to be pointed out that under the assumption that the second vowel of the stem in (13.A) is epenthetic, we can say that the attachment of a consonant-initial suffix to the noun stems in (13.A) creates a three-consonant cluster. These types of clusters are not allowed in JA. Hence, rules of epenthesis apply to break

them up. Under the sa

attachment of a vowe

eliminates the need fo

Word-medially, JA

unless the first conso

non-sonorant as in (4

Under the assumpt

the first column in (

consonants are creat

attached. In verbs a

stem vowel is under

when a consonant-i

However, when

column of the noun

cluster is created.

because the rules

consonants word-

created as a resul

deletion.

4.3.1.3. Consonant

Word-initiall

the JA data in (1

(14): ktáab~ʔikt

lsáan~ʔilsá

them up. Under the same assumption, we can also say that the attachment of a vowel-initial suffix to the nouns in (13.C) eliminates the need for epenthesis.

Word-medially, JA does not allow clusters of three consonants unless the first consonant is sonorant and the second one is non-sonorant as in (4.A).

Under the assumption that the second high vowel in the nouns in the first column in (13.A) is epenthetic, clusters of three consonants are created in JA when a consonant-initial suffix is attached. In verbs as in the first column in (13.B), where the second stem vowel is underlying, clusters of two consonants are created when a consonant-initial suffix is attached to the verb stem.

However, when a vowel-initial suffix is attached to the first column of the nouns in (13.C) and the verbs in (13.D), a two consonant cluster is created. In nouns, the two-consonant cluster is created because the rules of epenthesis do not apply in the context of two consonants word-medially. In verbs, the two consonant-cluster is created as a result of the application of rule (8) of high vowel deletion.

4.3.1.3. Consonant clusters word-initially:

Word-initially, JA allows clusters of two consonants. Consider the JA data in (14).

(14): ktáab~ʔiktáab "book"
lsáan~ʔilsáan "tounge"

THESIS

sláaħ~ʔisláaħ "Y

blaad~ʔiblaad "c

rčáab~ʔirčáab "s

stámaʕ~ʔistáma

štára~ʔíštara "h

nkásar~ʔinkásar

ltáħag~ʔiltáħag

ħtáram~ʔiħtára

The data in (14) s

word-initially. Thes

ʔi-. This prefix ha

purely phonetic. Its

in reference to epen

4.3.2. Consonant clu

Unlike JA, MSA

Consider the MSA d

JA data in (13).

(15.A): ʂúmr(-u-n)

šúðl(-u-n)

fíʂl(-u-n)

síʂr(-u-n)

ħábl(-u-n)

sláaħ~ʔisláaħ "weapon"

blaad~ʔiblaad "countries"

rčáab~ʔirčáab "stirrup"

stámaʂ~ʔistámaʂ "he listened"

štára~ʔíštara "he bought"

nkásar~ʔinkásar "he got broken"

ltáħag~ʔiltáħag "he joined"

ħtáram~ʔiħtáram "he respected"

The data in (14) show that JA allows two-consonant clusters word-initially. These clusters are optionally preceded by the prefix *ʔi-*. This prefix has no semantic function. Its function seems to be purely phonetic. Its function and derivation will be further analysed in reference to epenthesis in section 5 in this chapter.

4.3.2. Consonant clusters in MSA:

Unlike JA, MSA does have two-consonant clusters word-finally. Consider the MSA data in (15.A,B) which correspond to some of the JA data in (13).

(15.A): ʂúmr(-u-n) "age-nom.-indef."

šúðl(-u-n) "worknom.-indef."

fíʂl(-u-n) "action-nom.-infef."

síʂr(-u-n) "price-nom.-indef."

ħábl(-u-n) "rope-nom.-indef."

(15.B): šárib(-a)~*ša

ʕárif(-a)~*ʕa

rábiħ(-a)~*r

fáhim(-a)~*f

The data in (15.

word-finally. Thes

suffix *-u-n* "nom

(15.B) show that v

whether they have

On these groun

alternation word-

analysis of quest

unpermissible co

nouns in JA when

Word-mediall

arise in MSA. Th

"their" to the no

cluster because

optional word-f

The data in (16)

(16): ʕúmr(-u-

šúɣl(-u-n

fíʕl(-u-n

síʕr(-u-n

ħábl(-u-

(15.B): šárib(-a)~*šarb(-a) "he drank"

ʕárif(-a)~*ʕarf)-a) "he knew"

rábiħ(-a)~*rabħ(-a) "he won"

fáhim(-a)~*fahm(-a) "he understood"

The data in (15.A) show that MSA allows two-consonant clusters word-finally. These types of clusters show up in nouns where the suffix *-u-n* "nominative-indefinite" is optional. The MSA data in (15.B) show that verbs do not have consonant clusters word-finally whether they have the optional subject marker suffix *-a* or not.

On these grounds, we can say that the question of high vowel alternation word-finally does not arise in MSA. Accordingly, the analysis of questions related to phonotactic constraints on unpermissible consonant clusters word-finally will be restricted to nouns in JA where consonant-clusters are not allowed.

Word-medially, the question of three-consonant clusters does not arise in MSA. The attachment of a consonant-initial suffix *-hum* "their" to the noun stem as in (16) does not create a three consonant cluster because the case marker *-u-n* "nom.-indef." which is optional word-finally is obligatory with *-hum* and other suffixes. The data in (16) illustrate this.

(16): ʕúmr(-u-n) "age-nom.-indef."	ʕúmr-u-hum "their age"
šúðl(-u-n) "work-nom.-indef."	šúðl-u-hum "their work"
fíʕl(-u-n) "action-nom.-infef."	fíʕl-u-hum "their action"
síʕr(-u-n) "price-nom.-indef."	síʕr-u-hum "their price"
ħábl(-u-n) "rope-nom.-indef."	hábl-u-hum "their rope"

qábr(-u-n) "gra

ʂámal(-u-n) "w

ʂálam(-u-n) "f

The initial conso

three consonant clus

questions related to

word-medially do n

epenthesis word-m

4.4. Consonant clus

In this section

clusters of two-c

clusters word-me

(17.A): ʂúrs~ʂúru

ðúlb~ðúlu

mílħ~míl

ʂírg~ʂíri

čálb~čál

járħ~jár

gúl-t~gú

zúr-t~zu

ʂín-t~ʂ

(17.B): ʂúrs-ku

qábr(-u-n) "grave-nom.-indef." qábr-u-hum "their grave"

ʕámal(-u-n) "work-nom.-indef." ʕámal-u-hum "their work"

ʕálam(-u-n) "flag-nom.-indef." ʕálam-u-hum "their flag"

The initial consonant of the attached suffix will fail to form a three consonant cluster with the preceding noun stem. Thus questions related to constraints on three-consonant clusters word-medially do not arise in MSA. Accordingly, the analysis of epenthesis word-medially will be limited to JA.

4.4. Consonant clusters in reference to sonority:

In this section, we identify the contexts where JA allows clusters of two-consonants word-finally and three-consonant clusters word-medially. Consider the JA data in (17.A,B).

(17.A): ʕúrs~ʕúrus "wedding"

ðúlb~ðúlub "defeat, loss"

mílħ~míliħ "salt"

ʕírg~ʕírig "branch"

čálb~čálib "dog"

ǰárħ~ǰáruħ "wound"

gúl-t~gúl-it "I said"

zúr-t~zúr-it "I visited"

ʕín-t~ʕín-it "I helped"

(17.B): ʕúrs-kuw~ʕúrus-kuw "your wedding"

ɣúlb-kuw~ɣúlu

mílħ-kuw~míl

ʂírg-kuw~ʂíri

čálb-kuw~čáli

ǰárħ-kuw~ǰár

gúl-t-kuw~gú

zúr-t-kuw~zú

ʂín-t-kuw~ʂí

The data in (17.A
consonants word-fi
clusters of three co
clusters only show
sonorant and the fo
consonant is more
clusters are not al
nouns like in (3.A)
zero.

(18): ʂúmur~*ʂúm

šúɣul~*šúɣl

fíʂil~*fíʂl

síʂir~*síʂr

ħábil~*ħáb

gábur~*gáb

ǰífin~*ǰífn

ǰísim~*ǰís

ðúlb-kuw~ðúlub-kuw "your defeat, loss"

mílħ-kuw~míliħ-kuw "your salt"

ʕírg-kuw~ʕírig-kuw "your branch"

čálb-kuw~čálib-kuw "your dog"

ǰárħ-kuw~ǰáruħ-kuw "your wound"

gúl-t-kuw~gúl-it-kuw "I said you (I said your names)"

zúr-t-kuw~zúur-it-kuw "I visited you"

ʕín-t-kuw~ʕín-it-kuw "I helped you"

The data in (17.A) show that JA can have clusters of two consonants word-finally. The data in (17.B) show that JA can have clusters of three consonants word-medially. These types of clusters only show up when the first consonant of the cluster is a sonorant and the following one is an obstruent. But when the second consonant is more sonorant than the preceding one, these types of clusters are not allowed. The data in (18) illustrate this; these are nouns like in (3.A) but the second vowel does not alternate with zero.

(18): ʕúmur~*ʕúmr "age"

šúðul~*šúðl "work"

fíʕil~*fíʕl "action"

síʕir~*síʕr "price"

ħábil~*ħábl "rope"

gábur~*gábr "grave"

ǰífin~*ǰífn "eye lid"

ǰísim~*ǰísm "body"

gúṭun~*gúṭn "c

ħúzun~*ħúzn "s

láhim~*láħm "

sáhim~*sáhm

However, two-c

is more sonorant th

is followed by a vo

(19): súmur "age"

šúɣul "work"

físil "action"

ħábil "rope"

gábur "grave"

jífin "eye li

jísim "body"

gúṭun "cotto

ħúzun "sadd

láħim "mea

sáhim "arro

In (19), the a

stem creates a c

attachment of th

SD of rule (8) of

deleting the ult

created.

gúṭun~*gúṭn "cotton"

ħúzun~*ħúzn "sadness"

láhim~*láħm "meat"

sáhim~*sáhm "arrow'

However, two-consonant clusters in which the second consonant is more sonorant than the preceding one show up when the noun stem is followed by a vowel-initial suffix. Consider the data in (19).

(19):	súmur "age"	súmr-ak "your age"
	šúðul "work"	šúðl-ak "your work"
	fíʕil "action"	fíʕl-ak "your action"
	ħábil "rope"	ħábl-ak "your rope"
	gábur "grave"	gábr-ak "your grave"
	ǰífin "eye lid"	ǰífn-ak "your eye lid"
	ǰísim "body"	ǰísm-ak "your body"
	gúṭun "cotton"	gúṭn-ak "your cotton"
	ħúzun "saddness"	ħúzn-ak "your sadness"
	láħim "meat"	láħm-ak "your meat"
	sáhim "arrow"	sáhm-ak "your arrow"

In (19), the attachment of the vowel-initial suffix to the noun stem creates a cluster of two consonants word-medially. The attachment of the vowel-initial suffix creates conditions where the SD of rule (8) of high vowel deletion is satisfied. Rule (8) applies, deleting the ultimate high vowel and so a two-consonant cluster is created.

4.5. The Peak of Sono

The PSP is postul

consonant-clusters

break these clusters

earlier studies of s

Bell and Hooper 197

the "Sonority Seque

which says: "In any

sonority peak that

segments with pro

postulated here di

of Selkirk in that

syllable boundary.

Non-syll

consecut

and a sy

The feature s

identified in the

accoustically re

positions repres

between syllabi

words, it does r

consecutive syl

[#lba-], [-ablka-

4.5. The Peak of Sonority Principle (PSP):

The PSP is postulated to account for the unpermissible consonant-clusters and to provide the motivation for epenthesis to break these clusters. The PSP complies, in some respects, with earlier studies of sonority (Vennemann 1972; 1988; Zwicky 1972; Bell and Hooper 1978; Selkirk 1984). Selkirk (1984: 116) posited the "Sonority Sequencing Generalization" in reference to "syllables", which says: "In any syllable there is a segment constituting a sonority peak that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values." The PSP postulated here differs from the Sonority Sequencing Generalization of Selkirk in that it makes no reference to the syllable or the syllable boundary. The Peak of Sonority Principle is as follows:

> Non-syllabic peaks of sonority are not allowed between consecutive syllabic segments, or between a word boundary and a syllabic segment.

The feature syllabic here refers to the binary feature syllabic as identified in the SPE (Chomsky and Halle, 1968: 353). This is an accoustically recognizable feature. Word-initial and word-final positions represent a zero level of sonority. The PSP allows, between syllabics, only rises followed by steady falls. In other words, it does not allow sub-rises or sub-falls between two consecutive syllabic peaks. Accordingly, the PSP does not allow [#lba-], [-ablka-], and [-abl#] types of consonant clusters because

they have unsyllabic

With this principle, v

break up such types

the data in (20.A,B,C

(20.A): čálb~čálib "

(20.B): čálib-na~čál

(20.C): ħábil~*ħábl

(20.D): ħábil-na~*ħ

(20.E): ħabl-ak~*ħ

In (20.A), the

does not violate t

sonority. Hence,

both the precedin

valley of sonorit

sonority. Hence,

the grammatical

syllabic segment

scale of sonorit

violation of PSP

alternating form

and is higher th

they have unsyllabic peaks between syllabics or syllabics and #. With this principle, we can account for the role of epenthesis to break up such types of unpermissible consonant-clusters. Consider the data in (20.A,B,C).

(20.A): čálb~čálib "dog"

(20.B): čálib-na~čálb-na "our dog"

(20.C): ħábil~*ħábl "rope"

(20.D): ħábil-na~*ħábl-na "our rope"

(20.E): ħabl-ak~*ħabil-ak "your rope"

In (20.A), the final consonant-cluster is permitted because it does not violate the PSP; [l] is higher than [b] on the scale of sonority. Hence, there is a steady fall. In 20.B), [b] is lower than both the preceding and following consonants. [b] represents the valley of sonority on the flanks of which there is a steady rise in sonority. Hence, the peak of sonority principle is not violated and the grammaticality of *čálb-na* follows. In (20.C), [l] is not a syllabic segment and is higher than the preceding consonant on the scale of sonority. This means an unsteady fall in sonority and a violation of PSP. This explains the ungrammaticality of one of the alternating forms in (20.C). In (20.D), [l] is not a syllabic segment and is higher than both the preceding and following consonants.

This creates a rise b
violation of PSP. Th
and the grammatica
ħábil-na breaks th
which the peak of s
[bl] cluster in the c
not represent a viol
position in (20.C).

suffix makes [l] pa
the [l] represents a
represented in wor
followed by a fall
zero level. This e
other clusters in
preceding one on

Word-initiall
these clusters ar
(21.A,B).

(21.A): slaaħ~ʔi-
šmaaǧ~ʔi
draaǰ~ʔi-

(21.B): lsáan~ʔi
mšáaṭ~ʔ
rdáan~ʔi

This creates a rise between the peaks of sonority which is a violation of PSP. This explains the ungrammaticality of **ħábl-na*, and the grammaticality of *ħábil-na*. The epenthetic vowel in *ħábil-na* breaks the unpermissible cluster, creating a new one in which the peak of sonority principle is not violated. In (20.E), the [bl] cluster in the context of a following vowel-initial suffix does not represent a violation of the PSP as it is the case in word-final position in (20.C). In (20.E), the attachment of the vowel-initial suffix makes [l] part of a steady rise from [b] to [a]. But in (20.C), the [l] represents a rise which is followed by a level position represented in word-final position. Thus, we have a peak in [a] followed by a fall on [b], then a rise on [l], and finally a drop to a zero level. This explains the ungrammaticality of [bl#] clusters and other clusters in which the final consonant is higher than the preceding one on the scale of sonority.

Word-initially, JA allows two-consonant clusters. Some of these clusters are potential counter evidence to the PSP. Consider (21.A,B).

(21.A): slaaħ~ʔi-slaaħ "weapon"
šmaað~ʔi-šmaað "head cover"
draaǰ~ʔi-draaǰ "steps"

(21.B): lsáan~ʔi-lsáan "tongue"
mšáaṭ~ʔi-mšáaṭ "combs"
rdáan~ʔi-rdáan "sleeves"

In (21.A), the fir

less sonorant than t

assumptions of the

initial cluster is m

is potential counter

counter evidence is

(21.B) are preceded

[ʔi-] to the initial

violate the PSP. In

initial sonorant co

PSP is violated. In

represent an unsta

change is in progr

word-initially. T

the PSP. Clusters

To account fo

high vowel and gl

Rule (22):

(option

Ø ---

In (21.A), the first consonant in the initial consonant cluster is less sonorant than the following consonant. This complies with the assumptions of the PSP. But in (21.B), the first consonant in the initial cluster is more sonorant than the following consonant. This is potential counter evidence to the PSP. However, this potential counter evidence is partly accounted for where in both (21.A) and (21.B) are preceded by the prothetic vowel [ʔi-]. The attachment of [ʔi-] to the initial cluster yields an initial structure which does not violate the PSP. In the context where [ʔi-] is not attached, the initial sonorant consonant represents a sonority peak; otherwise the PSP is violated. In this context, I assume that forms without [ʔi-] represent an unstable stage of language change. This language change is in progress in the direction of losing consonant clusters word-initially. The motivation of this language change is to satisfy the PSP. Clusters which violate this principle are disappearing.

To account for prothesis, we postulate rules (22) and (23) of high vowel and glottal stop insertion, respectively.

Rule (22):

(optional)

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [-back] \end{matrix} \; / \; \# \_\_\_\_ \; C \; C$$

Rule (23):

Ø---> [-s

[-c

[+l

The analysis of

that epenthesis ap

geminates called f

epenthesis applies

Epenthesis applies

stopped talking", y

non-application o

with the predictio

does not. To acco

epenthesis is prin

and that epenthes

geminates, but is

In (24), we il

involve the high

(24):

/čalb/	/ħa
"dog"	"rop
čálb	ħáb

--- -

Rule (23):

$$\emptyset \longrightarrow \begin{matrix}[-syl] \\ [-cont] \\ [+low]\end{matrix} / \ \# \ \_\_\_\_ \ [+syl]$$

The analysis of the JA data we have considered so far indicate that epenthesis applies when the PSP is violated. But in a type of geminates called fake geminates as we will see in Chapter 8, epenthesis applies optionally even though the PSP is not violated. Epenthesis applies optionally to the fake geminate in *sakátt* "I stopped talking", yielding *sakátit* "I stopped talking". The non-application of epenthesis to geminates as in *sakátt* complies with the predictions of the PSP while its application as in *sakátit* does not. To account for this, I assume that the motivation for epenthesis is primarily to break unfavourable consonant clusters and that epenthesis is generalized to other clusters including fake geminates, but is obligatory where the cluster violates the PSP.

In (24), we illustrate the derivation of some words which involve the high vowel alternation.

(24):

/čalb/	/ħabl/	/ħabl-na/	/lsaan/	/ʂirif-na/	UR
"dog"	"rope"	"our rope"	"tongue"	"we knew"	
čálb	ħábl	ħábl-na	lsáan	ʂiríf-na	Rule (15) in Ch.3: Stress
---	---	---	---	ʂríf-na	Rule (8): HVD

čálib ħábil

--- ---

--- ---

[čálib] [ħábil]

In (24), the rul
their SD is met. R
of high vowel dele
feeds into rule (7
vowel insertion f

4.6. Epenthesis in

The main obje
alternating high
section 1 in this
examine the con
which it shows

(25.A): ħúlum "
kútub "
rújum
fúṭur "

čálib	ħábil	ħábil-na	---	----	Rule (7'): Epenthesis
---	---	---	ilsáan	---	Rule (22): Vowel inser.
---	---	---	ʔilsáan	---	Rule (23): Glottal stop insertion
[čálib]	[ħábil]	[ħábil-na]	[ʔilsáan]	[ʕríf-na]	PR

In (24), the rules do not have to be ordered. They apply whenever their SD is met. Rule (15) of stress assignment feeds into rule (8) of high vowel deletion (HVD). On the other hand, rule (8) of HVD feeds into rule (7) of vowel insertion. Rule (22) of word-initial vowel insertion feeds into rule (23) of glottal stop insertion.

4.6. Epenthesis in the context of a preceding high vowel:

The main objective of this section is to account for the alternating high vowel when it follows a high vowel. We argued in section 1 in this chapter that this vowel is epenthetic. Here, we examine the contexts in which the vowel shows up as [i] and those in which it shows up as [u]. Consider (25.A-B).

(25.A): ħúlum "dream"
kútub "books"
rújum "heap of stones"
fúṭur "mushroom"

cúšub "gras
zúrug "blue
ħúkum "juc
šúšul "wor
šúɛul "kinc
ɟúdul "twi
ɟúgum "th
kúħul "dar

(25.B): ɟísim "bo
ɟísir "bri
ɬíkir "th
ɛíšig "lov
síɲíɲ "pri
ħímil "to
ɛílim "sc
ɟídis "bre
ɟírɨl "ba
šímiš "g
ɬíɬin "s
ɾízig "pr
sihim "

ʕúšub "grass"

zúrug "blue ones"

ħúkum "judgment"

šúðul "work"

šúʕul "kind of sheep"

ǰúdul "twisted ears of sheep"

ǰúgum "things which are not straight"

kúħul "dark black cosmetic powder "

kúfuš "crippled hands"

xúbuθ "malice, ill feeling"

gúbuʕ "kind if hat"

búguʕ "spotted animals"

zúðut "spur"

(25.B): ǰísim "body"

ǰísir "bridge"

fíkir "thought"

ʕíšig "love"

síǰin "prison"

ħímil "load"

ʕílim "science"

ǰídiʕ "branch"

ţífil "baby"

ṣímið "glue"

fíţin "smart"

rízig "property"

síhim "share"

tíbin "hay"

ṣífin "purse"

zígiṭ "prope

In (25.A-B), the
vowel. The data sh
the vocalic contex
have similar conso
[i] in (25.B). In eit
vowel. Rule (7') o
account for the vo
epenthesis.

Rule (26):

Ø ---> [

Rule (26) of e
a preceding [+hig
includes and pre
vowel in the cor

4.7. Epenthesis

In this secti
context of a pr

tíbin "hay"

ṣífin "purse"

zígiṭ "proper name, a religious person"

In (25.A-B), the alternating vowel is a copy of the preceding high vowel. The data show that the quality of the vowel is determined by the vocalic context, not the consonantal one. In (25.A) and (25B), we have similar consonantal contexts. But the vowel is [u] in (25.A) and [i] in (25.B). In either case, the vowel is a copy of the preceding high vowel. Rule (7') of epenthesis predicts the [i] vowel in (25.B). To account for the vowel [u] in (25.A), we postulate rule (26) of epenthesis.

Rule (26):

$$\emptyset \longrightarrow \underset{\substack{[+high]\\[+back]}}{V} \; / \; \underset{\substack{[+high]\\[+back]}}{V} \; C \_\_ C \; C$$

Rule (26) of epenthesis accounts for the vowel in the context of a preceding [+high, +back] vowel. Rule (26) of epenthesis properly includes and precludes rule (7') of epenthesis which predicts an [i] vowel in the context of three consonants.

4.7. Epenthesis in the context of a preceding non-high vowel:

In this section, we consider the quality of the vowel in the context of a preceding low vowel. Consider (27).

(27: nafis "self"
nasif "explod
baδix "too mu
baxit "luck"
nafux "blowir
šaguf "small
čaʂib "heel"
nabiʂ "spring
nabuǰ "pulse
naguʂ "decre
gaʈuf "pickir
laħim "meat
baʈin "belly"
xanig "suffo
fariš "furnit
farux "chic
našur "sawi
baδul "mule
δasil "wash

In (27), stres
vowel is either
consistently [a].
vowel is determ
vowel is low.

Below, we ar
[a] vowel. This

(27: nafis "self"

nasif "exploding"

baðix "too much spending"

baxit "luck"

nafux "blowing up"

šaguf "small stones"

časib "heel"

nabiς "spring of water"

nabuǰ "pulse"

naguṣ "decrease"

gaṭuf "picking fruit"

laħim "meat"

baṭin "belly"

xanig "suffocating"

fariš "furniture"

farux "chick"

našur "sawing wood, publishing"

baðul "mule"

ðasil "washing"

In (27), stress is not indicated because it is irrelevant. The vowel is either [i] or [u], even though the preceding vowel is consistently [a]. Accordingly, we can not say that the quality of the vowel is determined by the vocalic context when the preceding vowel is low.

Below, we analyze all the consonantal contexts with a preceding [a] vowel. This includes an analysis of the vowel in the contexts of

preceding and follo

trill, and pharyngea

all the consonantal

Table (7): Epenthes

First Consonant
pharyngeal (phary
flap
emphatic (emph)
velar (vel)
lateral (lat)
coronal (cor)
labial (lab)

The verti

The horiz

consona

The vowe

vowel.

The dott

preceding and following labial, coronal, lateral, velar, emphatic, trill, and pharyngeal. This is illustrated in Table (7) which covers all the consonantal contexts in which the vowel shows up.

Table (7): Epenthesis in consonantal contexts

First Consonant	Second (following) Consonant						
	lab	cor	lat	vel	emph	flap	pharyn
pharyngeal (pharyn)	[i]	[i]	[i]	[u]	[u]	[u]	---
flap	[u]	[i]	---	[u]	[u]	---	[u]
emphatic (emph)	[u]	[i]	[u]	[u]	---	[u]	[u]
velar (vel)	[u]	[i]	[u]	---	[u]	[u]	[u]
lateral (lat)	[i]	[i]	---	[i]	[u]	---	[i]
coronal (cor)	[i]	[i]	[i]	[i]	[u]	[u]	[i]
labial (lab)	---	[i]	[i]	[u]	[u]	[u]	[i]

The vertical row indicates the first (preceding) consonant.

The horizontal column indicates the second (following) consonant.

The vowel in brackets indicate the quality of the epenthetic vowel.

The dotted line indicates the absence of these contexts.

Table (7) indicat

and those in which

of a following emph

of a following velar

It is also [u] in the

unless the followir

[i]. In the followin

contexts in which

be postulated to ac

4.7.1. Epenthesis i

In this sectio

following labial a

(28.A-C), respect

(28.A): farum "cu

ħaruf "a

ħarub "w

karum "g

ǰaruf "er

(28.B): ʂaǧum "

gaṣuf "s

šaṭub "c

ǯaṣub "

gaṭuf "p

Table (7) indicates the contexts in which the vowel appears as [i] and those in which it appears as [u]. The vowel is [u] in the context of a following emphatic or flap. The vowel is also [u] in the context of a following velar and unless the preceding consonant is a coronal. It is also [u] in the context of a preceding emphatic, flap, or velar unless the following consonant is coronal. Otherwise, the vowel is [i]. In the following sections, we provide some data illustrating the contexts in which the vowel appears as [u], and then some rules will be postulated to account for the vowel in these contexts.

4.7.1. Epenthesis in the context of following labials:

In this section, we analyze the vowel in the context of a following labial and a preceding flap, emphatic, and velar as in (28.A-C), respectively.

(28.A): farum "cutting"
ħaruf "a letter"
ħarub "war"
karum "garden"
ǰaruf "eroision"

(28.B): ʕaðum "bones"
gaṣuf "shelling"
šaṭub "cancelling"
ðaṣub "forcing"
gaṭuf "picking fruit"

(28.C): faδum "mou

dagum "to s

šaguf "sma

naxub "by s

sakub "kin

In the context

(28.A,B,C), respec

behaves as an emp

[+back], we postu

Rule (29):

Ø ---->

Rule (29) of e

a preceding cons

This includes en

(7') which predi

Here, it has to b

[labial] is used

4.7.2. Epenthes

In this sec

following vela

(28.C): faδum "mouth bite"

dagum "to say something face to face"

šaguf "small stones"

naxub "by selection"

sakub "kind of iron"

In the context of a preceding flap, emphatic, or velar as in (28.A,B,C), respectively, the vowel is [u]. Here, the JA Arabic [r] behaves as an emphatic. Assuming that emphatics and velars are [+back], we postulate rule (29) of epenthesis.

Rule (29):

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \; / \; \begin{matrix} C \\ [+back] \end{matrix} \; \_\_\_ \; \begin{matrix} C \\ [+labial] \end{matrix} \; C$$

Rule (29) of epenthesis accounts for the vowel in the context of a preceding consonant which is [+back], predicting an epenthetic [u]. This includes emphatics and velars. Rule (29) properly includes rule (7') which predicts [i], and applies disjunctively in relation to it. Here, it has to be noted that labials are [+ant, -cor]. The feature [labial] is used for clarity of presentation.

4.7.2. Epenthesis in the context of following velars:

In this section, we analyze the vowel in the context of a following velar and a preceding pharyngeal, trill, emphatic, lateral,

coronal, and labial

(30.A): lasug "tast
basug "bab
zasug "scr
mahug "ca
nasug "the

(30.B): farux "a y
harug "bu
faruk "rub
maruð "co
barug "li

(30.C): laṭux "s
maḏuð "
faṣux "u
maṣuk "
naṭug "a

(30.D): malik "
xalig "c
falix "t
čalix "
dalik "

(30.E): baðix

coronal, and labial as in (30.A-F).

(30.A): lasug "tasting"
basug "baby cry"
zasug "screaming"
maɦug "causing to perish"
nasug "the sound of a crow"

(30.B): farux "a young bird"
ɦarug "burning"
faruk "rubbing togather"
maruð "covering or soiling with dust"
barug "lightening"

(30.C): laṭux "splashing"
maḍuð "grinding food in the mouth"
faṣux "untying'
maṣuk "sound of slapping'
naṭug "articulation"

(30.D): malik "king"
xalig "creating"
falix "to split apart"
čalix "a kind of wild plant"
dalik "smoothening"

(30.E): baðix "extravagance"

xanig "suffo

hatik "violat

ʂajig "mess

nasix "copyi

(30.F): šabuk "enta

nafux "pum

dafug "dash

kamux "kin

dabuɣ "tar

In the context

coronal as in (3o.F

contexts the vowe

the Arabic latera

preceding pharyn

respectively, the

we postulate rul

Rule (31):

Ø ---

Rule (31) o

preceding and f

velars. Howeve

xanig "suffocating"

hatik "violating social norms"

ʂajig "messing"

nasix "copying"

(30.F): šabuk "entangling"

nafux "pumping up"

dafug "dashing of water"

kamux "kind of soft clay between layers of rock"

dabuɣ "tanning"

In the context of a following velar and a preceding lateral, or coronal as in (3o.D,E), respectively, the vowel is [i]. In these contexts the vowel is predictable by rule (7') of epenthesis. Here, the Arabic lateral [l] behaves as a coronal. But in the context of a preceding pharyngeal, flap, emphatic, or labial as in (30.A,B,C,F), respectively, the vowel is [u]. To account for the vowel in (30.B,C), we postulate rule (31).

Rule (31):

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \; / \; \begin{matrix} C \\ [+back] \end{matrix} \; \_\_\_ \; \begin{matrix} C \\ [+back] \end{matrix} \; C$$

Rule (31) of epenthesis predicts the vowel in the context of a preceding and following consonant which is [+back]. This includes velars. However, rule (31) does not account for the vowel in the

context of a preced

in (30.A,F). Accord

Rule (32):

Ø ---->

[+h

[+b

Rule (32) of ep

context of a follo

one which is [-co

preceding coronal

(7'). Rules (31) a

disjunctively in r

4.7.3. Epenthesis

In this secti

following empha

coronal, and lab

(33.A): gaħuṭ "c

maṣuṭ

faħuṣ "e

waṣuǧ

(33.B): faruǧ "

context of a preceding pharyngeal or labial and a following velar as in (30.A,F). Accordingly, we postulate rule (32) of epenthesis.

Rule (32):

$$\emptyset \text{ ---> } \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \; / \; \begin{matrix} C \\ [-cor] \end{matrix} \; \_\_\_ \; \begin{matrix} C \\ [+back] \end{matrix} \; C$$

Rule (32) of epenthesis predicts that the vowel is [u] in the context of a following consonant which is [+back] and a preceding one which is [-cor]. In the context of a following velar and a preceding coronal as in (30.D,E), the vowel is predictable by rule (7'). Rules (31) and (32) properly include rule (7') and apply disjunctively in relation to it.

4.7.3. Epenthesis in the context of following emphatics:

In this section, we analyze the vowel in the context of a following emphatic and a preceding pharyngeal, flap, velar, lateral, coronal, and labial as in (33.A-F).

(33.A): gaħuṭ "draught"
maʂuṭ "pulling hair out"
faħuṣ "examination"
waʂuḍ "preaching"

(33.B): faruḍ "obligatory"

šaxuǰ "scr

rakuǰ "run

mazuǰ "

(33.D): xaluǰ "mi

maluǰ "to

balųs "to

(33.E): našuǰ "t

gənųs "h

gəsuǰ "p

ħəšuǰ "t

(33.C): šaguǰ "kic

maδuǰ "st

maδųs "st

šaruǰ "cond

garųs "stin

ʔaruǰ "lan

garuǰ " sou

nəbuǰ "p

gəmuǰ "

nəfuǰ "p

nəfuǰ "

xəbųs "

šaruṭ "condition"

garuṣ "stinging"

ʔaruḍ "land"

garuṭ " sound of eating something crunchy"

(33.C): šaguṭ "kicking"

maðuṭ "stretching"

maðuṣ "stomach ache"

šaxuṭ "scratch"

rakuḍ "running"

(33.D): xaluṭ "mixing"

maluṭ "to tear apart without using a knife"

baluṣ "to get money by cheating"

(33.E): našuṭ "tie with a loop"

ganuṣ "hunting"

gasuṭ "part of a payment"

ħašuṭ "thrown in disorder"

mazuṭ "slipping off"

(33.F): nabuḍ "pulse"

gamuṭ "packing together"

nafuṭ "petrol, oil"

nafuḍ "sprinkling"

xabuṣ "mixing things togather"

In the context

pharyngeal, flap,

(33.A,B,C,D,E,F), r

(32) do not predic

and a preceding co

context of preced

(32) predicts an [

consonant (includ

fail to account fo

consonant is [+co

rule (34) of epen

Rule (34):

Ø --->

[

[

Rule (34) of

following emph

distinguished fr

feature [+back],

are [+cor] while

emphatic, the c

specified. This

includes rule (

In the context of a following emphatic and a preceding pharyngeal, flap, velar, lateral, coronal, or labial as in (33.A,B,C,D,E,F), respectively, the vowel is [u]. Here, rules (31) and (32) do not predict the vowel in the context of a following emphatic and a preceding coronal. Rule (31) predicts an [u] vowel in the context of preceding back consonants (including emphatics), and rule (32) predicts an [u] vowel in the context of a following back consonant (including emphatics) and a preceding [-cor]. Thus they fail to account for the vowel in (33.D,E) where the preceding consonant is [+cor] and the vowel is [u]. Accordingly, we postulate rule (34) of epenthesis.

Rule (34):

$$\emptyset \text{ ---> } \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \; / \; C \; \_\_\_ \; \begin{matrix} C \\ [+back] \\ [+cor] \end{matrix} \; C$$

Rule (34) of epenthesis predicts an [u] vowel in the context of a following emphatic. In this respect, emphatics have to be distinguished from velars; both velars and emphatics share the feature [+back], but they do not share the feature [+cor]; emphatics are [+cor] while velars are [-cor]. In the context of a following emphatic, the quality of the preceding consonant does not have to be specified. This explains the need for rule (34). Rule (34) properly includes rule (7') and applies disjunctively in relation to it.

In this section
following non-emp
emphatic, velar, la

(35.A): baħiš "dig
raṣid "thu
naṣiθ "sc
naṣiš "co
baħiθ "re

(35.B): kariš "be
ħariθ "pl
farid "pi
fariš "fu
sariǰ "s

(35.C): baṭiš "c
ħaṣid "
ħaǰin "
gaṣid "
baṭin "

(35.D): faxiǰ
ħagin
wakit

4.7.4. Epenthesis in the context of following non-emphatic coronals:

In this section, we analyze the vowel in the context of a following non-emphatic coronal and a preceding pharyngeal, flap, emphatic, velar, lateral, coronal and labial as in (35.A-G).

(35.A): baħiš "digging"
raṣid "thunder"
naṣiθ "scattering"
naṣiš "coffin"
baħiθ "research"

(35.B): kariš "belly"
ħariθ "ploughing"
farid "pistol"
fariš "furniture"
sarij "saddle"

(35.C): baṭiš "cruelty"
ħaṣid "harvesting"
ħaḏin "hugging, embracing"
gaṣid "intention"
baṭin "belly"

(35.D): faxið "thigh"
ħagin "injection"
wakit "time"

samin "pu

čabid "liv

In the contex

preceding pharyn

or labial as in (3

all of these con

epenthesis.

(35.F): ḥāšid "crov

xadiš "scre

naǰid "a pr

natiš "a cu

baǰid "tor

(35.G): gamiz "ju

natis "sel

kabiš "ram

samin "pu

(35.E): ǰaiid "whipp

čalič "chew

malis "smo

ḥalit "swee

talit "to le

zabit "punch

čagid "contr

ʕagid "contract"

zaðit "punching with a nail"

(35.E): ǰalid "whipping"

ʕalič "chewing gum"

malis "smoothening"

ħalif "swearing"

falit "to let out, to set free"

(35.F): ħašid "crowd"

xadiš "scratch"

naǰid "a province in Arabia"

natiš "a cut in cloth resulting from hooking"

baǰid "torn because of high pressure"

(35.G): gamiz "jumping"

nafis "self"

kabiš "ram"

samin "purified butter"

čabid "liver"

In the context of a following non-emphatic coronal and a preceding pharyngeal, lateral, flap, emphatic, velar, lateral, coronal or labial as in (35.A,B,C,D,E,F,G), respectively, the vowel is [i]. In all of these contexts the vowel is predictable by rule (7') of epenthesis.

4.7.5. Epenthesis in

In this section,
following lateral ar

(36.A): ṣaṭul "buck
faṣul "chap
ʔaṣul "orig
faðul "gene
waṣul "rec

(36.B): nagul "tra
baðul "mu
ʕagul "mi
naxul "pa
ħagul "fie

In the contex
[l] as in (36.A,B),
the vowel is not
[+cor] and rule (
preceding velar
this problem, w
context of a pre
non-emphatic.
spread account

4.7.5. Epenthesis in the context of following laterals:

In this section, we analyze the vowel in the context of a following lateral and a preceding emphatic, and velar as in (36.A-B).

(36.A): ṣaṭul "bucket"
faṣul "chapter"
ʔaṣul "origin"
faðul "generosity"
waṣul "receipt"

(36.B): nagul "transfer"
baðul "mule"
ʕagul "mind"
naxul "palm trees pl., lever"
ħagul "field"

In the context of a preceding emphatic, or velar and a following [l] as in (36.A,B), respectively, the vowel is [u]. In these contexts, the vowel is not predictable by other rules of epenthesis. [l] is [+cor] and rule (7') predicts that the vowel is [i] in the context of a preceding velar or emphatic and a following coronal. To account for this problem, we assume that [l] is an emphatic coronal in the context of a preceding velar or emphatic. Elsewhere [l] is non-emphatic. Rule (37) of emphasis assimilation or emphasis spread accounts for the appearance of emphatic [l].

Rule (37):

[+lateral]

Rule (37) replac

non-emphatic [l] in

consonant, yielding

Accordingly, rule (

(31). Rule (37) of

feeding relation to

that for convenien

chart of distincti

features: [+son, +

4.7.6. Epenthesis

In this secti

following flap a

and labial as in

(38.A): šaṣur "

bañur

nañur

jaṣur

jañur

(38.B): šaṭur

Rule (37):

$$[+\text{lateral}] \longrightarrow [+\text{back}] \;/\; C \;\; (V) \;\; \underline{\quad}\; [+\text{back}]$$

Rule (37) replaces rule (6) of Chapter 2. It applies to non-emphatic [l] in the context of a preceding velar or emphatic consonant, yielding an emphatic [ɫ] which is [+back, +cor]. Accordingly, rule (37) applies to the data in (36.A,B), feeding rule (31). Rule (37) of emphasis spread or emphasis assimilation is in a feeding relation to rule (34) of epenthesis. Here, it has to be noted that for convenience I identify [l] by the feature [+lateral]. In the chart of distinctive features in Chapter 2, [l] has the distinctive features: [+son, +cont, -nas].

4.7.6. Epenthesis in the context of a following flap:

In this section, we analyze the vowel in the context of a following flap and a preceding pharyngeal, emphatic, velar, coronal, and labial as in (38.A-E).

(38.A): šaʕur "hair"

baħur "sea'

naħur "killing, stabbing"

ǰaʕur "the sound of a cow"

ǰaħur "glaring"

(38.B): šaṭur "splitting"

saṭur "writ

haḍur "cufe

gaṣur "pala

maṣur "Eg

(38.C): fagur "pove

šaxur "snor

makur "dec

šaður "soa

bakur "pro

(38.D): naθur "pr

saǰur "re

našur "s

ǰadur "t

natur "s

(38.E): xamur "

hafur "d

jamur "

habur "

jabur "

In the cont

emphatic, vel

the vowel is [

Accordingly,

saṭur "writing line"

ħaḏur "cufew"

gaṣur "palace"

maṣur "Egypt"

(38.C): fagur "poverty"

šaxur "snoring:

makur "deceiving, tricking"

šaður "soaring"

bakur "proper name"

(38.D): naθur "prose, scattering"

ʂaǰur "raw, not ripe"

našur "sawing wood"

ǰadur "the area within the city limit"

natur "speaking forcefully"

(38.E): xamur "wine"

hafur "digging"

ǰamur "glowing charcoal"

habur "lean meat"

ǰabur "proper name"

In the context of a following flap and a preceding pharyngeal, emphatic, velar, coronal, or labial as in (38.A,B,C,D,E), respectively, the vowel is [u]. Here, Arabic [r] behaves as an emphatic. Accordingly, rule (34) of epenthesis which accounts for the vowel in

the context of a foll

context of a followi

4.7.7. Epenthesis in

In this section,

following pharynge

(39.A-C).

(39.A): šaruħ "exp

šaruʂ "lav

ǰaruh "wo

garuʂ "pu

ǰaruʂ "sv

(39.B): gaʈuʂ "cu

faɮuħ "d

ʂaʈuħ "r

baʈuħ "k

maʂuʂ "

(39.C): šaguħ

šaguʂ "

naxuʂ

faguʂ

raguʂ

the context of a following emphatic accounts for the vowel in the context of a following [r].

4.7.7. Epenthesis in the context of following pharyngeals:

In this section, we analyze the vowel in the context of a following pharyngeal and a preceding, flap, emphatic, and velar as in (39.A-C).

(39.A): šaruħ "explanation"
šaruʂ "law"
ǰaruh "wound"
garuʂ "pumpkin"
ǰaruʂ "swallowing"

(39.B): gaṭuʂ "cutting"
faðuħ "disclosure, making secrets public"
ṣaṭuħ "roof
baṭuħ "knocking someone"
maṣuʂ "slipping"

(39.C): šaguħ "crack, slice"
šaguʂ "sound of pouring water"
naxuʂ "to spit noisily to clear the throat"
faguʂ "bubbling"
raguʂ "patching"

In the context of
(39.A,B,C), respecti
vowel is predictabl
vowel in the contex
following non-coro

Rule (40):

Ø ---->
[+
[+

Rule (40) prop
relation to it.

To sum up, th
as in rule (26).
velar or emphati
vowel is [u] in t
non-coronal. In
(32). The vowe
this context, th
vowel is [i] as
where the vow

The analysi
(36), (37), and
question is pr
vowel as rule

In the context of a preceding flap, emphatic, or velar as in (39.A,B,C), respectively, the vowel is [u]. In these contexts, the vowel is predictable by rule (40) of epenthesis which predicts an [u] vowel in the context of a preceding consonant which is [+back] and a following non-coronal.

Rule (40):

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \; / \; \begin{matrix} C \\ [+back] \end{matrix} \; \_\_\_ \; \begin{matrix} C \\ [-cor] \end{matrix} \; C$$

Rule (40) properly includes rule (7'), and applies disjunctively in relation to it.

To sum up, the vowel is [u] in the context of a preceding [u] vowel as in rule (26). The vowel is also [u] in the context of a preceding velar or emphatic and a following non-coronal as in rule (40). The vowel is [u] in the context of a following velar and a preceding non-coronal. In these contexts, the vowel is accounted for by rule (32). The vowel is [u] in the context of a following emphatic. In this context, the vowel is accounted for by rule (34). Elsewhere, the vowel is [i] as rule (7') predicts. Table (7) illustrates the contexts where the vowel is [i] and those where it is [u].

The analysis of the JA data in (25), (27), (28), (30), (33), (35), (36), (37), and (39) support the assumption that the vowel in question is predictable. The vowel is a copy of the preceding high vowel as rule (26) predicts. But in the context of a preceding low

vowel, the quality o

preceding or followi

consonants are [+ba

in the context of a

[-cor] as rule (34)

velar and a precedi

context of a follow

the vowel is [i] as

accounted for by r

(32), (30.B) by (40

4.8. Rule applicat

In this sectio

involved in the d

have argued to b

rules of epenthe

rules of epenthe

Rules (26),

epenthetic [u] p

these four rule

in relation to i

have postulate

and (40).

vowel, the quality of the vowel is determined by that of the preceding or following consonant. If the preceding and following consonants are [+back], [u] is predicted by rule (31). The vowel is [u] in the context of a preceding emphatic or velar and a following [-cor] as rule (34) predicts. It is [u] in the context of a following velar and a preceding [-cor] as rule (32) predicts. It is [u] in the context of a following emphatic as rule (34) predicts. Elsewhere the vowel is [i] as rule (7') predicts. But in fact all the data accounted for by rule (31) are accounted for by other rules: (30.A) by (32), (30.B) by (40), (30.C) by (40), and (30.F) by (32).

4.8. Rule application:

In this section, we consider the relation between the rules involved in the derivation of the alternating high vowel which we have argued to be epenthetic. This involves the relation between the rules of epenthesis, on the one hand, and the relation between the rules of epenthesis, deletion, and stress assignment, on the other.

Rules (26), (32), (34), and (40) of epenthesis which predict an epenthetic [u] properly include rule (7') which predicts [i]. Each of these four rules properly includes rule (7') and applies disjunctively in relation to it. Following, we repeat the rules of epenthesis we have postulated in this chapter. That is rules (7'), (26), (32), (34), and (40).

Rule (7'):

Ø ---> [+h

[-b

Rule (26):

Ø ---> [+

Rule (32):

Ø ---> [

Rule (34):

Ø ---

Rule (40):

Ø --

Rules (7')

(7') applies in

Rule (7'):

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [-back] \end{matrix} \; / \; C \_\_\_ C \; C$$

Rule (26):

$$\emptyset \longrightarrow \begin{matrix} V & V \\ [+high] & [+high] \\ [+back] & [+back] \end{matrix} \; / \; C \_\_\_ C \; C$$

Rule (32):

$$\emptyset \longrightarrow \begin{matrix} V & C \\ [+high] & [-cor] \\ [+back] & \end{matrix} \; / \; \_\_\_\_ \; C \; C \; [+back]$$

Rule (34):

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \; / \; C \_\_\_\_ C \; C \; \begin{matrix} [+back] \\ [+cor] \end{matrix}$$

Rule (40):

$$\emptyset \longrightarrow \begin{matrix} V & C \\ [+high] & [+back] \\ [+back] & \end{matrix} \; / \; \_\_\_\_ \; C \; C \; [-cor]$$

Rules (7') and (26) of epenthesis are two different rules. Rule (7') applies in the context of three consonants. Here, the vocalic

context is not inclu

vowel is determine

rule (26) applies i

high vowel. The qu

that of the epenth

In (42), we ill

(34), and (36) in t

(41.A): nafis "sel

B): ħulum "dr

(C): šabuk "en

(D): nabuǧ "pu

(E): baṭin "be

(F): saǧum "b

(G): faṣul "te

The words

context of a pre

include emphat

include the app

[i] and [u].

(41):

/nafs/ /ħulm

náfs ħúlm

context is not included in the SD of the rule. The quality of the vowel is determined by the preceding or following consonant. But rule (26) applies in the context of three consonants preceded by a high vowel. **The quality of this preceding high vowel determines that of the epenthetic vowel.**

In (42), we illustrate the application of the rules (7'), (26), (32), (34), and (36) in the derivation of the JA words in (41).

(41.A): nafis "self"

B): ħulum "dream"

(C): šabuk "entangling"

(D): nabuǰ "pulse"

(E): baṭin "belly"

(F): ʕaǰum "bones"

(G): faṣul "term"

The words in (41) include the appearance of the vowel in the context of a preceding high back or a low vowel. The words also include emphatic and non-emphatic contexts. These contexts include the appearance of the alternating high vowel in the forms of [i] and [u].

(41):

/nafs/ /ħulm/ /šabk/ /nabuǰ/ /baṭn/ /ʕaǰm/ /faṣl/ UR

náfs ħúlm šábk nábǰ báṭn ʕáǰm fáṣl Rule (15) in Ch.3: Stress

--- húlum ---

--- --- ---

--- --- šáb

--- --- ---

--- --- ---

náfis --- --

[náfis] [húlum] [

In the deriv

whenever their

applies to eithe

[+back]. This f

of a following

need for rule o

properly inclu

4.9. Summary:

In this ch

contrast with

vowels. High

---	ħúlum	---	---	---	---	---	Rule (26): Epenthesis
---	---	---	---	---	---	fáṣl	Rule (37): Emphasis ass.
---	---	šábuk	nábuḏ	---	---	---	Rule (32): Epenthesis
---	---	---	---	---	---	fáṣul	Rule (34): Epenthesis
---	---	---	---	---	ʕáḏum	---	Rule (40): Epenthesis
náfis	---	---	---	báṭin	---	---	Rule (7'): Epenthesis
[náfis]	[ħúlum]	[šábuk	[nábuḏ]	[báṭin]	[ʕáḏum]	[fáṣul]	PR

In the derivation of the PR of the data in (41) the rules apply whenever their SD is met. Rule (37) of emphasis assimilation applies to either *faṣl* or *faṣil,* yielding an emphatic [l] which is [+back]. This feeds into rule (34) which predicts [u] in the context of a following emphatic. In the derivation of all the PR forms the need for rule ordering does not arise; rules (32), (34), and (40) properly include rule (7') and apply disjunctively in relation to it.

4.9. Summary:

In this chapter, the analyses of JA vowels show that high vowels contrast with low vowels and that there are two types of high vowels. High vowels contrast with low vowels [a] in respect to

deletion; high vowe

but low vowels do

alternate with zer

vowels which show

corresponding con

those of the secon

the second type a

in Chapter 3 pred

stress at all.

On these grou

epenthetic and th

that epenthesis

phonotactic cons

word-finally an

constraints com

In MSA, the

clusters of two

of three consor

a consonant-in

consonants do

these context

To accou

question in t

To account fo

(26), (32), (3

the rules app

ordering con

deletion; high vowels delete in the context of a vowel-initial suffix but low vowels do not. Those which show up in nouns optionally alternate with zero in the context of a preceding sonorant but high vowels which show up in verbs do not alternate with zero in the corresponding contexts. Vowels of the first type contrast with those of the second type in respect to stress assignment; vowels of the second type are assigned stress as the stress rules postulated in Chapter 3 predict but vowels of the first type are not assigned stress at all.

On these grounds, we assume that vowels of the first type are epenthetic and those of the second type underlying. We also assume that epenthesis applies in JA to satisfy some language specific phonotactic constraints which do not allow two consonant clusters word-finally and three consonant clusters word-medially. These constraints comply with the peak of sonority principle.

In MSA, the question of epenthesis does not arise. MSA allows clusters of two consonants word-finally. Word-medially, clusters of three consonants do not arise in MSA. In MSA, the attachment of a consonant-initial suffix to nouns which have final clusters of two consonants does not create a three consonant cluster because in these contexts a vowel which marks case shows up obligatorily.

To account for the appearance of the alternating high vowel in question in the form of [i], we postulated rules (7') of epenthesis. To account for its appearance in the form of [u], we postulated rules (26), (32), (34), and (40). In the derivation of the vowel in question, the rules apply whenever their SD is satisfied. The need for a rule ordering constraint does not arise because the principle of Proper

Inclusion Precedence accounts for that.

In this chapte

counter evidence

The chapter is di

consider some da

(26) which epent

second section, v

evidence to rule

(32) of epenthes

[+back] consonan

rule (34) of epe

coronal emphat

epenthesis whi

coronal and a f

section, we co

second radical

vowel-initial

Regarding this

underlying; th

epenthetic and

vowel which

fourth section

Chapter 5

Problematic Data

In this chapter, we consider some data which are potential counter evidence to the rules of epenthesis postulated in Chapter 4. The chapter is divided into four sections. In the first section, we consider some data which are potential counter evidence to rule (26) which epenthesizes [u] in the context of a preceding [u]. In the second section, we consider some data which are potential counter evidence to rule (7') of epenthesis which predicts an [i] vowel, rule (32) of epenthesis which applies in the context of a following [+back] consonant and a preceding [-cor] and predicts an [u] vowel, rule (34) of epenthesis which applies in the context of a following coronal emphatic and predicts an [u] vowel, and rule (40) of epenthesis which applies in the context of a preceding [+back] coronal and a following [-cor] and predicts an [u] vowel. In the third section, we consider the vowel which appears between the first and second radicals in imperfect verb forms in the context of a vowel-initial suffix and the first person singular prefix [ʔa-]. Regarding this vowel, we consider three analyses: that the vowel is underlying; that it is a metathesized vowel; and that the vowel is epenthetic and that its quality is determined by the underlying vowel which appears between the second and third radicals. The fourth section is a conclusion.

5.1. Data problem

In this sectio

counter evidence

predicts the vow

Consider the dat

(1.A): fújil (*fú

búšil (*bu

(1.B): xúbuz~xu

búruǰ~bu

xúruǰ~xu

(1.C): gúlit~gú

ṣúmit~ṣ

búsit~bú

šúfit~šú

zúrit~zu

In (1.A), th

rule (26). In (

[u]. The forms

which predict

alternates be

alternate is r

common amo

5.1. Data problematic to rule (26):

In this section, we consider some data which are potential counter evidence to rule (26) of epenthesis in Chapter 4, which predicts the vowel to be a copy of the preceding [+high,+back] vowel. Consider the data in (1.A,B,C):

(1.A): fújil (*fújul) "raddish"
búšil (*búšul) "bushel"

(1.B): xúbuz~xubíz "bread"
búruǰ~buríǰ "tower"
xúruǰ~xuríǰ "kind of bag"

(1.C): gúlit~gúlut "I said"
ṣúmit~ṣúmut "I fasted"
búsit~búsut "I kissed"
šúfit~šúfut "I saw"
zúrit~zúrut "I visited"

In (1.A), the vowel is [i] which is contrary to the predictions of rule (26). In (1.B), the vowel optionally alternates between [i] and [u]. The forms with [i] are potential counter evidence to rule (26) which predicts an [u] vowel. In (1.C) also, the vowel optionally alternates between [i] and [u], but it is more commonly [i]. The [u] alternate is more common among the older generation and less common among the younger generation. This alternation is not

predictable by rul

The high vowe

underlying becaus

Chapter 4 are epe

claim, consider (

(2.A): fújil-hum

búšil-hum

(2.B): xúbiz-hur

búrij-hur

xúrij-hur

(2.C): gúli-t-hu

ṣúmi-t-h

búsi-t-hu

šúfi-t-hu

zúri-t-h

In (2.A,B,C

creates a two

assignment ru

assigned stre

assigned stre

epenthetic vo

To accoun

instead of [u

predictable by rule (26).

The high vowel in question in (1.A-C) cannot be considered underlying because it patterns with the vowels which we argued in Chapter 4 are epenthetic. For further evidence in support of this claim, consider (2.A,B,C), with regard to stress.

(2.A): fújil-hum ~*fujíl-hum "their raddish"
búšil-hum ~*bušíl-hum "their bushel"

(2.B): xúbiz-hum~*xubíz-hum "their bread"
búriǰ-hum~*buríǰ-hum "their tower"
xúriǰ-hum~*xuríǰ-hum "their bag"

(2.C): gúli-t-hum~*gulí-t-hum "I said to them"
ṣúmi-t-hum~*ṣumí-t-hum "I fasted on them"
búsi-t-hum~*busí-t-hum "I kissed them"
šúfi-t-hum~*šufí-t-hum " I saw them"
zúri-t-hum~*zurí-t-hum "I visited them"

In (2.A,B,C), the attachment of the consonant-initial suffix creates a two-consonant cluster. Accordingly, the stress assignment rules predict that the vowel before the cluster be assigned stress. But contrary to this prediction, the vowel is not assigned stress. In this behavior, the vowel patterns with epenthetic vowels.

To account for the appearance of the vowel in the form of [i] instead of [u] as in *fújil* "raddish", we assume that the vowel

appears as [i] in

of epenthesis, W

(26).

Rule (3):

Ø ---->

[

[

Rule (3) app

context is rela

minimized, inc

/fujl/, and /bu

that /r/ is [+b

contexts whic

native speaker

which satisfy

(1.A) are acco

In (1.B), t

that the vowe

it appears as

dialects in w

dialects, the

change which

change is pr

dialects wit

with [i] repr

appears as [i] in the context of unemphatic coronals. This is rule (3) of epenthesis, which properly includes and so takes precedence on (26).

Rule (3):

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [-back] \end{matrix} \Big/ \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \begin{matrix} C \\ [+cor] \\ [-back] \end{matrix} \_\_\_ \begin{matrix} C \\ [+cor] \\ [-back] \end{matrix} C$$

Rule (3) applies in an environment in which the consonantal context is relatively complex and therefore vowel distinctions are minimized, including the contrast of [i] and [u]. Rule (3) applies to /fuǰl/, and /bušl/, yielding [fuǰil] and [bušil], respectively. Note that /r/ is [+back] like an emphatic consonant. Note also that the contexts which satisfy the SD of rule (3) are very limited. As a native speaker informant of JA, I cannot think of any other words which satisfy the SD of the rule. On these grounds, the words in (1.A) are accounted for.

In (1.B), to account for the alternation of the vowel, we assume that the vowel appears as [u] in compliance with rule (26) and that it appears as [i] under the influence of borrowing from other Arabic dialects in which the corresponding vowel is [i]. In the urban dialects, the vowel is [i] as in *xúbiz*. This also reflects a language change which goes in the direction of using [i] instead of [u]. This change is probably initiated under the influence of the other dialects with which JA is in contact. I assume the prnounciations with [i] represent code-switching and as such are outside the rules

of JA.

In (1.C), the vo
of the vowel in t
appearance in the
with [i], as I hav
such are outside

To sum up, th
indicate that th
yonger generati
progress in whi
contexts, repla
explantion for t
grounds, we ca
exceptions to r

5.2. Data probl

In this sec
counter evide
Consider the

(4.A): gabuş
galub
şalub
şafuh
ţaşum
rafuş

of JA.

In (1.C), the vowel alternates between [u] and [i]. The appearance of the vowel in the form of [u] is predictable by rule (26), but its appearance in the form of [i] is not. I assume the pr̥n̥unciations with [i], as I have indicated above, represent code-switching and as such are outside the rules of JA.

To sum up, the analyses of the data in (1.A,B,C) and (2.A,B,C) indicate that the vowel tends to show up as [i], especially among the yonger generation. We take this as evidence of a language change in progress in which the use of the [i] form is generalized to more contexts, replacing [u] which tends to lose ground to [i]. A possible explantion for this is that [i] is less marked than [u]. On these grounds, we can say that the data in (1.A,B,C) represent principled exceptions to rule (26) of epenthesis.

5.2. Data problematic to rules (7', 32, 34, and 40):

In this section, we consider some data which are potential counter evidence to rules (7'), (32), (34), and (40) in Chapter 4. Consider the data in (4.A,B,C,D). Stress is regular and not indicated.

(4.A): gabuʕ "peeling"
galub "heart"
ṣalub "crucifiction"
ṣafuh "forgiveness"
ṭaʕum "taste"
rafuʕ "lifting"

(4.B): nabiʂ "spri

čalib "dog

salib "robb

safih "foot

daʂim "co

nafiʂ "ben

(4.C): šaariʂ "st

šaabik "e

faaxif "v

šaaðir "v

maakir

raafiḑ

(4.D): šaruʂ "l

šabuk "e

faxur "p

šaður "s

makur "

rafuḑ "

The data i

vowel. But co

In (4.B), the

identical to

is [i] as rule

(32), (34), a

(4.B): nabiʕ "spring"

čalib "dog"

salib "robbing"

safih "foot of a hill"

daʕim "collision"

nafiʕ "benefit"

(4.C): šaariʕ "street"

šaabik "entangled"

faaxif "valuable"

šaaðir "vacancy"

maakir "treacherous"

raafiḑ "rejecting"

(4.D): šaruʕ "law"

šabuk "entangling"

faxur "pride, bragging"

šaður "soaring"

makur "treachery"

rafuḑ "rejection"

The data in (4.A) satisfy the SD of rule (7') which predicts an [i] vowel. But contrary to the predictions of rule (7'), the vowel is [u]. In (4.B), the directly preceding and following consonants are identical to those of the corresponding vowel in (4.A), but the vowel is [i] as rule (7') predicts. The data in (4.C) satisfy the SD of rules (32), (34), and (40) which predict an [u] vowel. But contrary to the

predictions of th

preceding and fol

corresponding co

To account fo

have to take into

In (4.A), the init

(4.B), it is neith

affects the foll

context of a pre

vowel is [-back

2).

Rule (5):

[+syl

[-hig

Rule (5) p

velars and em

context, we p

Rule (6):

Ø –

Rule (6)

[-high, +bac

predictions of these rules, the vowel is [i]. In (4.D), the directly preceding and following consonants are identical to those of the corresponding consonants but the vowel is [u] as the rules predict.

To account for the appearance of the vowel as [u] in (4.A), we have to take into consideration the quality of the preceding vowel. In (4.A), the initial consonant is either emphatic or velar, while in (4.B), it is neither emphatic nor velar. In (4.A), the initial consonant affects the following low vowel which becomes [+back] in the context of a preceding velar or emphatic. In other contexts, the low vowel is [-back], [æ]. This is rule (5) (repeated from (2) in Chapter 2).

Rule (5):

$$\begin{matrix}[+syll] \\ [-high]\end{matrix} \longrightarrow \begin{matrix}[+back] \\ \\ \end{matrix} \; / \; \begin{matrix}[-syll] \\ [+back]\end{matrix} \; \_\_\_$$

Rule (5) predicts the low preceding vowel to be [+back] after velars and emphatics. To account for epenthesis of [u] in this context, we postulate rule (6).

Rule (6):

$$\emptyset \longrightarrow \begin{matrix}V \\ [+high] \\ [+back]\end{matrix} \; / \; \begin{matrix}V \\ [-high] \\ [+back]\end{matrix} \; C \; \_\_\_ \; C \; C$$

Rule (6) predicts the vowel to be [u] in the context of a preceding [-high, +back] vowel as in (4.A). Rule (6) does not apply to the data

in (4.B) because i

[-back].

Rules (6) abo

simplified into o

Rule (7):

Ø ---

Rule (7), wh

general than ei

context of a pr

contexts of bo

[+high, +back]

in (4.A) are ac

To accoun

(8.A-B), which

respectively.

(8.A): šaarís+

šaabík+

faaxír+

šaaδír+

maakí

raafíð

in (4.B) because its SD is not satisfied; the preceding vowel is [-back].

Rules (6) above and (26) of epenthesis in Chapter 4 can be simplified into one rule. This is rule (7).

Rule (7):

$$\emptyset \longrightarrow \begin{matrix} V \\ [+high] \\ [+back] \end{matrix} \; / \; \begin{matrix} V \\ [+back] \end{matrix} \; C \_\_\_ C \; C$$

Rule (7), which is a simplification of rules (6) and (26), is more general than either rule. Rule (7) predicts an [u] vowel in the context of a preceding [+back] vowel. This captures the preceding contexts of both rule (6) and (26) in which the preceding vowel is [+high, +back] and [-high, +back], respectivly. On this basis, the data in (4.A) are accounted for.

To account for the [i] vowel in (4.C), we consider the data in (8.A-B), which include the same roots as (4.C) and (4.D), respectively.

(8.A): šaaríʕ+hum "their street"
šaabík+hum "entangling them"
faaxír+hum "their valuable thing"
šaaðír+hum "their vacancy"
maakír+hum "their treacherous one"
raafíð̩+hum "rejecting them"

(8.B): šáruʕ-hum (

šábuk-hum

fáxur-hum

šáður-hum

mákur-hum

ráfuʔ-hum

In (8.A), the

rules predict. T

consonant-initi

(8.B), the corre

that the status

that of the cor

assume that th

the correspond

of epenthesis

apply to a clu

there is no su

cluster. Thu

Thus, the dat

(32), (34), (4

Now cons

(9.A): ʔiy-ná

ʔiy-ħ

ʔiy-m

ʔiy-ʕ

(8.B): šáruʂ-hum (*šarúʂ-hum) "law"

šábuk-hum (*šabúk-hum) "entangling"

fáxur-hum (*faxúr-hum) "pride, bragging"

šáður-hum (*šaðúr-hum) "soaring"

mákur-hum (*makúr-hum) "treachery"

ráfuǰ-hum (*rafúǰ-hum) "rejection"

In (8.A), the vowel in question is assigned stress as the stress rules predict. This is the result of the attachment of the consonant-initial suffix to the corresponding data in (4.C). But in (8.B), the corresponding vowel is not assigned stress. This argues that the status of the vowel in question in (8.A) is different from that of the corresponding high vowel in (8.B). On this basis, we assume that the high vowel of the stem in (8.A) is underlying while the corresponding one in (8.B) is epenthetic. Accordingly, the rules of epenthesis do not apply to the data in (4.C). Rules of epenthesis apply to a cluster of three consonants word-medially. But in (8.A), there is no such cluster. The underlying vowel breaks such a cluster. Thus the SD of the rules of epenthesis is not satisfied. Thus, the data in (4.C) are removed as counter evidence to rules (32), (34), (40).

Now consider the data in (9.A-B).

(9.A): ʔiy-nággiṣ "he increases"

ʔiy-ħáǰǰir "he prepares"

ʔiy-máxxiṭ "he clears the nose"

ʔiy-ʂárriǰ "he widens"

5.3. Imperfec

The data in (

of Chapter (4).

context of a pr

predicts that t

[+back]. Rule (

of a preceding

Again, this

the data in (9

context of a f

Thus, it is no

(9.B): ʔiy-naggíṣ

ʔiy-ħaʕʕí

ʔiy-maxxí

ʔiy-ɛarrí

ʔiy-ṣarrí

ʔiy-ṣárrí

In this se

between the

verbs. Cons

(10.A): ʔá-ħ

ʔá-s

ʔiy-ṣárrif "he cashes"

(9.B): ʔiy-naggíṣ+ha "he decreases it"

ʔiy-ħaǰǰír+ha "he prepares it"

ʔiy-maxxíṭ+ha "he clears its nose"

ʔiy-ʕarríǰ+ha "he widens it"

ʔiy-ṣarríf+ha "he cashes it"

The data in (9.A,B) is counter evidence to rule (32), (34) and (40) of Chapter (4). Rule (32) predicts that the vowel is [+back] in the context of a preceding [-cor] and a following [+back]. Rule (34) predicts that the vowel is [+back] in the context of a following [+back]. Rule (40) predicts that the vowel is [+back] in the context of a preceding [+back] and a following [-cor].

Again, this high vowel is different from the vowel in question: the data in (9.B) show that the vowel is assigned stress in the context of a following consonant cluster. The vowel is underlying. Thus, it is not supplied by the rules of epenthesis.

5.3. Imperfect verbs and rules (7', 32, 34, and 40):

In this section, we consider the high vowel which appears between the second and third consonants of the stem in imperfect verbs. Consider (10.A,B,C,D,E,F).

(10.A): ʔá-ħrig "I burn"

ʔá-srig "I steal"

ʔá-krim "l

ʔá-xriǰ "l

ʔá-ṭliʕ "l

(10.B): ʔa-ħríg-h

ʔa-sríg-h

ʔa-krím-

ʔa-xríǰ-h

ʔa-ṭlíʕ-h

(10.C): ʔá-ħirg-

ʔá-sirg-

ʔá-kirm-

ʔá-xirǰ-

ʔá-ṭilʕ-

(10.D): ʔá-nsu

ʔá-lǰur

ʔá-ršu

ʔá-lθu

ʔá-štu

(10.E): ʔa-nsu

ʔa-lǰu

ʔa-rš

ʔa-lθ

ʔa-št

ʔá-krim "I honor"

ʔá-xrij "I force out"

ʔá-ʈliʂ "I pull up"

(10.B): ʔa-ħríg-hum "I burn them"

ʔa-sríg-hum "I steal them"

ʔa-krím-hum "I honor them"

ʔa-xríj-hum "I force them out"

ʔa-ʈlíʂ-hum "I pull them up"

(10.C): ʔá-ħirg-ak "I burn you"

ʔá-sirg-ak "I steal you"

ʔá-kirm-ak "I honor you"

ʔá-xirj-ak "I force you out"

ʔá-ʈilʂ-ak "I pull you up"

(10.D): ʔá-nsuf "I plow up"

ʔá-ljum "I tighten the mouth"

ʔá-ršug "I splash"

ʔá-lθum "I kiss"

ʔá-štum "I curse"

(10.E): ʔa-nsúf-hum "I plow them up"

ʔa-ljúm-hum "I tighten their mouths"

ʔa-ršúg-hum "I splash them"

ʔa-lθúm-hum "I kiss them"

ʔa-štúm-hum "I curse them"

(10.F): ʔá-nusí-a

ʔá-lujm-a

ʔá-rušg-a

ʔá-luθm-

ʔá-šutm-

In (10.A), the

consonants of t

stress rules pr

attached, the s

predict. In (10

stem vowel do

but a vowel id

radicals. This

rules, is not a

second and th

(10.E) as in (1

vowel is assi

(10.C), where

does not sho

identical to

vowel, contr

assigned str

Accordi

the quality

the stem co

non-back v

(10.F): ʔá-nusʃ-ak "I plow you up"

ʔá-lujm-ak "I tighten your mouth"

ʔá-rušg-ak "I splash you"

ʔá-luθm-ak "I kiss you"

ʔá-šutm-ak "I curse you"

In (10.A), the high vowel between the second and third consonants of the stem is [i] and stress is on the prefix as the stress rules predict. In (10.B), where a consonant-initial suffix is attached, the stem vowel is assigned stress as the stress rules predict. In (10.C), where a vowel-initial suffix is attached, the stem vowel does not show up between the second and third radicals, but a vowel identical to it shows up between the first and second radicals. This high vowel, contrary to the predictions of the stress rules, is not assigned stress. In (10.D), the high vowel between the second and third consonants is [u] as assigned by the lexicon. In (10.E) as in (10.B), where a consonant-initial suffix is attached, the vowel is assigned stress as the stress rules predict. In (10.F) as in (10.C), where a vowel-initial suffix is attached, the stem vowel does not show up between the second and third radicals, but a vowel identical to it shows up between the first and second radicals. This vowel, contrary to the predictions of the stress rules, is not assigned stress.

According to the rules of epenthesis which we have postulated, the quality of the vowel between the first and second consonants of the stem could be determined by the consonantal context when a non-back vowel precedes and by the vocalic context when a back

vowel precedes.

appears between

appears not to be

consonantal cont

contexts which

between coronal

epenthesis whic

case that of the

consonants as s

respectively.

To account

the vowel is ur

vowel is meta

vowel is epent

5.3.1. The unde

Under the

first and sec

account for t

(10.C) and (1

verb stem th

Rule (11):

Im

Accordi

vowel precedes. But in (10.C,F), the quality of the vowel which appears between the first and second consonants of the stem appears not to be determined by either the vocalic or the consonantal context. In (10.C), the vowel is [i] in consonantal contexts which predict [u] (rule 34). In (10.F), the vowel is [u] between coronals, contrary to the predictions of rule (7') of epenthesis which predicts [i]. The quality of these vowels is in each case that of the vowel which shows up between the second and third consonants as shown by the data in (10.A,B) and (10.D,E), respectively.

To account for this, we consider three analyses. The first, that the vowel is underlying, is presented in 5.3.1. The second, that the vowel is metathecized, is presented in 5.3.2. The third, that the vowel is epenthetic, is presented in 5.3.3.

5.3.1. The underlying vowel analyses:

Under the assumption that the vowel which appears between the first and second consonants of the stem is underlying, we have to account for the failure of the vowel to be assigned stress as in (10.C) and (10.F). Under this assumption, we assign the imperfect verb stem the underlying form in (11).

Rule (11):

Imperfect verb stem: /CVCVC/

According to rule (11), we assign the stem of the data in

ʔa-t̪ʲiːiʃ

(12.D): ʔa-nuʃ

ʔa-luʃ

ʔa-ruʃ

ʔa-luʃ

ʔa-ʂuʃ

(12.E): ʔa-n

(12.C): ʔa-ħirʲ

ʔa-sirʲg

ʔa-kirʲm

ʔa-xirʲ

ʔa-t̪ʲiːiʃ

(12.B): ʔa-ħirʲg

ʔa-sirʲg

ʔa-kirʲm

ʔa-xirʲ

ʔa-t̪ʲiːiʃ

(12.A): ʔa-ħirʲg

ʔa-sirʲg

ʔa-kirʲm

ʔa-xirʲ

ʔa-t̪ʲiːiʃ

(10.A-F), the unde

(10.A-F), the underlying representations in (12.A-F), respectively.

(12.A): ʔa-ħirig "I burn"
ʔa-sirig "I steal"
ʔa-kirim "I honor"
ʔa-xirij̆ "I force out"
ʔa-ṭiliʂ "I pull up"

(12.B): ʔa-ħirig-hum "I burn them"
ʔa-sirig-hum "I steal them"
ʔa-kirim-hum "I honor them"
ʔa-xirij̆-hum "I force them out"
ʔa-ṭiliʂ-hum "I pull them up"

(12.C): ʔa-ħirig-ak "I burn you"
ʔa-sirig-ak "I steal you"
ʔa-kirim-ak "I honor you"
ʔa-xirij̆-ak "I force you out"
ʔa-ṭiliʂ-ak "I pull you up"

(12.D): ʔa-nusuf "I plow up"
ʔa-lujum "I tighten the mouth"
ʔa-rušug "I splash"
ʔa-luθum "I kiss"
ʔa-šutum "I curse"

(12.E): ʔa-nusuf-hum "I plow them up"

ʔa-lujum-

ʔa-rušug-

ʔa-luθum

ʔa-šutum

(12.F): ʔa-nusuf

ʔa-lujum

ʔa-rušug

ʔa-luθur

ʔa-šutur

In (12.C,E),
of the verb is
account for th
first and seco
be assigned st
(12.C,F). We a
in the contex
vowel which
referred to a
in (12.A,D) or

To accoun
stress, we h
suffix stres
(13).

ʔa-luǰum-hum "I tighten their mouths"

ʔa-rušug-hum "I splash them"

ʔa-luθum-hum "I kiss them"

ʔa-šutum-hum "I curse them"

(12.F): ʔa-nusuf-ak "I plow you up"

ʔa-luǰum-ak "I tighten your mouth"

ʔa-rušug-ak "I splash you"

ʔa-luθum-ak "I kiss you"

ʔa-šutum-ak "I curse you"

In (12.C,E), the form of the underlying representation of the stem of the verb is /-CVCVC-/. Under this assumption, we have to account for the failure of the vowel which appears between the first and second radicals (to be referred to as the "first vowel") to be assigned stress when a vowel-initial suffix is present as in (12.C,F). We also have to account for the absence of the first vowel in the context of a consonant-initial suffix as in (12.B,F), and the vowel which appears between the second and third radicals (to be referred to as the "second vowel") in the context of a zero suffix as in (12.A,D) or a vowel-initial suffix as in (12.C,F).

To account for the failure of the first vowel to be assigned stress, we have to assume that in the context of a vowel-initial suffix stress is morphologized to the prefix of the verb. This is rule (13).

Rule (13):

V ---

Rule (13) of
prefix of the ve
conditioned rul
the general str
morphologicall

To account
(14) of high st

Rule (14):

V --
[+high]

Rule (14)
context of a
in (10,A,D) i
consonant.

To accou
rule (15) of

Rule (15):

V
[+h

Rule (13):

$$V \text{ ---> } [+\text{stress}] \; / \; \_\_\_\_ [\; X \;]_{\text{imperfect}} \; -V$$

Rule (13) of stress morphologization assigns stress to the prefix of the verb in (12.C,F). In their application, morphologically conditioned rules take precedence over other rules. This includes the general stress rules postulated in Chapter 3; those rules are not morphologically conditioned. On these grounds, rule (13) which is morphologically conditioned applies before the general stress rules.

To account for the absence of the first vowel, we postulate rule (14) of high stem vowel deletion (HSVD).

Rule (14):

$$V \text{ ---> } \emptyset \; / \; \_\_\_\_ \; C \quad V \quad C]_{\text{stem}} \; C$$

$$[+\text{high}]$$

Rule (14) accounts for the absence of the first vowel in the context of a consonant-initial suffix as in (10.B,E), or no suffix as in (10,A,D) if we think of a word boundary as equivalent to a consonant.

To account for the absence of the second vowel, we postulate rule (15) of high stem vowel deletion (HSVD).

Rule (15):

$$V \text{ ---> } \emptyset \; / \; \_\_\_\_ \; C]_{\text{stem}} \; V$$

$$[+\text{high}]$$

Rule (15) acco

context of a vow

By using the

collapsed into or

Rule (16):

V

[+high]

Rule (16) a

contexts.

In (17), we

representation

of the rules w

(17):

/ʔa-nus

ʔá-nusu

ʔá-nus

[ʔá-nus

In (17),

the applicat

/ʔa-nusuf-

Rule (15) accounts for the absence of the second vowel in the context of a vowel-initial suffix as in (10.C,F).

By using the angled brackets notation, rules (14) and (15) can be collapsed into one rule. This is rule (16).

Rule (16):

$$V \xrightarrow{[+high]} \emptyset \;/\; \_\_\_ \langle C\ V \rangle\ C]_{stem}\ [\langle - \rangle\ +syl]$$

Rule (16) applies to both vowel-initial and consonant-initial contexts.

In (17), we present the derivation of the phonetic representation (PR) of /ʔa-nusuf-ak/, /ʔa-nusuf-hum/ on the basis of the rules we postulated under the underlying vowel analyses.

(17):

/ʔa-nusuf-ak/	/ʔa-nusuf-hum/	UR, rule (11)
ʔá-nusuf-ak	---	Rule (13): Stress
ʔá-nusf-ak	---	Rule (16): HSVD
---	ʔa-nusúf-hum	Rule (15) in ch. 3: Stress
---	ʔa-nsúf-hum	Rule (16): HSVD
[ʔá-nusf-ak]	[ʔa-nsúf-hum]	PR

In (17), under the assumption that the first vowel is underlying, the application of the stress and high vowel deletion rules to /ʔa-nusuf-ak/ and /ʔa-nusuf-ak/ yield the correct PR.

Morphologically
pre-empt the ge
deletion, respec
before the gener
requirement cor
rules is the prin
before other ru

However, so
that the first v
represents ste

(18): ʔá-smaʕ
ʔá-ʕmal
ʔá-šrab
ʔá-rfaʕ

In (18), t
The stem of
the context o
evidence for
radicals. Th
have an unde

Thus un
underlying
To maintai
analyses, w
in Arabic i

Morphologically conditioned rules, that is rules (13) and (15), pre-empt the general rules of stress and rule (16) of high vowel deletion, respectively. The analyses require that rule (13) apply before the general stress rule. One interpretation of this requirement consistent with the exclusion of extrinsic ordering of rules is the principle that morphologically conditioned rules apply before other rules.

However, some questions can be raised against the assumption that the first vowel is underlying. Consider the data in (18) which represents stems with low vowels.

(18): ʔá-smaʕ-ak~*ʔá-samʕ-ak "I hear you"
ʔá-ʕmal-ak~*ʔá-ʕaml-ak "I do yoy"
ʔá-šrab-ak~*ʔá-šarb-ak "I drink you"
ʔá-rfaʕ-ak~*ʔá-rafʕ-ak "I lift you"

In (18), the low stem vowel gives no evidence to alternation. The stem of the verb has only one vowel which does not alternate in the context of vowel or consonant-initial suffixes. The data give no evidence for the existence of a vowel between the first and second radicals. This argues that verbs with an underlying [-high] vowel have an underlying stem of the form /-CCVC-/.

Thus under rule (11), we miss a generalization that the underlying form of the imperfect verb stem in Arabic is /-CCVC-/. To maintain this generalization under the underlying vowel analyses, we assume that the underlying form of the imperfect stem in Arabic is as in (19).

(19):

Imperfect v

In (19), the

(19) has some a

related to the s

and second radi

third radicals,

postulate rules

On the basis of

position, but n

Under the

the vowel bet

second and th

Rule (20): Imp

Rule (21): Im

Rule (20)

stem vowel

Rule (21) ac

stem vowel

(10.D). It a

[-high] ster

and applies

(19):

Imperfect verb stem: /-V, CCC-/.

In (19), the position of the stem vowel is not specified. Rule (19) has some advantages over rule (11). In (19), the problems related to the simultaneous presence of the vowel between the first and second radicals, on the one hand, and between the second and third radicals, on the other, do not arise. We do not have to postulate rules which delete either the first or the second vowel. On the basis of rule (19), the vowel can only appear in either position, but not simutaneously in both.

Under the assumption in (19), to account for the appearance of the vowel between the first and second radicals and between the second and third radicals, we postulate rules (20) and (21).

Rule (20): Imperfect verb stem: $-C\ \begin{matrix}V\\ [+high]\end{matrix}\ C\ C-/\ -V$

Rule (21): Imperfect verb stem: -CCVC-

Rule (20) accounts for the imperfect stem of verbs with a high stem vowel in the context of a vowel-initial suffix as in (10.C). Rule (21) accounts for the imperfect verb stem of verbs with a high stem vowel and in the context of a consonant-initial suffix as in (10.D). It also accounts for the imperfect stem of verbs with a [-high] stem vowel as in (18). Rule (20) properly includes rule (21) and applies disjunctively in relation to it. Rules (20) and (21)

comply with the
pattern morphol
over rule (21). R
and a vowel-init
consonant initia
as in (10.A,D).

The function
linearize a non-
does not arise
rule (19). The
Accordingly, w

In (22), we
ʔánusfak "I e
assumptions

(22):

ʔa-nusf-a

ʔá-nusf-

[*ʔá-nusf-*

The ana
question re
analyses ba
the prefix

comply with the analysis of Hudson (1985) of Arabic root and pattern morphology. In their application, rule (20) takes precedence over rule (21). Rule (20) applies in the context of a high stem vowel and a vowel-initial suffix, and rule (21) else where. This includes consonant initial contexts and contexts where no suffix is present as in (10.A,D).

The function of rules (20) and (21) in relation to rule (19) is to linearize a non-linearized input. The need for this linearizarion does not arise if we postulate rules (20) and (21) independently of rule (19). The postulation of rules (20) and (21) pre-empt rule (19). Accordingly, we dispense with it.

In (22), we illustrate the derivation of the imperfect verbs *ʔánusfak* "I explode you" and *ʔansúfhum* "explode them" under the assumptions of rules (20), and (21).

(22):

ʔa-nusf-ak (Rule 20) *ʔa-nsuf-hum* (Rule 21)

ʔá-nusf-ak	---	Rule (13): Stress
---	ʔa-nsúf-hum	Rule (15) in ch. 3: Stress
[ʔá-nusf-ak]	[ʔa-nsúf-hum]	PR

The analysis in (22) yields the correct results. However, a question related to stress assignment might be raised against the analyses based on rules (20) and (21). In (22), stress is assigned to the prefix vowel vowel by a morphologically conditioned rule. That

is rule (13). In

conditioned rule

prediction. On t

reconsidered in

is the metathes

5.3.2. The meta

To account

(23) of metath

Rule (23):

C

1

Under th

imperfect, t

imperfect st

satisfy the

Rule (23

posited by

stem bound

metathesiz

boundary i

[+high,-lon

against a

is rule (13). In our analysis, we resort to this morphologically conditioned rule when other analyses fail to yield the correct prediction. On these grounds, the underlying analysis will be reconsidered in the light of the findings of the other analysis, that is the metathesis and epenthesis analyses.

5.3.2. The metathesis analyses:

To account for the derivation of the vowel, we postulate rule (23) of metathesis.

Rule (23):

$$\frac{C\ C\ V\ C]_{\text{imperfect}}\ -V}{1\ 2\ 3\ \ \ 4} \quad ===>\ 1\ \ 3\ \ 2\ \ 4$$

Under the usual assumption about the stem shape of the imperfect, that the form of the underlying representation of the imperfect stem is /-CCVC-/, the verb forms of the data in (10.C,F) satisfy the SD of rule (23) of metathesis.

Rule (23) of metathesis is similar to the rule of metathesis posited by Alghazo (1987: 92) in his analysis of JA except for the stem boundary and the features which specify the identity of the metathesized vowel. Alghazo's rule does not include the stem boundary in its SD, and the metathesized vowel is [+high,-long,-stress]. In his analysis, Alghazo (1987: 92-94) argues against a metathesis rule. His main argument against metathesis is

that the functio

of high vowel de

epenthesis, whi

Alghazo,1987).

rule to superfic

This argum

show that the

rules of high v

always accoun

some contexts

by the rules o

deletion feeds

consonant clu

But the rule

appearance o

The rules of

ʔá-šutm-ak

of a precedi

environment

the environ

vowels by

In (24),

by applying

(24):

that the function of a rule of metathesis is exactly the same as that of high vowel deletion (syncope in his terms) followed by epenthesis, which he argues are independently motivated (see Alghazo,1987). Accordingly, he views metathesis as an additional rule to superficially account for certain facts in the language.

This argument against metathesis can be successful if we can show that the vowel in question can be accounted for by applying the rules of high vowel deletion and epenthesis. But these rules do not always account for the appearance of the vowel in question. In some contexts, the appearance of the vowel cannot be accounted for by the rules of syncope and epenthesis. The rule of high vowel deletion feeds into the rule of epenthesis; it creates a three consonant cluster which satisfies the SD of the rule of epenthesis. But the rule or rules of epenthesis fail to account for the appearance of the vowel in the form of [u] in contexts such as (10.F). The rules of epenthesis predict the vowel to be [i] in (10.F), but in *ʔá-šutm-ak* "I curse you" as in (10.F) the vowel is [u] in the context of a preceding and following coronal. That is, [u] appears in the environment (10.F) in exactly and only the stems which have [u] in the environment (10.E). The [u] of (10.E) and (10.F) are the same vowels by metathesis.

In (24), we present the derivation of *ʔá-šutm-ak* "I curse you" by applying the rules of high vowel deletion and epenthesis.

(24):	/ʔa-štum-ak/	UR (assumption 20)
	ʔá-štum-ak	Rule (13): Stress
	ʔá-štm-ak	Rule (15): HSVD

ʔá-š

*[ʔá-š

In (24), rule (7'

predicted an [i]

further discuss

Under the m

harmony (see b

job of three ru

the epenthesis

deletion, epen

metathesis be

vowel harmon

In (25), v

applying rule

(25): /ʔa-štu

ʔá-štu

ʔá-šut

[ʔá-šu

The anal

condition o

applies onl

to the penu

In our a

their SD is

ʔá-šitm-ak	Rule (7') in ch.4: Epenthesis
*[ʔá-šitm-ak]	PR

In (24), rule (7') of epenthesis yields the wrong prediction: it predicted an [i] vowel instead of [u]. The epenthesis analysis is further discussed in (5.3.3).

Under the metathesis analysis, the need for a rule of vowel harmony (see below) does not arise. The rule of metathesis does the job of three rules--deletion, epenthesis, and harmony as it arises in the epenthesis analysis. On the other hand, the rules of high vowel deletion, epenthesis, and vowel harmony can not do the job of metathesis because the rule of deletion bleeds the context of the vowel harmony rule.

In (25), we present the derivation of the PR of /ʔa-štum-ak/, applying rule (23) of metathesis.

(25):	/ʔa-štum-ak/	UR
	ʔá-štum-ak	Rule (15, Ch. 3): Stress
	ʔá-šutm-ak	Rule (23): Metathesis
	[ʔá-šutm-ak]	PR

The analysis in (25) yields the correct prediction if we impose a condition on the application of the stress rule and assume that it applies only once. Without this condition stress will have to shift to the penultimate vowel, yielding *[ʔa-šútm-ak].

In our analysis, however we assume that rules apply whenever their SD is satisfied, but constraints on the application of rules are

allowed in the f
universals such
the principle wh
take precedence
metathesis ana
assignment of
principle of rul
(25) yields the
ordering const
postulated in
stress assignm
rule of stress
SD of both rul
apply once, a
the prefix vo
met. Accord
metathesize

To accou
metathesize
analyses. T
extrinsicall
metathesis
are not ass
morphologi

We reje
constraint
adequacy.

allowed in the form of some general principles which are linguistic universals such as the principle of Proper Inclusion Precedence and the principle which requires that morphologically conditioned rules take precedence. On these grounds, we have either to reject the metathesis analysis or think of another way to account for the assignment of stress. An alternative analysis follows the latter principle of rule application. Under this assumption, the analysis in (25) yields the correct result without the imposition of a rule ordering constraint. In (25), both rule (15) of stress assignment postulated in Chapter 3 and the morphologically conditioned rule of stress assignment in (13) assign stress to the prefix vowel. The rule of stress and the rule of metathesis apply simultanously; the SD of both rules is met. Without the constraint that stress rules apply once, a problem arises if we assume that stress is assigned to the prefix vowel by rule (15). In *ʔášutm-ak,* the SD of rule (15) is met. Accordingly, rule (15) predicts the shifting of stress to the metathesized vowel.

To account for the problem related to the failure of the metathesized vowel to be assigned stress, we consider two analyses. The first is that rules of stress assignment are extrinsically ordered and that they apply before the rule of metathesis and only once. The second is that metathesized vowels are not assigned stress because stress in imperfect verbs is morphologically conditioned as in rule (13).

We reject extrinsic ordering of rules because it is an arbitrary constraint the main motivation of which is achieving observational adeqacy. Extrinsic ordering of rules allows the application of rules

in the order we

analysis, we ass

apply whenever

Linguistic theor

power. The app

general princip

On the othe

mophologically

phonologically

assuming rule

in which it ap

(15).

Still a qu

conditioned s

(26): ʔa-stá-

ʔa-sta-

ʔa-stá-

In (26),

structure o

to the word

(15) in Cha

vowel, yie

conditione

vowel, yie

assume th

in the order we want, just in order to get the desired results. In our analysis, we assume that rules must be intrinsically ordered; rules apply whenever their SD is met (Koutsoudas, et al, 1974: 8). Linguistic theory as such is simpler, and has more explanatory power. The application of rules has to be constrained only by general principles, which have to be universally valid.

On the other hand, if rules are ordered intrinsically and mophologically conditioned rules take precedence over phonologically conditioned rules, the correct forms are generated assuming rule (13), which pre-empts (15) in all lines of derivations in which it applies, including (25), except with (13) rather than (15).

Still a question related to rule (13) of morphologically conditioned stress assignment can be raised. Consider (26).

(26): ʔa-stá-gbil "I welcome"
ʔa-sta-gbíl-hum "I welcome them"
ʔa-stá-gibl-ak "I welcome you"

In (26), stress assignment adjusts to the changes in the structure of the word. A problem arises in the assignment of stress to the word, *ʔa-stá-gibl-ak*. The general stress rules, that is rule (15) in Chapter 3, incorrectly assign stress to the high penultimate vowel, yielding **ʔa-sta-gíbl-ak*. The stress morphologically conditioned rule, that is rule (13), assigns stress to the prefix vowel, yielding **ʔá-sta-gbil-ak*. To account for this problem, we assume that the variable "[X]" in rule (13) stands for a single

morpheme. Unde

stress to the vo

[g] in *ʔa-stá-gl*

evidence to rule

On these gr

account for the

radicals in the

stress assignm

assignment wh

stem. Now, th

metathesized

notational, bu

advantage of

imperfect ve

imperfect ve

attached and

imperfect ve

metathesis

more genera

underlying,

framework

evaluated.

5.3.3. The

Under

that the v

morpheme. Under this interpretation of "[X]", rule (13) will assign stress to the vowel preceding the first radical of the stem, which is [g] in *ʔa-stá-gbil-ak*. Thus the data in (26) are not counter evidence to rule (13) of stress assignment.

On these grounds, we conclude that rule (23) of metathesis can account for the presence of the vowel between the first and second radicals in the context of a vowel-initial suffix. The question of stress assignment is accounted for by rule (13) of stress assignment which assigns stress to the vowel preceding the verb stem. Now, the question arises whether the vowel is underlying or metathesized. The differences between the two analyses may be notational, but the metathesis analysis may be said to have the advantage of capturing more generality about the structure of the imperfect verb stem. In the underlying analysis, we argued that the imperfect verb stem is -CVCC- when a vowel-initial suffix is attached and -CCVC- elsewhere. But in the metathesis analysis, the imperfect verb stem is -CCVC-.in all contexts. This argues that the metathesis analysis has to be preferred on the grounds of capturing more generality about the imperfect verb stem. In Chapter 6, the underlying, metathesis, and epenthesis analyses (within the framework of both linear and non-linear phonology) will be further evaluated.

5.3.3. The epenthesis analysis:

Under this assumption, we have to give evidence which argues that the vowel is predictable. But as we have argued in 5.3, the

rules of epenthes

appearance of th

forms of (10.F).

(27.A): yí-kisr-

tí-kisr-

ní-kisr-

ʔí-kisr-

(27.B): ʔá-kisr

(27.C): yi-ksír

ti-ksír

ni-ksír

ʔi-ksír

(27.D): ʔá-ks

(27.E): yú-nu

tú-nu

nú-nu

ʔú-nu

(27.F): ʔá-n

(27.G): yu-n

tu-n

rules of epenthesis postulated in Chapter 4 fail to predict the appearance of the vowel in the form of [u] in the imperfect verb forms of (10.F). Consider (27.A-H).

(27.A): yí-kisr-ak "he breaks you"
ti-kisr-ak "she breaks you"
ní-kisr-ak "we break you"
ʔí-kisr-uh "you sg. break (imperative) him"

(27.B): ʔá-kisr-ak "I break you"

(27.C): yi-ksír-hum "he breaks them"
ti-ksír-hum "she breaks them"
ni-ksír-hum "we break them"
ʔi-ksír-hum "you sg. break (imperative) them"

(27.D): ʔá-ksír-hum "I break them"

(27.E): yú-nusf-ak "he blows you up"
tú-nusf-ak "she blows you up"
nú-nusf-ak "we blow you up"
ʔú-nusf-uh "you sg. blow (imperative) him up"

(27.F): ʔá-nusf-ak "I blow you up"

(27.G): yu-nsúf-hum "he blows them up"
tu-nsúf-hum "she blows them up"

nu-nsúf-

ʔu-nsúf-

(27.H): ʔa-nsúf-

In (27.A), t

vowel; both vo

shows up betw

consonant-ini

(27.B,D,F,H) is

identical to t

to the vowel

in the contex

the prefix vo

Likewise, in

second vowe

quality of a

vowel, and t

of the prefi

because the

To acco

regressive

Rule (28):

[+

nu-nsúf-hum "we blow them up"

ʔu-nsúf-hum "blow them up (sg. imperative)"

(27.H): ʔa-nsúf-hum "I blow them up"

In (27.A), the vowel in question is identical to the high prefix vowel; both vowels are [i] and are identical to the vowel which shows up between the second and third radicals in the context of a consonant-initial suffix as in (27.C). The low prefix vowel of (27.B,D,F,H) is invariably [a]. In (27.E), the vowel in question is also identical to the prefix vowel; both vowels are [u] and are identical to the vowel which shows up between the second and third radicals in the context of a consonant-initial suffix as in (27.G). In (27.A,C), the prefix vowel, the first vowel and the second vowel are all [i]. Likewise, in (27.E,G), the prefix vowel, the first vowel and the second vowel are all [u]. On these grounds, we assume that the quality of a prefix high vowel is determined by that of the second vowel, and that the quality of the first vowel is determined by that of the prefix vowel; it cannot be determined by the second vowel because the two stem vowels do not show up simultaneously.

To account for the prefix vowel, we postulate rule (28) of regressive high vowel harmony (RHVH).

Rule (28):

$$V \longrightarrow [\alpha back] \;/\; \#\ C \_\_\_ - C\ C\ \underset{[+high]}{V}$$

$$\underset{[+high]}{V} \longrightarrow [\alpha back] \;/\; \#\ C \_\_\_ - C\ C\ \underset{[+high]\ [\alpha back]}{V}$$

Rule (28) of reg

prefix vowels,

high stem vow

radicals, yield

time, rule (28)

harmony whic

epenthesis be

Rule (29):

[+s

[+h

Rule (29) of

vowel. THis

the first an

context of

account for

first and s

vowel whe

(27.B,F). I

prefix vow

yí-kisr-a

Rule (28) of regressive high vowel harmony applies to the imperfect prefix vowels, harmonizing the prefix high vowel to the underlying high stem vowel which appears between the first and second radicals, yielding the correct form of the prefix vowel. At the same time, rule (28) of (RHVH) feeds into a rule of progressive vowel harmony which applies to the vowels inserted by the rules of epenthesis between the first and second radicals. This is rule (29).

Rule (29):

$$\begin{bmatrix}+\text{syll}\\+\text{high}\end{bmatrix} \longrightarrow [\alpha\text{back}] \;/\; \#\,C\;\; V\;\; -C\;\; \_\_\_\;\; C\;\; C \qquad \begin{matrix}+\text{high}\\ \alpha\text{back}\end{matrix}$$

Rule (29) of PHVH harmonizes the epenthetic vowel to the prefix vowel. THis accounts for the correspondence between the forms of the first and second vowels which appear in the verb stem in the context of a preceding high prefix vowel. But the problem is to account for the quality of the high vowel which appears between the first and second radicals in the context of a preceding [-high] prefix vowel where the SD of rule (29) of PHVH is not satisfied as in (27.B,F). In (27.B,F), the first vowel can not be determined by the prefix vowel which is [a]. This is illustrated in the derivation of *yí-kisr-ak, ʔá-kisr-ak, yú-nusf-ak,* and *ʔá-nusf-ak* in (30).

(30): yi-ksir-ak

yí-ksir-ak

---

yí-ksr-ak

yí-kisr-a

[yí-kisr-a

In (30), rules
simultaneous
the SD of bot
to rule (16).
other hand, r
which also f
harmonizes
context of a
the epenthe
vowel as in
Accordingl
[-high] pre
correct fo

On the

(30): yi-ksir-ak	ʔa-ksir-ak	yi-nsuf-ak	ʔa-nsuf-ak	UR
yí-ksir-ak	ʔá-ksir-ak	yí-nsuf-ak	ʔá-nsuf-ak	Rule (15): Stress
---	---	yú-nsuf-ak	---	Rule (28): RHVH
yí-ksr-ak	ʔá-ksr-ak	yú-nsf-ak	ʔá-nsf-ak	Rule (16): HSVD
yí-kisr-ak	ʔá-kisr-ak	yú-nisf-ak	ʔá-nisf-ak	Rule (7'): Epen.
---	---	yú-nusf-ak	---	Rule (29): PHVH
[yí-kisr-ak]	[ʔá-kisr-ak]	[yú-nusf-ak]	*[ʔá-nisf-ak]	PR

In (30), rules (28) of RHVH and rule (16) of HSVD apply simultaneously. After the application of (15) of stress assignment, the SD of both rules is satisfied. Rule (15) is in a feeding relation to rule (16). Accordingly, they are intrinsicaly ordered. On the other hand, rule (16) of HSVD feeds into rule (7') of epenthesis which also feeds into rule (29) of PHVH. Rule (29) of PHVH harmonizes the high vowel inserted by rule (7') of epenthesis in the context of a preceding high suffix vowel but it does not harmonize the epenthetic vowel in the context of a preceding [-high] prefix vowel as in *ʔá-nisf-ak* because its SD is not satisfied. Accordingly, the vowel [i] does not harmonize with the preceding [-high] prefix vowel. This yields *[ʔá-nisf-ak], not [ʔá-nusf-ak], the correct form.

On these grounds, we tentatively conclude that the high vowel

which appears t

verbs is unpred

the framework

analyses accor

metathesized.

the vowel.

5.4. Conclusio

The analy

counter evide

indicate that

first type ap

Alternating

accordingly

appear betw

stem are un

We consider

verb, in the

the vowel p

which appears between the first and second radicals in imperfect verbs is unpredictable by the rules of epenthesis postulated within the framework of linear phonology. This argues in support of the analyses according to which the vowel is either underlying or metathesized. In Chapter 6, we consider the non-linear approach to the vowel.

5.4. Conclusion:

The analysis of the problematic data which pose potential counter evidence to the rules of epenthesis postulated in Chapter 4 indicate that there are two types of alternating high vowel. The first type appears in nouns and the second type appears in verbs. Alternating high vowels which appear in nouns are predictable and accordingly they are epenthetic. But alternating high vowels which appear between the first and second radicals in the imperfect verb stem are unpredictable by the rules of epenthesis and accordingly we consider them either underlying or metathesized. In this type of verb, in the context of a vowel-initial suffix, stress is assigned to the vowel preceding the stem by a morphologically conditioned rule.

In this cha

vowel in ques

(1987) of JA

first section,

This includes

postulated to

the second s

to the derive

the autosegr

linear appro

6.1. The non

In this s

the vowel.

default, tie

vowel harm

on the basi

6.1.1. Sync

Syncop

vocalic s

Chapter 6

A Non-linear Approach

In this chapter, we review the autosegmental approach to the vowel in question. Our review is based on the analysis of Alghazo (1987) of JA data. The chapter is divided into three sections. In the first section, we present the autosegmental approach to the vowel. This includes a presentation of the autosegmental rules which are postulated to account for the derivation of the vowel in question. In the second section, we apply the rules presented in the first section to the derivation of the vowel in some JA data. In the third section, the autosegmental approach is evaluated in comparison with the linear approach presented in Chapters 4 and 5.

6.1. The non-linear approach:

In this section, we present the rules involved in the derivation of the vowel. This includes rules of syncope, epenthesis, association, default, tier conflation, emphasis spreading, emphasis rounding, and vowel harmony. These rules are either as postulated by Alghazo or on the basis of his analysis when the rule is informally presented.

6.1.1. Syncope:

Syncope is viewed by Alghazo (1987:100) as the deletion of a vocalic slot from the skeletal tier which is associated with a

matrix containi

The appropriate

syllable (Algha

formal identifi

slot is not affe

not provide us

syncope. But c

autosegmenta

Rule (1):

V ---->

In (1), the vo

the skeletal

floating. In

derivation c

it feeds rul

(2): fihim

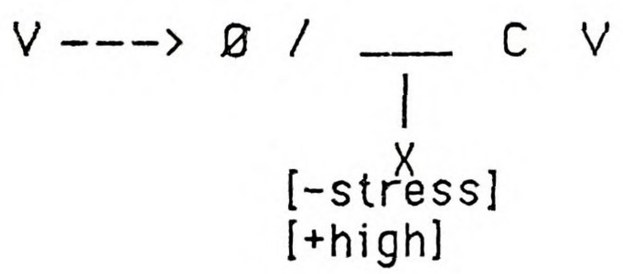
fihm-

fariig

kâtab

matrix containing a [+high] feature in the appropriate environment. The appropriate environment is that of an unstressed, nonfinal, open syllable (Alghazo referred to the syllable without providing a formal identification of it). The matrix associated with the deleted slot is not affected, but remains floating on its tier. Alghazo did not provide us with an explicitly formalized autosegmental rule of syncope. But on the basis of his analysis, we provide the autosegmental syncope rule in (1).

Rule (1):



In (1), the vocalic slot of an unstressed high vowel is deleted from the skeletal tier and the matrix "X" associated with it remains floating. In (3), we see the application of rule (1) of syncope in the derivation of the words in (2). Rule (15) precedes rule (1) because it feeds rule (1).

(2): fíhim "he understood"
fíhm-ak "he understood you"
faríig-ak "your team"
kátab-ak "he wrote you"

(3): /fihim/ /

fíhim

[fíhim] [

Rule (1) of

kátabak bece

vowel is [+hig

fariigak, the

is [+stress], t

the SD of the

[-high]. In (3

fíhmak whe

CV.

6.1.2. Epent

Epenthe

empty voca

environme

his analys

(4).

Rule (4):

(3):	/fihim/	/fihim-ak/	/fariig-ak/	/katab-ak/	UR
	fíhim	fíhimak	faríigak	kátabak	Rule (15) in Ch. 3: Stress
	---	fíhmak	---	---	Rule (1): syncope
	[fíhim]	[fíhmak]	[faríig-ak]	[kátabak]	PR

Rule (1) of syncope does not apply to *fíhim, faríigak,* or *kátabak* because its SD is not satisfied. In *fíhim,* the second vowel is [+high, -stress] but it is not in an open syllable. In *fariigak,* the second vowel is [+high] and is in an open syllable but it is [+stress], hence the SD of the rule is not satisfied. In *kátabak,* the SD of the rule is not satisfied because the second vowel is [-high]. In (3), rule (1) of syncope applies only in the derivation of *fíhmak* where the deleted vowel is [-stress, +high], and followed by CV.

6.1.2. Epenthesis:

Epenthesis is viewed (Alghazo 1987: 101) as the insertion of an empty vocalic slot into the skeletal tier in the appropriate environment, which is either C ___ C#, or C ___ CC. On the basis of his analysis, we postulate the autosegmental rule of epenthesis in (4).

Rule (4):

$$\emptyset \text{ ---> } V \,/\, C \_\_\_ C \left\{ \begin{matrix} C \\ \# \end{matrix} \right\}$$

In rule (4), o
melodic tier as
the CV tier are
epenthesis is v
the CV tier. Th
rule (4); the qu
rules which w
association, d
Obligatory Co

6.1.3. Associa

The rule o
melodic tier
floating mat
syncope wil
inserted by
formalize a

Rule (5):

X

C

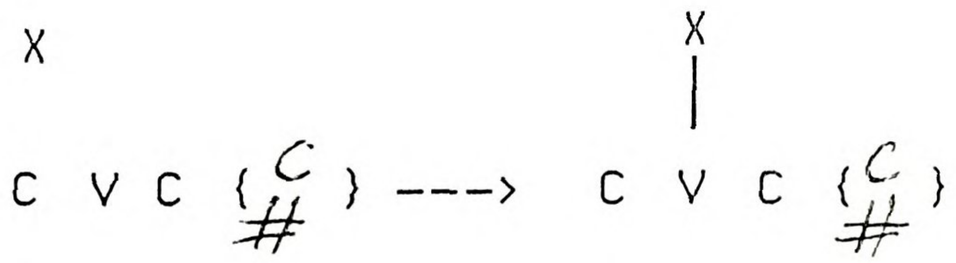
In (5),
vowel the
associate

In rule (4), only the CV tier is provided; the matrices on the melodic tier associated with the consonantal and vocalic slots at the CV tier are not provided because they are not involved since epenthesis is viewed as the insertion of an empty vocalic slot into the CV tier. The matrices in the melodic tier are not determined by rule (4); the quality of the inserted vowel is determined by other rules which will be discussed later. This includes the rules of association, default, and spreading in accordance with the Obligatory Contour Principle (OCP).

6.1.3. Association:

The rule of association associates an unassociated matrix on the melodic tier to an unassociated slot on the CV tier. Accordingly, the floating matrix which results from the application of rule (1) of syncope will be associated with the unassociated vocalic slot inserted by rule (4) of epenthesis (Alghazo, 1987: 102). This I formalize as rule (5) (Alghazo, 1987: 102).

Rule (5):



In (5), the "X" on the left stands for a floating matrix of a [+high] vowel the vocalic slot of which on the CV tier is deleted. Rule (5) associates the unassociated floating matrix to the empty vocalic

slot inserted by

where there is

associated wit

is one. The ass

feature matrix

OCP according

represented se

This is illustr

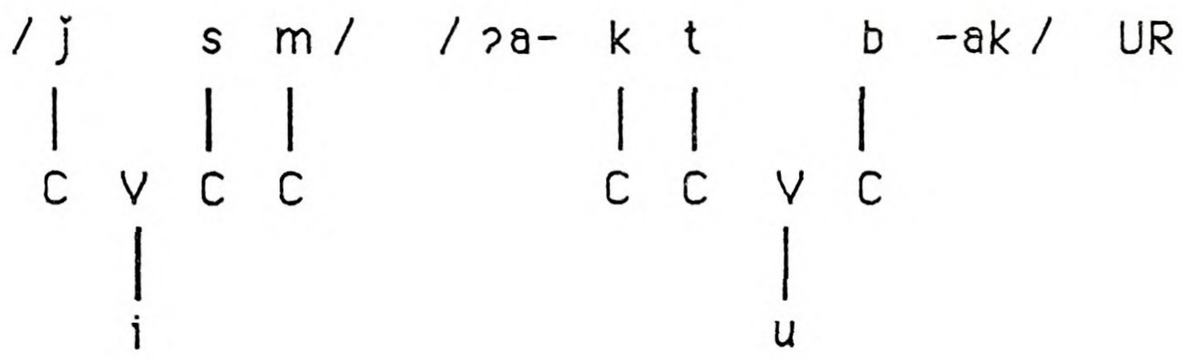
ʔá-kutb-ak

(6):

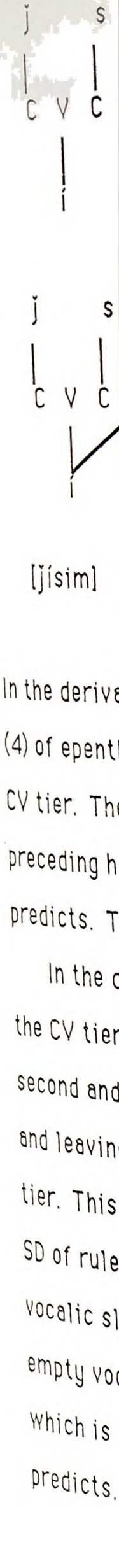


slot inserted by rule (4) of epenthesis on the CV tier. In the context where there is not an unassociated matrix, the vocalic slot is associated with the matrix of a high vowel on the same tier if there is one. The association of two vocalic slots on the CV tier with one feature matrix on the melodic tier takes place in compliance with OCP according to which two adjacent identical segments can not be represented separately on the same tier (Alghazo, 1987: 108-9). This is illustrated in the derivation of the words *jísim* "body" and *ʔá-kutb-ak* "I write you" in (6).

(6):



jísm	ʔá-ktub-ak	Rule (15) in Ch.3: Stress
---	ʔá- k t b -ak	Rule (1): Syncope
	C C C	
	u	



[jísim]

In the deriva

(4) of epent

CV tier. Th

preceding h

predicts. T

In the c

the CV tier

second and

and leavin

tier. This

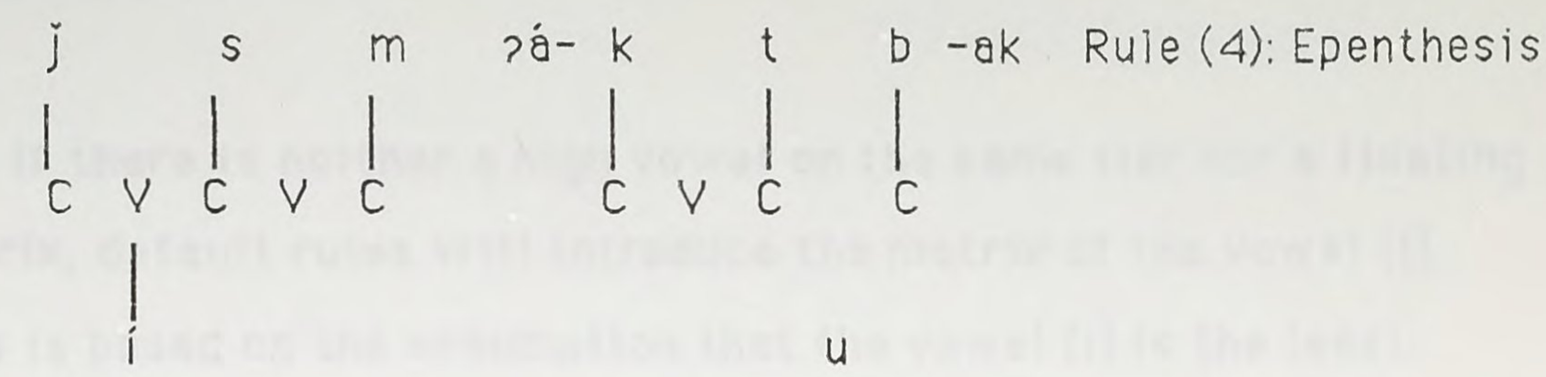
SD of rule

vocalic sl

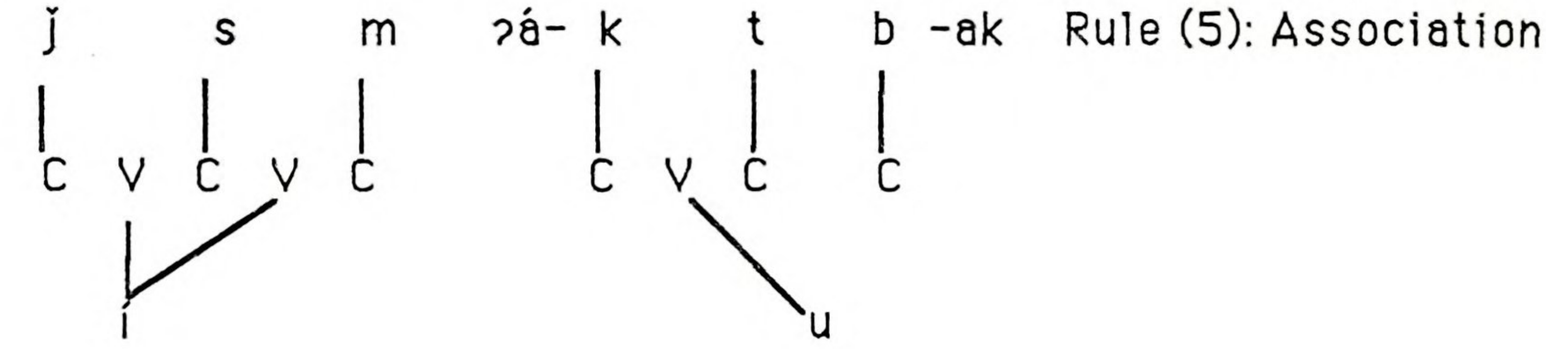
empty voc

which is

predicts.



Rule (4): Epenthesis



Rule (5): Association

[jísim] [ʔá-kutb-ak] PR

In the derivation of *jisim,* rule (1) of syncope does not apply. Rule (4) of epenthesis applies, inserting an empty vocalic slot into the CV tier. The empty slot is then associated with the matrix of the preceding high vowel on the same tier as rule (5) of association predicts. This complies with the OCP.

In the derivation of *ʔá-kutb-ak,* rule (1) of syncope applies to the CV tier of the unstressed high vowel which appears between the second and third radicals, deleting its vocalic slot on the CV tier and leaving behind it its feature matrix floating on the melodic tier. This creates a cluster of three consonants which satisfies the SD of rule (4) of epenthesis. Rule (4) applies, inserting an empty vocalic slot between the first and second radicals. The inserted empty vocalic slot is then associated with the floating matrix, which is generated by rule (1) of syncope, as rule (5) of association predicts.

6.1.4. Default:

If there is
matrix, defaul
This is based
specified vow
is rule (7) (Al

Rule (7):

V
|
[

To illus
derivation o

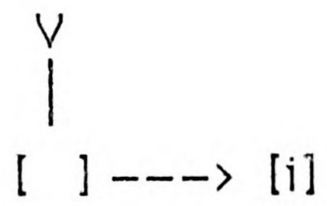
(8):

/

6.1.4. Default:

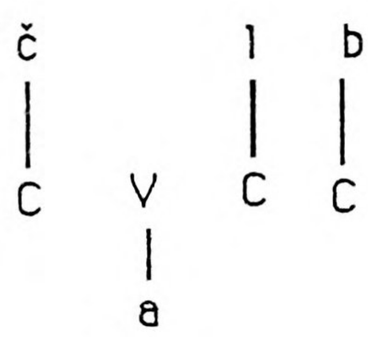
If there is neither a high vowel on the same tier nor a floating matrix, default rules will introduce the matrix of the vowel [i]. This is based on the assumption that the vowel [i] is the least specified vowel underlyingly and has no features in its matrix. This is rule (7) (Alghazo, 1987: 101).

Rule (7):



To illustrate the application of rule (7), we present the derivation of the word *čálib* "dog" in (8).

(8):





In (8), th

(4) of epent

On the other

associate a

comes to th

of the high

of /čalb/ i

6.1.5. Emp

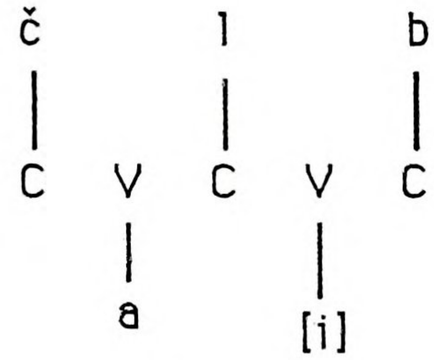
In emp

default ru

emphasis



Rule (4): Epenthesis



Rule (7): Default

[čálib] PR

In (8), the empty vocalic slot inserted into the CV tier by rule (4) of epenthesis does not have a feature matrix on the melodic tier. On the other hand, there is not a floating matrix with which it can associate according to rule (5). In this context, rule (7) of default comes to the rescue. Rule (7) of default inserts the feature matrix of the high vowel [i]. In this way, the correct phonetic realization of /čalb/ is realized.

6.1.5. Emphasis spreading, rounding and backing:

In emphatic contexts, the vowel [i] which is introduced by default rules gets rounded; the vowel first undergoes rules of emphasis spreading (Alghazo, 1987:130) and then emphasis rounding

provided in (9)

Rule (9):

[X X

E

I am over

reference to

emphasis sp

and E stands

to segments

split". That

illustrated

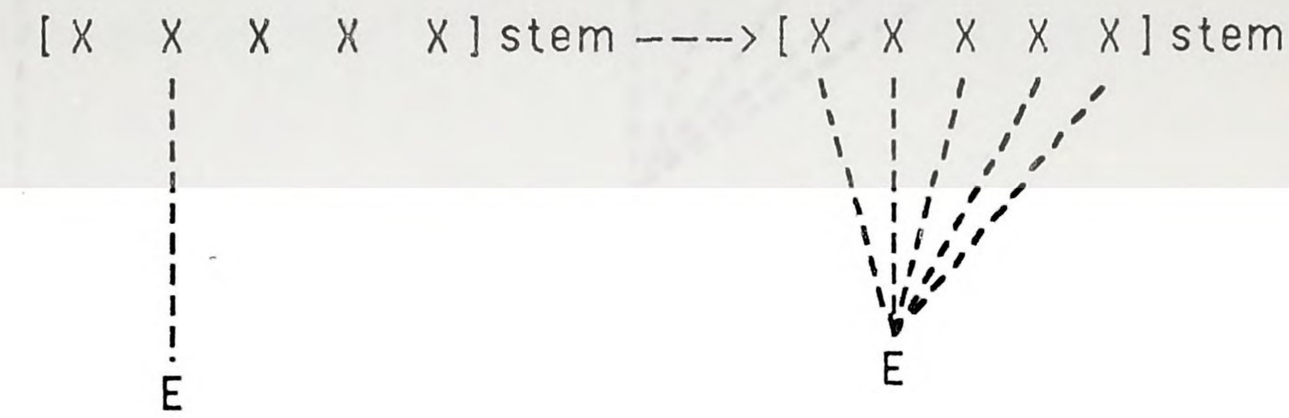
the applica

(10.A):

ti-

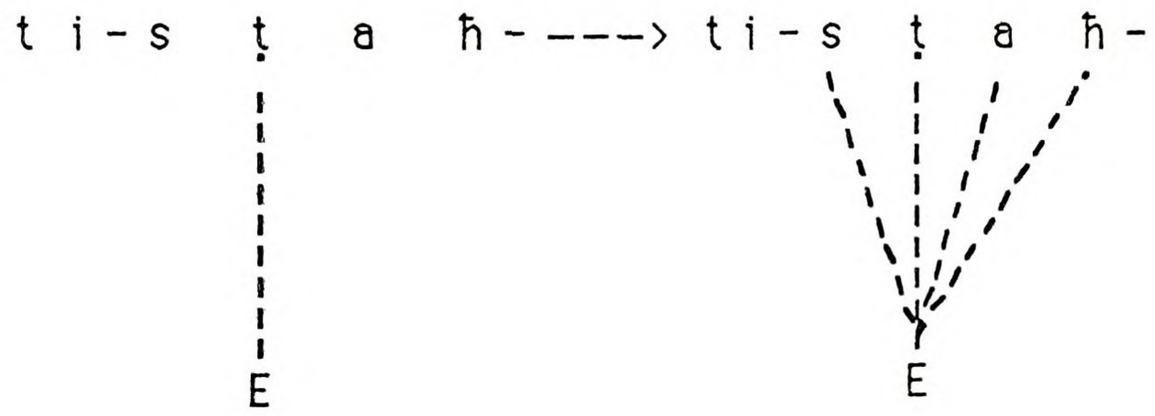
provided in (9) and (11), respectively (Alghazo, 1987: 130, 135).

Rule (9):



I am overlooking the problem that could be raised by Alghazo's reference to the category "stem" in the SD of the rule. In rule (9) of emphasis spreading, the X slots stand for any segment in the stem, and E stands for emphasis. That rule (9) of emphasis spread applies to segments in the stem is illustrated by the JA word [ti-ṣṭaħ] "to split". That rule (9) applies to epenthetic vowels in the stem is illustrated by the JA word [ṭabul] "drum". In (10.A,B), we illustrate the application of rule (9) to *ti-ṣṭaħ,* and *ṭabul,* respectively.

(10.A):



(10.B):

t a

E

In (10.A),

the stem as

not spread to

But it spread

of emphasis

consonant [ş

ţabil and e

word. Algh

of the i vow

that an emp

rounding. T

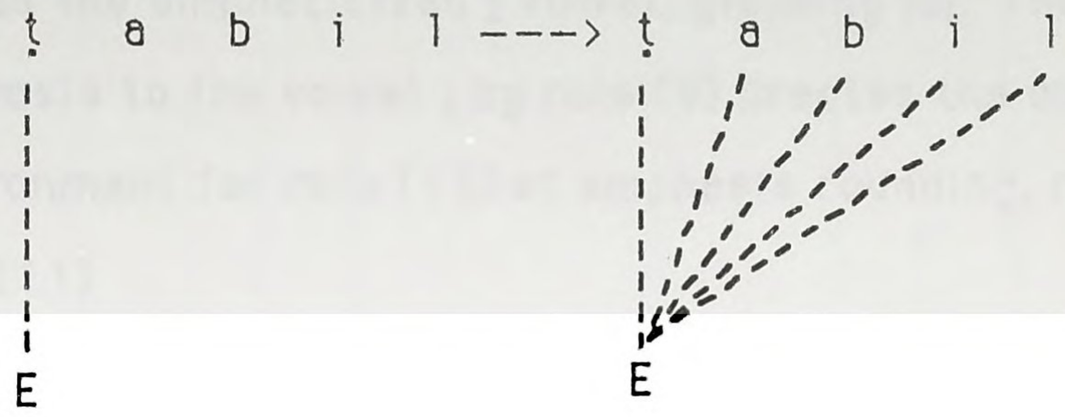
135).

Rule (11):

i

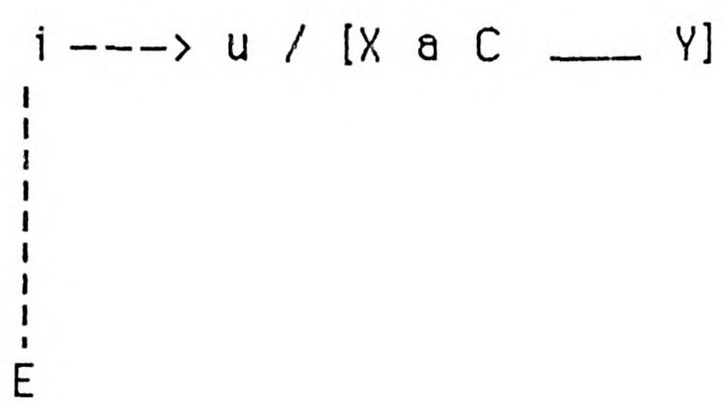
E

(10.B):



In (10.A), emphasis spreads only to to the segments which are in the stem as rule (9) of emphasis spreading predicts. Emphasis does not spread to to the prefix ti- because it is not part of the stem. But it spreads to the vowels and consonants in the stem. The spread of emphasis to the stem consonant /s/ yields the emphaticized consonant [ṣ]. In (10.B), rule (9) of emphasis spreading applies to *ṭabil* and emphasis spreads to the vowels and consonants in the word. Alghazo provides us with no evidence about the phonetic form of the i vowel which is in the domain of emphasis. But he argues that an emphaticized i vowel gets rounded by a rule of emphasis rounding. This is rule (11) of emphasis rounding (Alghazo, 1987: 135).

Rule (11):



In rule (11), "X
rounds the emp
emphasis to th
environment f
rule (11).

However,
rounded in an
[ɔiyxarbiṭ] "t
get rounded b
problem, Alg
to be marked
vowel in wo
rounded if i
rounding".

Alghazo
it is ad hoc
facts in the
which acco
examples.
it has to b
rule. Algh

In his
emphasis
(9) of em
backing (

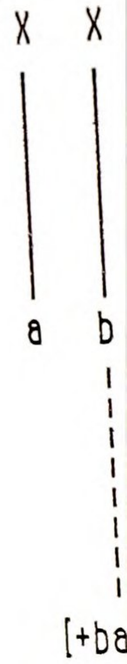
In rule (11), "X" and "Y" are variables within the stem. Rule (11) rounds the emphaticized i̲ vowel, yielding [u]. The spread of emphasis to the vowel i̲ by rule (9) creates the appropriate environment for rule (11) of emphasis rounding; rule (9) feeds into rule (11).

However, there are contexts in which the vowel i̲ does not get rounded in an emphatic context. For example, the [i] vowel in [ʔiyxarbiṭ] "to confuse" is in an emphatic context. But it does not get rounded by rule (11) of emphasis rounding. To account for this problem, Alghazo (1987:134) says that underlying /i/ vowels have to be marked with [-ER], "-emphasis rounding". Accordingly, the i̲ vowel in words such as [ʔiyxaribṭu] "to confuse him" does not get rounded if it is underlying and so marked with [-ER], "-emphasis rounding".

Alghazo (1987: 137) rejects this assumption on the grounds that it is ad hoc in the sense that it is adopted to account for certain facts in the language and argues that a better solution would be one which accounts for the facts and explains the apparent counter examples. He claims that a non-linear analysis will do this. (Here, it has to be noted that rule (9) of emphasis spreading is a non-linear rule. Alghazo seems to have forgotten this.)

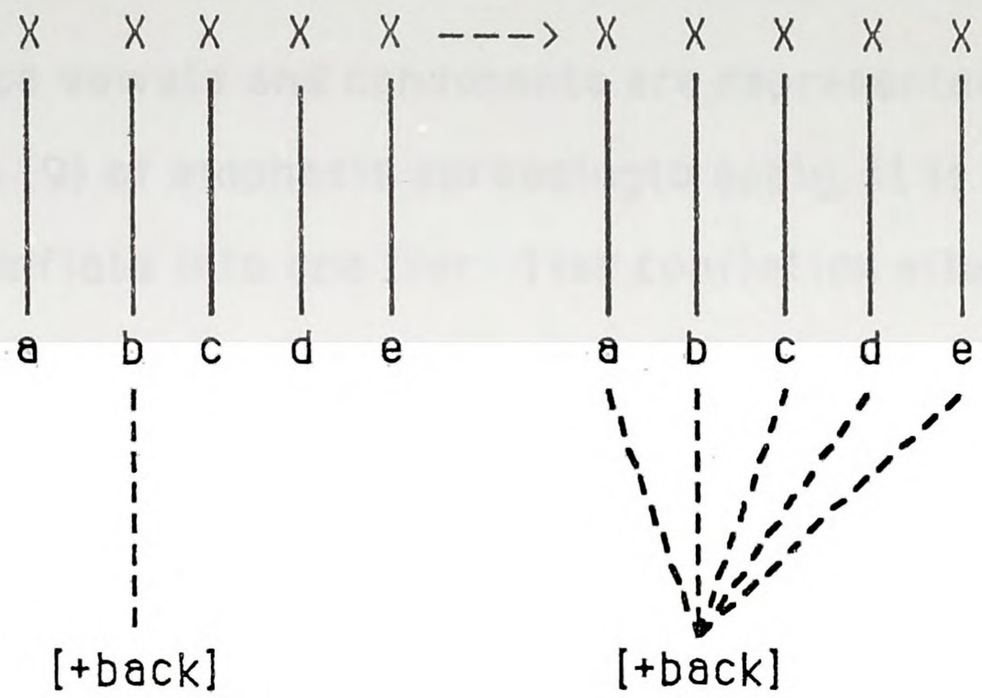
In his non-linear analysis, Alghazo (1987: 145) argues that emphasis be represented by the feature [+back]. Accordingly, rule (9) of emphasis spreading is revised into rule (12) of emphasis backing (Alghazo, 1987: 159).

Rule (12):



The rule of e
include the
provided by
consonanta
feature ma
melodic tie
(The empha
the feature
segments
backing w
in (17). R
rules prov
applicati
feature [-
seeing th
the non-

Rule (12):

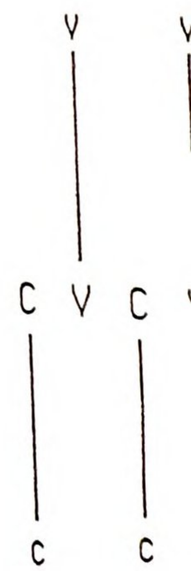


The rule of emphasis backing as postulated by Alghazo does not include the input provided in rule (12); only the output of the rule is provided by Alghazo. In (12), the X's represent the vocalic and consonantal slots on the CV tier, and the small letters represent the feature matrices of the consonantal and vocalic segments on the melodic tier. "b" is the feature matrix of an emphatic consonant (The emphatic feature could be on "a", "c", "d", or "e".). In rule (12), the feature [+back] spreads from an emphatic segment to the other segments within its domain. The function of rule (12) of emphasis backing will be illustrated in the derivation of the epenthetic vowel in (17). Rule (12) of emphasis backing feeds into the redundancy rules provided in (15). The features inserted as a result of the application of the redunduncy rules takes into consideration the feature [+back] provided by rule (12) of emphasis backing. Before seeing this, we present some related principles which are invoked in the non-linear approach.

6.1.6. Tier conflation

Since vowels and
for rule (9) of emphe
tiers conflate into o
emphasis to spread
they are no longer o
in (13).

Rule (13):

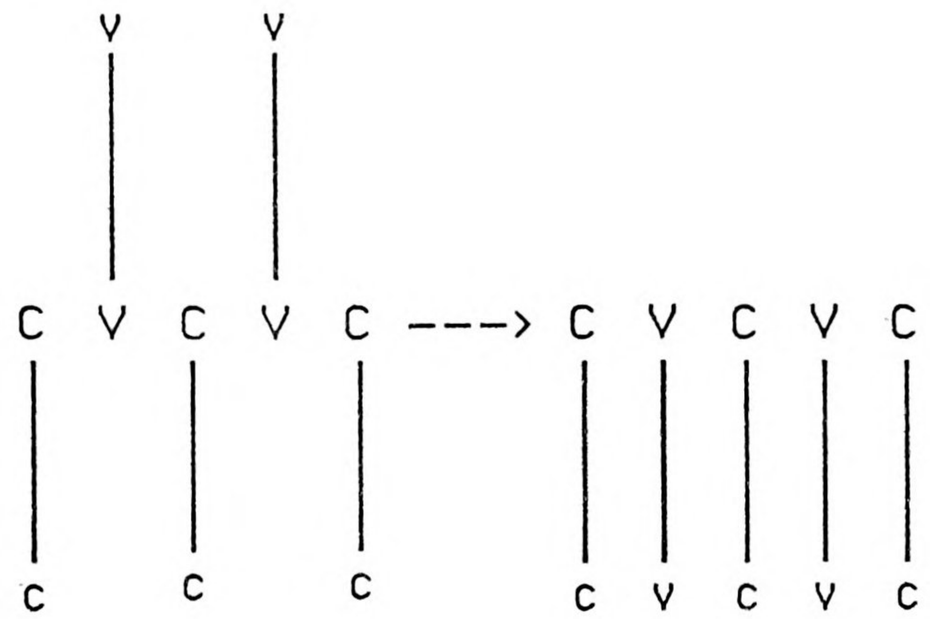


Rule (13) of t
word which has a
capital letters st
tier and the smal
and consonants o
to spread from a
non-emphatic co

6.1.6. Tier conflation:

Since vowels and consonants are represented on separate tiers, for rule (9) of emphasis spreadingto apply, it is necessary that all tiers conflate into one tier. Tier conflation allows the feature of emphasis to spread from an emphatic consonant to a vowel since they are no longer on separate tiers. Tier conflation is illustrated in (13).

Rule (13):



Rule (13) of tier conflation puts the vowels and consonants of a word which has a CVCVC structure on the same tier. In (13), the capital letters stand for the consonantal and vocalic slots on the CV tier and the small letters for the feature matrices of the vowels and consonants on the melodic tier. Tier conflation allows emphasis to spread from an emphatic consonant or vowel to the other non-emphatic consonants and vowels of a stem.

6.1.7. Redundancy ru

In his analysis of
principles of the the
framework of this t
unspecified underly
underspecified vow
respectively. This

Rule (14):

(A): [ ] =

|
V

In (14), [ ] ste
[+round]. Within t
he also postulated
in the missing fea
1987:156).

Rules (15):

(A): [ ]

(B): [ ]

(C): [ ]

(D): [ ]

(E): [ ]

6.1.7. Redundancy rules:

In his analysis of epenthesis, Alghazo invokes some of the principles of the theory of underspecification. Within the framework of this theory, he argues that the vowel [i] in JA is unspecified underlyingly and that the distinctive features of the underspecified vowels, [u] and [a] are [+round] and [-high], respectively. This is illustrated in (14.A-C).

Rule (14):

(A): [ ] = i (B): [+r] = u (C): [-high] = a

In (14), [ ] stands for an empty matrice, and [+r] for the feature [+round]. Within the framework of the theory of underspecification, he also postulated the redundancy rules in (15.A-F). These rules fill in the missing features of the vowels in (14.A-C) (Alghazo, 1987:156).

Rules (15):

(A): [ ] ---> [+high]

(B): [ ] ---> [-round]

(C): [ ] ---> [∝low] / [_____]
- ∝high

(D): [ ] ---> [+back] / [_____]
+round

(E): [ ] ---> [-back]

(F): [ ] --

By using the re
principles of the th
claims that the und
This is illustrated

6.2. Application of

In this section
first section abov
Consider the JA d

(16.A): ṭagis "we
(B): báṭin "tur
(C): šábuk "en

The JA data
analyzed. The JA
of Alghazo (198
non-linear appro
non-linear rules
vowel in (16.A,
predict an [u] v
results if we e
spreading to in

(F): [ ] ---> [∝round] / [_____]

∝back, -low

By using the redundancy rules (15.A-F) in compliance with the principles of the theory of underspecification, Alghazo (1987: 158) claims that the underlying vowel does not have to be marked [-ER]. This is illustrated in the derivation of some JA words in 6.2.

6.2. Application of non-linear rules to JA data:

In this section, we apply the non-linear rules postulated in the first section above in the derivation of the JA vowel in question. Consider the JA data in (16.A-B).

(16.A): ṭagis "weather"

(B): báṭin "tummy; belly"

(C): šábuk "entangling"

The JA data in (16) are from the same JA dialect which Alghazo analyzed. The JA word in (16.C) is cited in the appendix of the study of Alghazo (1987: 176). (16.A,B) are counter evidence to the non-linear approach presented above. The application of the non-linear rules provided above in the derivation of the epenthetic vowel in (16.A,B) yield the wrong results; the rules incorrectly predict an [u] vowel. But in (16.C), the rules yield the correct results if we extend the application of rule (12) of emphasis spreading to include velars.

In (17.A,B,C), we

the derivation of the

vowel is [i] in the co

[+back,+cor] consona

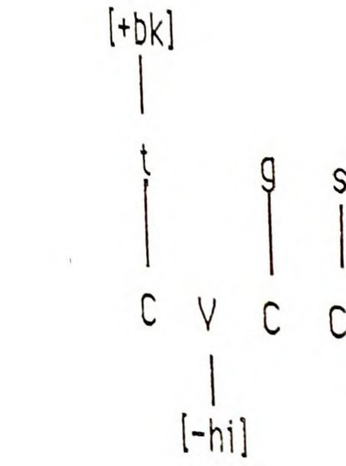
the context of a pre

consonant.

(17.A):

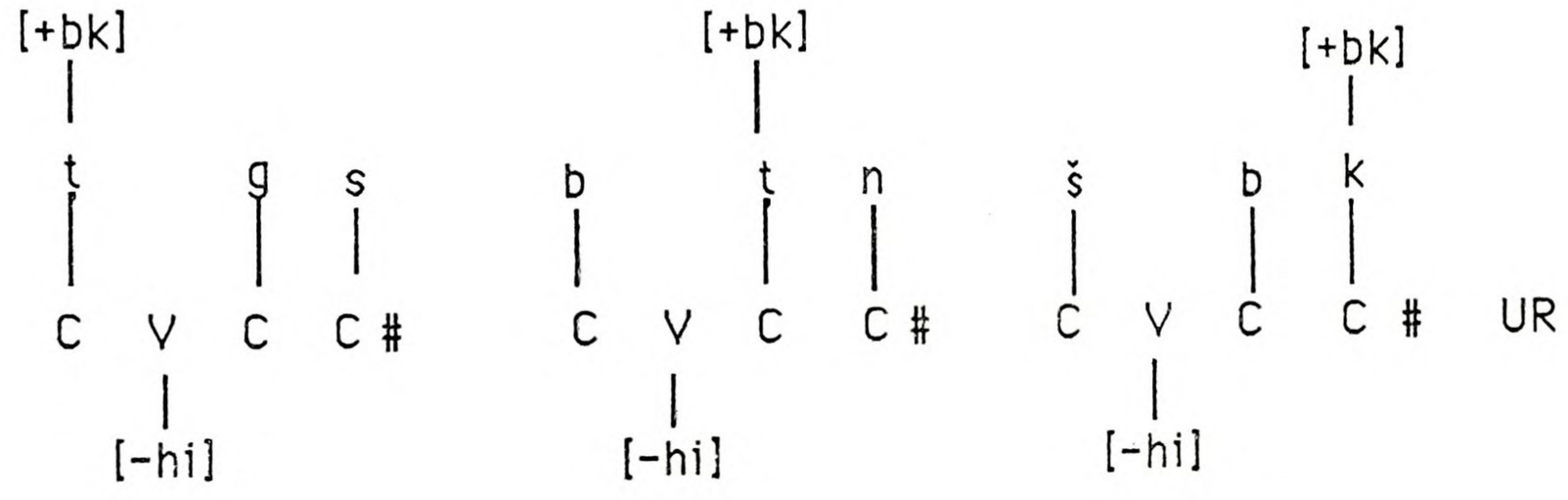
/ṭags/

"weather"

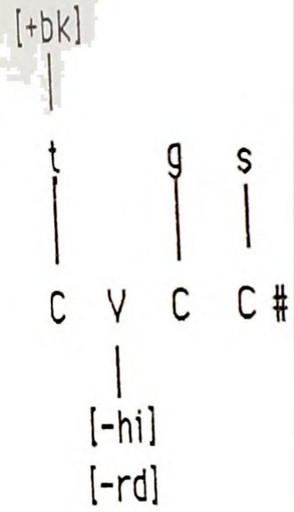


In (17.A,B,C), we apply the non-linear rules presented above in the derivation of the data in (16.A,B,C). Note that in (16.A,B), the vowel is [i] in the context of a preceding [-hi] vowel and a [+back,+cor] consonant. Note also that the vowel in (16.C) is [u] in the context of a preceding [-hi] vowel and a following [+back,-cor] consonant.

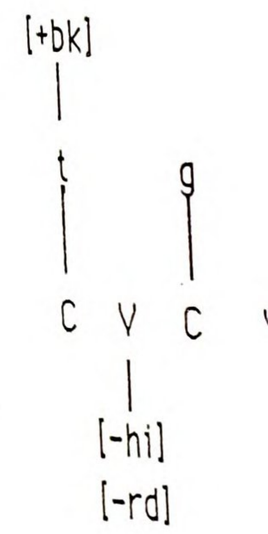
(17.A):	(17.B):	(17.C):	
/ṭags/	/baṭn/	/šabk/	UR
"weather"	"tummy"	"entangling"	



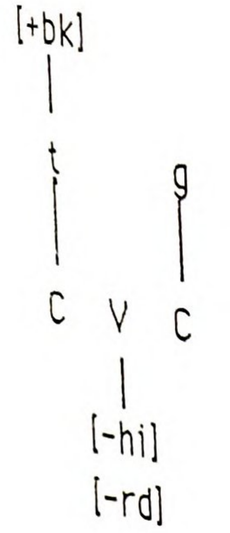
Redundancy rule (15.



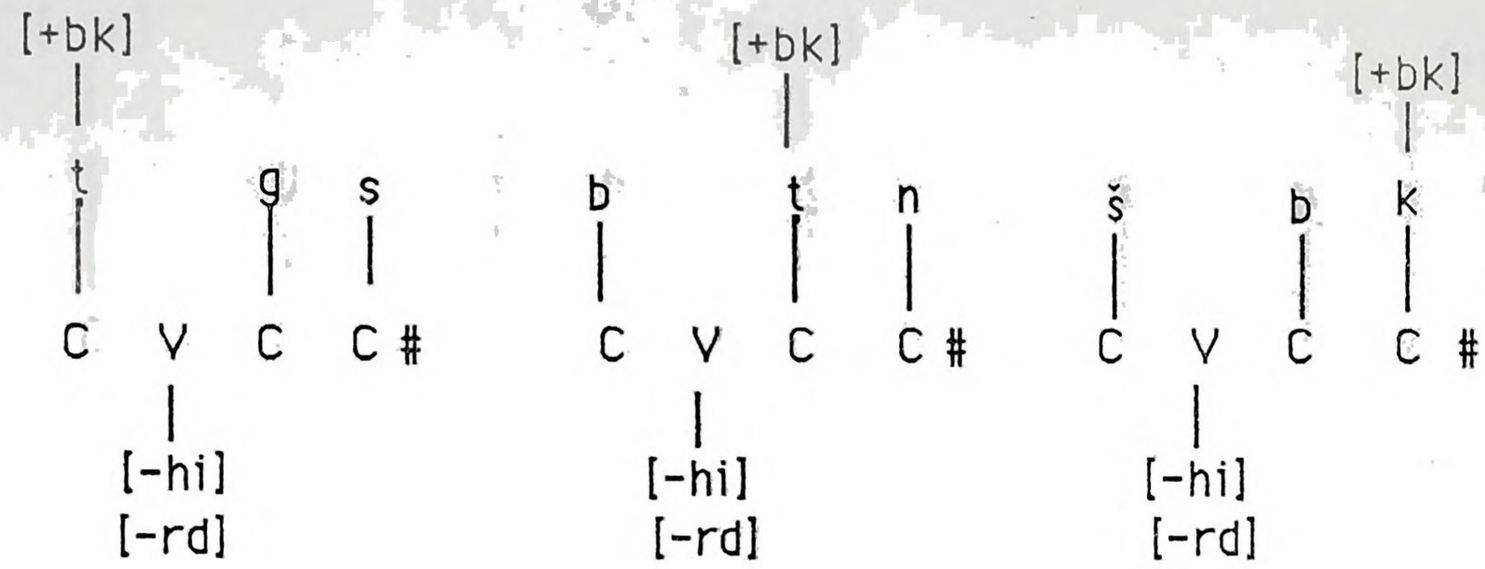
Rule (4): Epenthesi



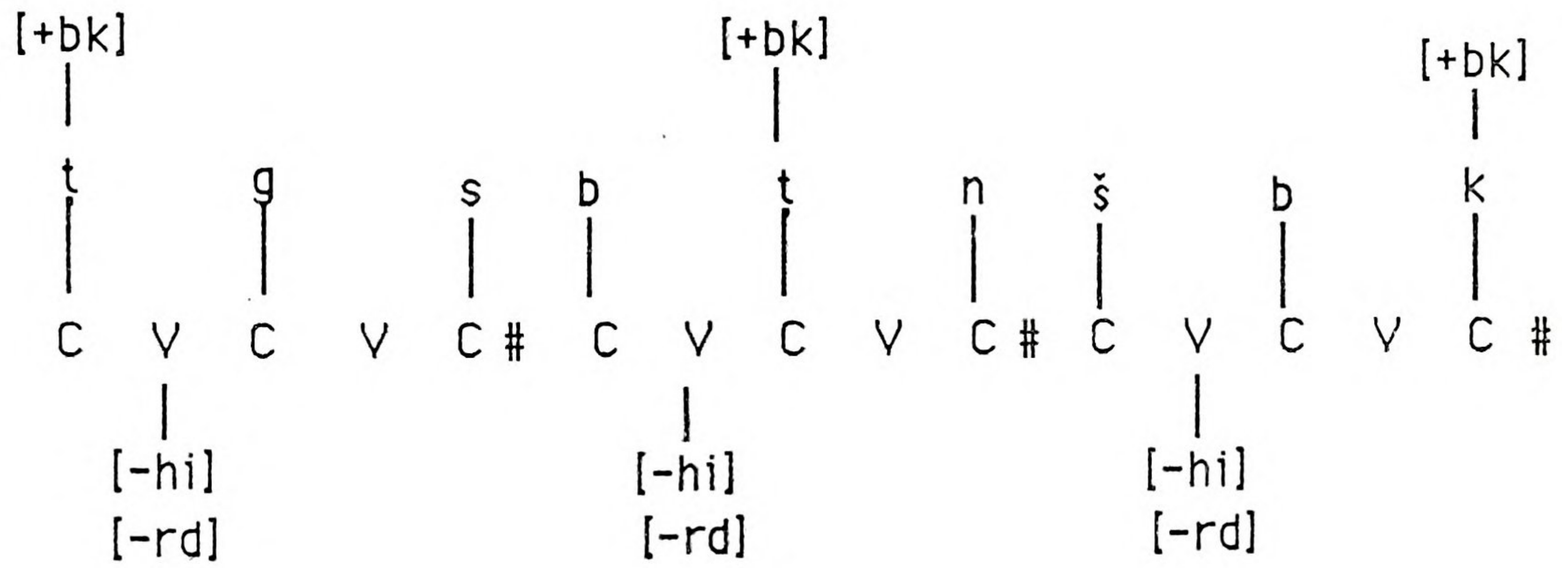
Rule (5): Associa



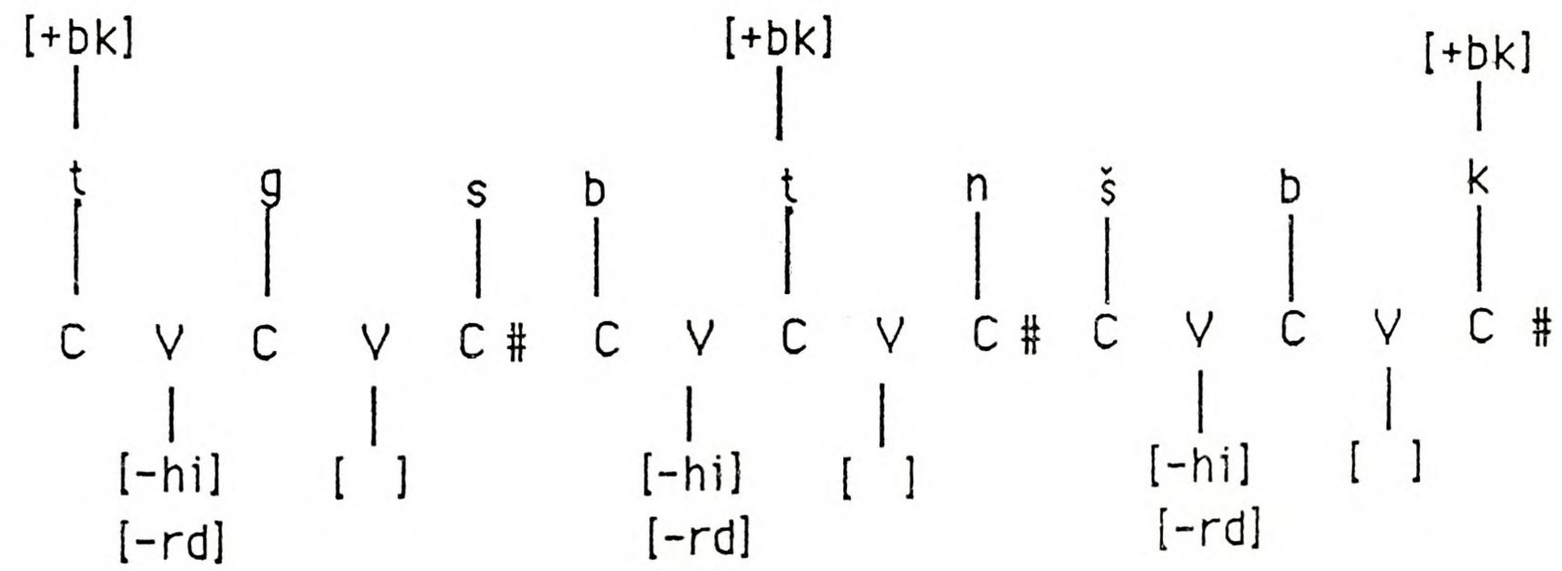
Redundancy rule (15.B):



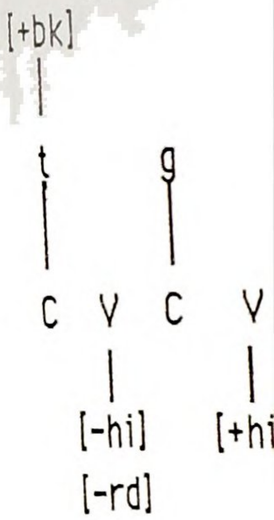
Rule (4): Epenthesis:



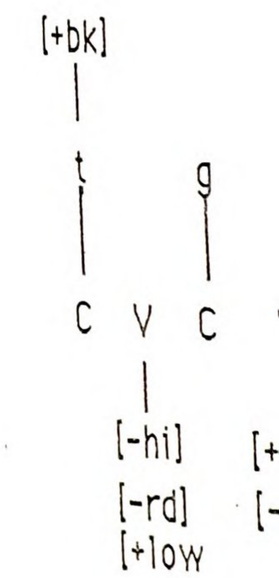
Rule (5): Association:



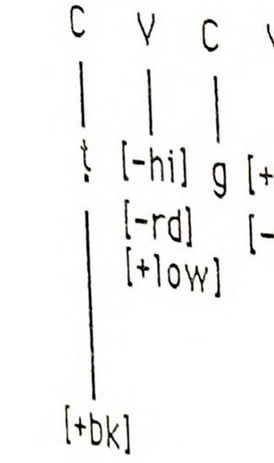
Redundancy rule (15



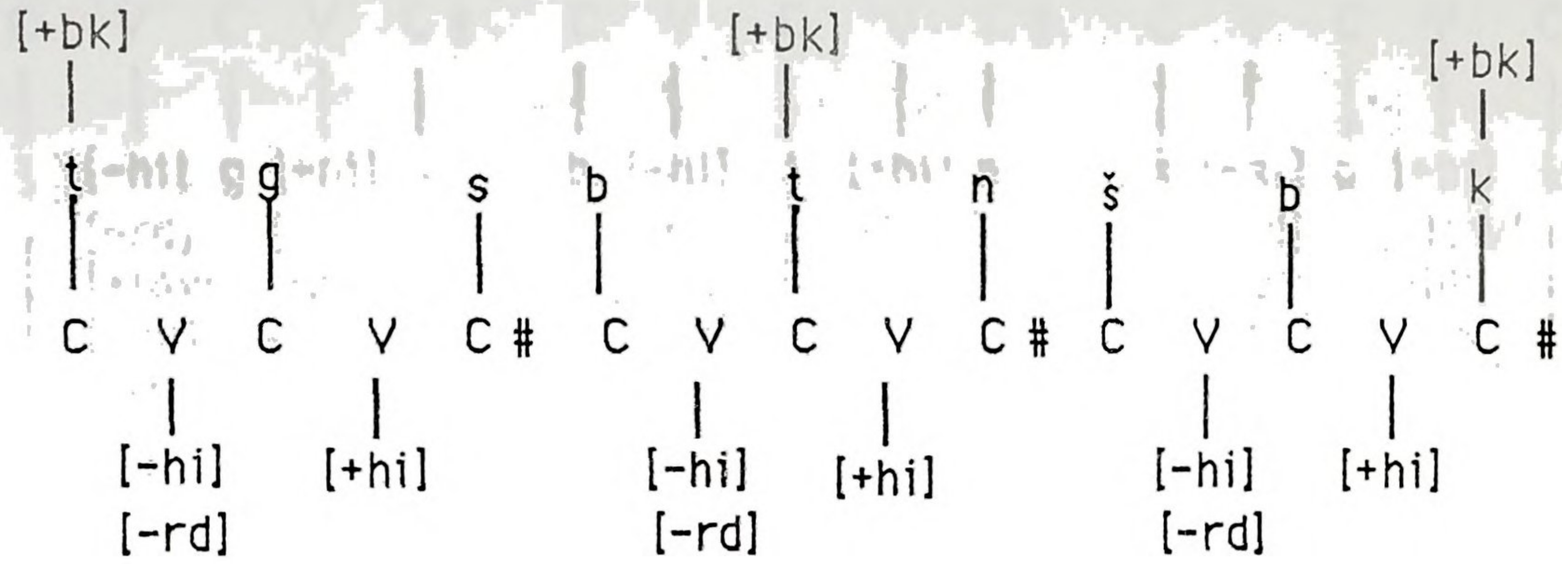
Redundancy rule (



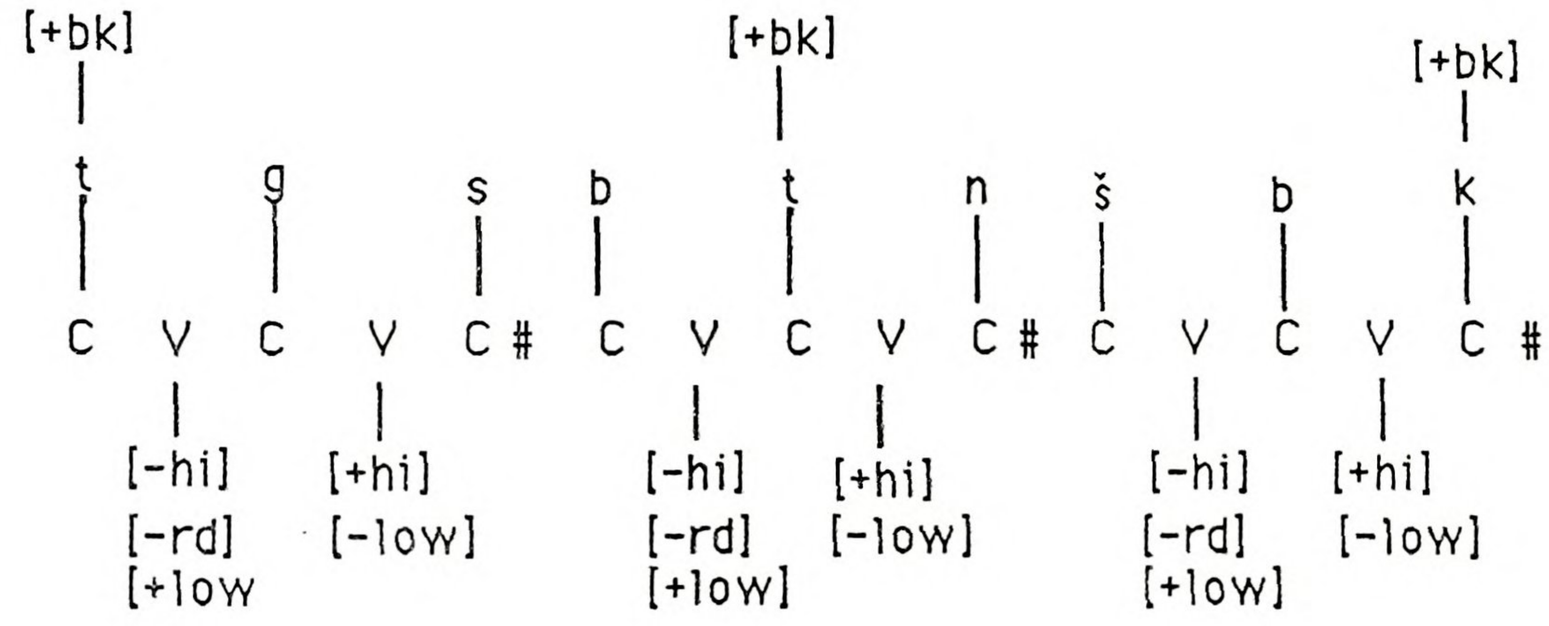
Rule (13): Tier c



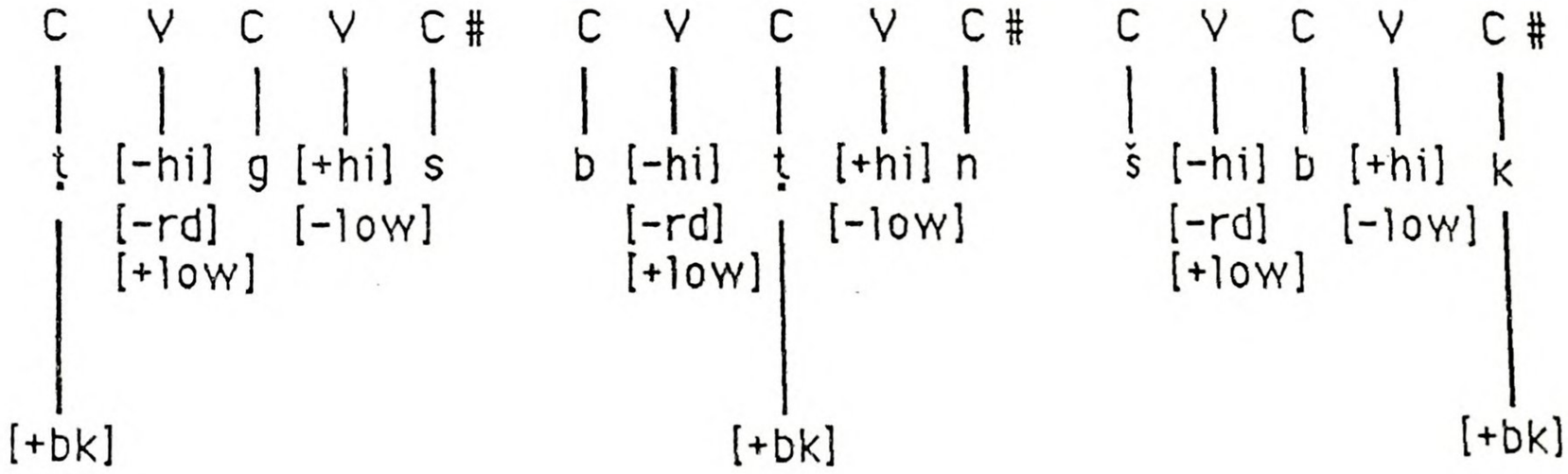
Redundancy rule (15.A):



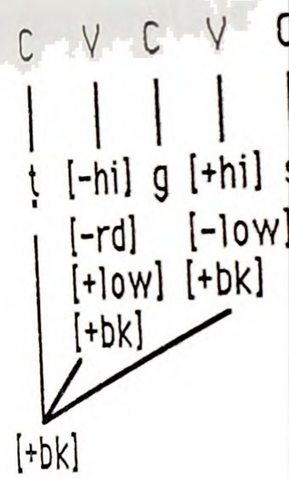
Redundancy rule (15.C):



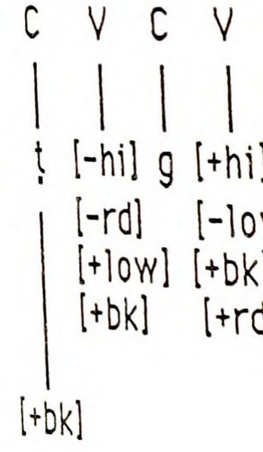
Rule (13): Tier conflation:



Rule (12): Emphasis



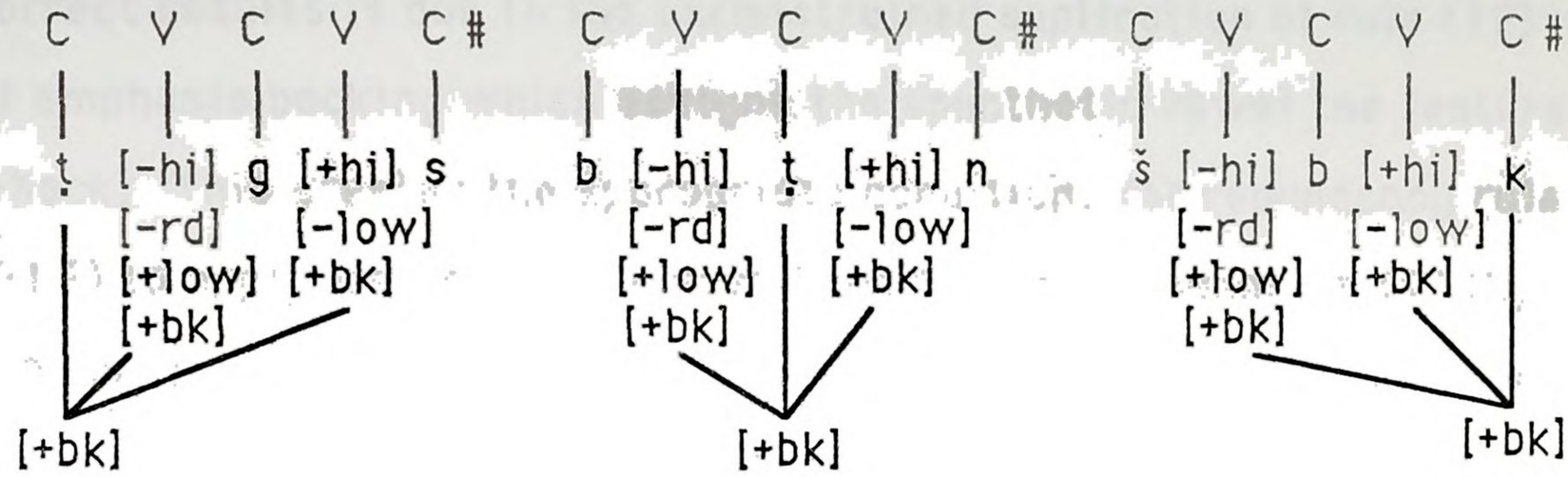
Redundancy rule (1



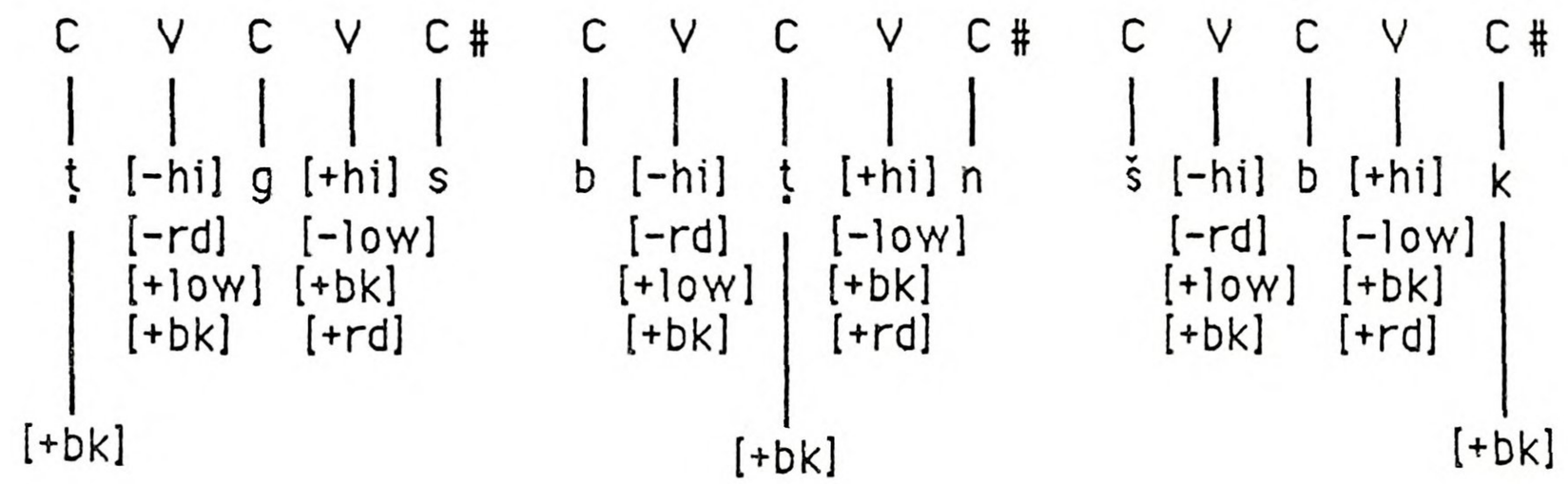
*[ṭagus]

The analys
to yield the corr
emphatic contex
But in (17.A,B),
vowel, which is
vowel by exten
spreading to ve
consonants.

Rule (12): Emphasis spreading:



Redundancy rule (15.F)



*[ṭagus] *[baṭun] [šabuk] PR

The analyses in (17) show that the non-linear approach fails to yield the correct results. In (16.A,B), the vowel is [-rd] in an emphatic context, and in (16.C) it is [+rd] in a non-emphatic context. But in (17.A,B), the application of the non-linear rules predict an [u] vowel, which is contrary to fact. In (17.C), the rules predict an [u] vowel by extending the application of rule (12) of emphasis spreading to velars which share the feature [+back] with emphatic consonants.

In (17.A,B), the
correct results is d
of emphasis backing
[+back]. This create
(51.F) to apply, ass
the non-linear rule
the assumption tha
feature [+back]. Si
spreading will app
context of velars,
of emphasis sprea

But a problem
words such as [na
vowel is [i]. In th
non-linear rules
imposing a constr
context of corona
will also have to
includes the line

In order to a
(17.A,B) as [u] ir
to patch up. But
linear facts into
consideration th
spreading or wh
constrained fro
followed by a c

In (17.A,B), the failure of the non-linear approach to yield the correct results is due to the unconstrained application of rule (12) of emphasis backing which assigns the epenthetic vowel the feature [+back]. This creates the appropriate conditions for redundancy rule (51.F) to apply, assigning the vowel the feature [+round]. In (17.C), the non-linear rules yield the correct results. This follows from the assumption that emphasis spreading be represented by the feature [+back]. Since velars are [+back], rule (12) of emphasis spreading will apply not only in the context of emphatics but in the context of velars, as well. In this way, the application of rule (12) of emphasis spreading captures more generality.

But a problem arises in the derivation of the epenthetic vowel in words such as [nagid] "criticism" and [nakiš] "digging" in which the vowel is [i]. In these words, the epenthetic vowel is [i]. But the non-linear rules predict [u]. This problem can be accounted for by imposing a constraint on the spread of the feature [+back] in the context of coronals. Such a constraint, as we have argued above, will also have to take into consideration some linear facts. This includes the linear arrangement of vowels and consonants in a word.

In order to account for the appearance of the epenthetic vowel in (17.A,B) as [u] instead of [i] in the context of emphatics, Alghazo has to patch up. But if he patches, he will have to patch up by taking linear facts into consideration. He will have to take into consideration the linear order of vowels and consonants. Emphasis spreading or what might be called "[+back]" spreading has to be constrained from spreading to the epenthetic vowel when it is followed by a coronal. Within the framework of non-linear

phonology this could

constraints will hav

feature [+back] to th

In linear phonol

epenthetic [i] and [u

[u] does not derive

Epenthetic [u] is in

the epenthetic rule

linear rules, the e

its phonetic enviro

findings of the non

linear approaches.

6.3. Evaluation:

In the analysi

and non-linear ap

the non-linear ap

just to achieve o

draw a distincti

also arbitrary to

empty vocalic s

unassociated (f

some other rule

vocalic and con

derivation of th

just to allow th

phonology this could only be handled arbitrarily. Some arbitrary constraints will have to be imposed to restrict the spreading of the feature [+back] to the epenthetic vowel [i].

In linear phonology, these problems do not arise. Both epenthetic [i] and [u] are inserted by rules of epenthesis. Epenthetic [u] does not derive from epenthetic [i] by assimilation rules. Epenthetic [u] is inserted by epenthetic rules which properly include the epenthetic rule which inserts [i]. In these properly including linear rules, the epenthetic vowel draws its characteristics from its phonetic environment. In the following section, we consider the findings of the non-linear approach in comparison with those of the linear approaches.

6.3. Evaluation:

In the analysis of the vowel within the framework of both linear and non-linear approaches, some problems arise. The problem with the non-linear approach is that it resorts to arbitrary assumptions just to achieve observational adequacy. We have no evidence here to draw a distinction between the CV tier and the melodic tier. It is also arbitrary to assume that epenthesis is the insertion of an empty vocalic slot on the CV tier which later associates with an unassociated (floating) matrix that is left stranded as a result of some other rule such as syncope, and arbitrary to assume that vocalic and consonantal tiers conflate at a certain point in the derivation of the vowel. The motivation of such an assumption is just to allow the rule of emphasis spreading to apply at a certain

point in the derivat

separate on the me

spreading from app

emphatic context.

in the application

More important

observational adeq

epenthetic vowel

[bāṭin] "tummy". T

consistant explan

the forms of both

appears as [u] in

has to be noted th

[bāṭin], [šābuk] an

The failure o

an emphatic con

constraints on t

The function of

epenthetic vowe

assignment of t

appropriate env

assign the vow

But the for

linear facts in

and consonants

spreading will

coronal. In do

point in the derivation. Keeping the vocalic and consonantal tiers separate on the melodic tier will block the rule of emphasis spreading from applying to the [i] vowels and from rounding in an emphatic context. Tier conflation shows the need for a linear order in the application of rules of a supposed non-linear phonology.

More important, the non-linear approach fails to achieve observational adequacy. It fails to account for the presence of the epenthetic vowel in the form of [i] in an emphatic context as in [báṭin] "tummy". The non-linear approach fails also to provide a consistant explanation for the appearance of the epenthetic vowel in the forms of both [i] and [u] in the context of velars. The vowel appears as [u] in [šábuk] "entangling", but as [i] in [nágid]. (Here, it has to be noted that the phonetic representation of the words [báṭin], [šábuk] and [nágid] is not controversial.)

The failure of the non-linear approach to predict an [i] vowel in an emphatic context could be patched by imposing some arbitrary constraints on the application of rule (12) of emphasis spreading. The function of such a constraint will be just to prevent the epenthetic vowel [i] from being assigned the feature [+back]. The assignment of this feature to the epenthetic vowel creates the appropriate environment for rule (15.F) of redundancy to apply and assign the vowel the feature [+round].

But the formulation of such a constraint will have to take some linear facts into consideration. The linear arrangement of vowels and consonants will have to be taken into consideration. Emphasis spreading will have to be blocked in the context of a following coronal. In doing so, Alghazo will be contradicting his claim that

non-linear analysis
for the facts and ex
1987:137).

The failure of th
an unemphatic cont
into consideration
Accordingly, the ap
have to be extende
change in the SD o
appropriate termi
rule (12) a rule of
emphasis spreadi
emphatic or a vel
a word. In this c
will be assigned
of "back spreadin
[+round] by redun

In patching u
appearance of th
of velars, a prob
[nakiš] "digging"
accounted for by
feature [+back]
have argued abo
linear facts. Th
consonants in a
of emphasis sp

non-linear analysis would provide a better solution which accounts for the facts and explains the seeming counter examples (Alghazo, 1987:137).

The failure of the non-linear approach to predict an [u] vowel in an unemphatic context such as in [šabuk] could be patched by taking into consideration the fact that velars like emphatics are [+back]. Accordingly, the application of rule (12) of emphasis spreading will have to be extended to cover velars. This does not require any change in the SD of the rule. It only requires the use of the appropriate terminology. Thus it would be more appropriate to call rule (12) a rule of "back spreading" instead of restricting it to emphasis spreading. The feature [+back] will spread from either an emphatic or a velar consonant to the other consonants and vowels in a word. In this case, the epenthetic vowel in words like [šabuk] will be assigned the feature [+back] by the revised form of rule (12) of "back spreading". Then the vowel will be assigned the feature [+round] by redundancy rule (15.F).

In patching up the non-linear approach to account for the appearance of the epenthetic vowel in the form of [u] in the context of velars, a problem arises in words such as [nagid] "criticism" and [nakiš] "digging" in which the vowel is [i]. This problem can be accounted for by imposing a constraint on the the spread of the feature [+back] in the context of coronals. Such a constraint, as we have argued above, will also have to take into consideration some linear facts. This includes the linear arrangement of vowels and consonants in a word. On the other hand, if we assume that rule (12) of emphasis spreading applies only in emphatic contexts, we will be

unable to account fo
as in [šábuk]. More
rule (12) of emphas
emphatics are [+ba

In linear phono
of epenthesis whic
vowel draws its ch
the context of a pr
the vowel is [i] as
a following velar
rule (32) of epent
rules.

Within the fra
4 that alternatin
predictable. Acc
vowels which ap
in the imperfect
epenthesis. The
which appears b
context of a con
either underlyin

In the under
of the imperfec
vowel in their
-CCVC-. In -CV
a morphologica
precedence ove

unable to account for the appearance of the vowel in the form of [u] as in [šábuk]. More over, it is arbitrary to restrict the application of rule (12) of emphasis spreading to emphatics since both velars and emphatics are [+back].

In linear phonology, epenthetic vowels are inserted by the rules of epenthesis which we postulated in Chaprter 4. In these rules, the vowel draws its characteristics from its phonetic environment. In the context of a preceding back consonant and a following coronal, the vowel is [i] as rule (7') of epenthesis predicts. In the context of a following velar and a preceding non-coronal, the vowel is [u] as rule (32) of epenthesis predicts. These rules are essentially linear rules.

Within the framework of a linear approach, we argued in Chapter 4 that alternating high vowels which appear in nouns are predictable. Accordingly, they are epenthetic. But alternating high vowels which appear between the first and second stem consonants in the imperfect verb forms are unpredictable by the rules of epenthesis. These vowels are always identical with the vowel which appears between the second and third stem consonants in the context of a consonant-initial suffix. We argued that they are either underlying or metathesized vowels.

In the underlying vowel analysis, we argued that the structure of the imperfect verb stem is -CVCC- for verbs which have a high vowel in their stem and a vowel-initial suffix. Elsewhere it is -CCVC-. In -CVCC- verbs, stress is assigned to the prefix vowel by a morphologically conditioned rule which takes disjunctive precedence over the general stress rules. In the metathesis

analysis, the struc

the rule of metathe

suffix, yielding a

shape, stress is as

the case in the unc

analysis, the meta

imperfect verb ste

In non-linear

the first and seco

vowels. The deriv

involves the appl

association whic

deletes the vocal

between the seco

stranded floating

inserting an emp

second stem con

associating the

with the inserte

assumed-to-be

that of the sync

above, the deriv

assumptions. I

an empty vocal

deletion of an

floating strand

such arbitrary

analysis, the structure of the imperfect verb stem is -CCVC- and the rule of metathesis applies in the context of a vowel-initial suffix, yielding a -CVCC- verb stem. In verbs with a -CVCC- stem shape, stress is assigned by a morphologically conditioned rule as is the case in the underlying analysis. Compared with the underlying analysis, the metathesis analysis has the advantage that the imperfect verb stem is assigned one underlying form.

In non-linear phonology, the high vowels which appear between the first and second stem consonants are considered epenthetic vowels. The derivation of these assumed to be epenthetic vowels involves the application of the rules of syncope, epenthesis, and association which we are provided in 6.1. above. The rule of syncope deletes the vocalic slot of the underlying high vowel which appears between the second and third stem consonants, leaving behind a stranded floating feature matrix. The rule of epenthesis applies, inserting an empty vocalic slot on the CV tier between the first and second stem consonants. Then a rule of association applies, associating the floating matrix of the syncopated underlying vowel with the inserted empty vocalic slot. In this way, the assumed-to-be epenthetic vowel is assigned a quality identical to that of the syncopated underlying stem vowel. As we have argued above, the derivation of epenthesis in this way involves arbitrary assumptions. It is arbitrary to view epenthesis as the insertion of an empty vocalic slot into the CV tier, and that syncope is the deletion of an empty vocalic slot on the CV tier, leaving behind a floating stranded feature matrix. In linear phonlogy, the need for such arbitrary assumptions does not arise; CV tiers and melodic

tiers do not exist i

Another proble

rule (12) of emphas

domain. In the imp

SD of rule (12) of

is expected to app

and is assumed to

Here, two questio

phonetic form of

emphasis spreadi

the vowel from g

Alghazo provided

[+back] [i] vowel.

rule (12) of emph

reference to the

redundancy rules

matrix of the sy

case, a rule orde

non-linear rule

emphasis sprea

arise. The need

arise since it i

(12) from assig

either. The lin

apply to high v

epenthetic [u],

tiers do not exist in linear analysis.

Another problem which arises in non-linear phonology relates to rule (12) of emphasis spreading and the vowels which appear in its domain. In the imperfect JA verb [yi-ṭilʕ-ak] "to force you out", the SD of rule (12) of emphasis spreading is met. Accordingly, the rule is expected to apply to the [i] vowel which appears in the verb stem and is assumed to be epenthetic, assigning it the feature [+back]. Here, two questions arise. The first question relates to the phonetic form of the [i] vowel which is in the domain of rule (12) of emphasis spreading, and the second question relates to preventing the vowel from getting rounded. In reference to the first question, Alghazo provided us with no evidence about the phonetic form of a [+back] [i] vowel. The phonetic form of an [i] vowel in the domain of rule (12) of emphasis spreading is not discussed in his analysis. In reference to the second question, the vowel is not rounded by the redundancy rules because the vowel is associated with the feature matrix of the syncopated underlying vowel which is [-rd]. In this case, a rule order constraint is needed. Under such a constraint, the non-linear rule of association must apply before rule (12) of emphasis spreading. In linear phonology, these questions do not arise. The need for phonological rules to derive the vowel does not arise since it is considered underlying. The need for preventing rule (12) from assigning the vowel the feature [+back] does not arise, either. The linear rules which assign the feature [+back] do not apply to high vowels; they apply only the low vowel /a/. As for epenthetic [u], it is not derived by assimilation rules.

The representa
evidence to the st
The problem to be
one segment or as
present counter e

In this study,
underlyingly and
the main differen
relates to the beh
glides are subjec
vocalization.

The chapter
we analyse gemi
the representati
epenthesis and s
behavior of gem
representation
stress. In the t
within the fram
Contour Princip
Formedness Co
postulated by

Chapter 7

Geminates

The representation of geminates involves potential counter evidence to the stress assignment rules postulated in chapter 3. The problem to be accounted for is whether to identify geminates as one segment or as two. If represented as one segment, geminates present counter evidence to the stress assignment rules.

In this study, we argue that geminates are two segments underlyingly and one long segment phonetically. We also argue that the main difference between geminates in JA and geminates in MSA relates to the behavior of geminate glides in JA. In JA, geminate glides are subject to rules of glide degemination and glide vocalization.

The chapter is divided into four sections. In the first section, we analyse geminates in JA. The analysis involves a discussion of the representation of geminates, and of their behavior in relation to epenthesis and stress. This includes an analysis of the distinctive behavior of geminate glides. In the second section, we analyse the representation of geminates in MSA and their behavior in relation to stress. In the third section, we examine the analysis of geminates within the framework of CV phonology. This includes the Obligatory Contour Principle (OCP) and related constraints such as the Well Formedness Condition (WFC) and the Linking Constraint postulated by Hayes (1986). The fourth section is a summary of the

7.1. Geminates in J

In this section
representation of
geminates in relat
epenthesis and str

7.1.1. Representat

In JA, gemina
phonologically as

(1.A): máal "prop
fáar "mous
ħáal "cond
sáad "he c
ħáar "he c
ʔísmar "b

(1.B): kátab "he
ʔákal "he
ħáča "he
dáras "h

(1.C): kátab "h

analysis of geminates in JA and MSA.

7.1. Geminates in JA:

In this section, we consider the phonetic and phonological representation of geminates. We also consider the behavior of geminates in relation to glide degemination, glide vocalization, epenthesis and stress assignment.

7.1.1. Representation:

In JA, geminates contrast with non-geminates phonetically and phonologically as seen in (1).

(1.A): máal "property"	(1.A'): máall "bored"
fáar "mouse"	fáarr "escapee"
ħáal "condition"	ħáall "staying; residing"
sáad "he dominated"	sáadd "closing; blocking"
ħáar "he got confused"	ħáarr "hot"
ʔísmar "brown"	ʔismárr "he became brown"
(1.B): kátab "he wrote"	(1.B'): káttab "he made someone write"
ʔákal "he ate"	ʔákkal "he made someone eat"
ħáča "he talked"	ħáčča "he made someone talk"
dáras "he studied'	dárras "he taught"
(1.C): kátab "he wrote"	(1.C'): maktúub " something written"

dáras "he stu

ṭálab "he rqu

sálab "he rob

(1.D): šádd "he tigh

sádd "he clo

ħáll "he soi

ṭáxx "he sho

The data in (1
word-finally. The
non-geminates w
contrast simple v
in (1.C,C') and roo
consonants of th
but appear as a s
[sad:] etc.). This
is an appropriate

Additional e
geminates as tw

(2.A): kátabu(h)

(B): kátabuw

(C): ʕáduw

(d): ʕadúww

In (2.A), ka

	dáras "he studied"		madrúus "something studied"
	ṭálab "he rquested"		maṭlúub "something requested"
	sálab "he robbed"		maslúub "something robbed"
(1.D):	šádd "he tightened"	(1.D'):	mašdúud "something tightened"
	sádd "he closed"		masdúud "something closed"
	ħáll "he soived"		maħlúul "something solved"
	ṭáxx "he shot"		maṭxúux "someone shot"

The data in (1.A,A') contrast geminates with non-geminates word-finally. The data in (1.B,B') contrast geminates with non-geminates word-medially. The data in (1.C,C') and (1.D,D') contrast simple verbs with participles in roots of $C_1C_2C_3$ form as in (1.C,C') and roots of $C_1C_2C_2$ form as in (1.D,D'). The identical consonants of the latter type are separated by a long vowel in (1.D') but appear as a single long consonant in (1.D) (šadd = [šad:], sadd = [sad:] etc.). This alternation of C_2VC_2 with [C:] is evidence that CC is an appropriate representation of long consonants.

Additional evidence for the phonological representation of geminates as two segments can be obtained from the data in (2.A-D).

(2.A): kátabu(h) "he wrote it"

(B): kátabuw "they wrote"

(C): ʕáduw "running; transmittion of disease"

(d): ʕadúww "enemy"

In (2.A), *kátabu(h)* "he wrote it" contrasts with *kátabuw*

"they wrote" in (2.B

with *ɕáduw* "runn

contrasts with *ɕa*

attributed to the f

segment while *ɕad*

has to be noted tha

commonly used in

switching or what

mainly to illustra

non-geminates. A

ɕádaw, which is r

deals with glide c

If geminates a

then we would be

in (2.D) and *ɕádu*

these grounds, a

phonetically rea

phonetically rea

the grounds that

assume that *ká*

would be unable

and *kátabu(h)*

The analyse

geminates cont

phonetically.

"they wrote" in (2.B). On the other hand, *kátabuw* in (2.B) rhymes with *ʕáduw* "running; transmission of disease" as in (2.C) but it contrasts with *ʕadúww* "enemy" as in (2.D). The contrast has to be attributed to the fact that *ʕáduw* in (2.C) ends with one glide segment while *ʕadúww* in (2.D) ends with a geminate glide. Here it has to be noted that *ʕadúww* "enemy" is a MSA word which is commonly used in JA. Its use in JA indicates a kind of code switching or what might be called borrowing. It is analysed here mainly to illustrate the phonetic distinction between geminates and non-geminates. As a matter of fact the corresponding JA word is *ʕádaw,* which is rarely used. This will be analysed in 6.1.2.1 which deals with glide degemination in JA.

If geminates are phonetically represented as one short segment, then we would be unable to maintain the contrast between *ʕadúww* in (2.D) and *ʕáduw* in (2.C) or the JA words in (1.A) and (1.A'). On these grounds, an argument might be raised that *ʕadúww* in (2.D) is phonetically realised as [ʕáduw], and that *ʕáduw* in (2.C) is phonetically realised as [ʕádu]. This argument has to be rejected on the grounds that *ʕáduw* rhymes with *kátabuw* in (2.B). If we assume that *kátabuw* in (2.B) is realised as [kátabu], then we would be unable to maintain the contrast between *kátabuw* in (2.B) and *kátabu(h)* in (2.A).

The analyses of the data in (1.A-D) and (2.A-D) argue that geminates contrast with non-geminates both phonologically and phonetically.

7.1.2. Geminate gli

The behavior o
other geminates.

(3.A): ʕarabíyy-ih
badawíyy-i
nabíyy-ih "
ʕadáww-ah

(3.B): ʕárabiy "a
bádawiy "
nábiy "a p
ʕádaw "an

(3.A) shows
nouns in (3.B).
feminine gender
geminate glide
nouns are not m
vowel as the s
the penultimate
an adjustment
effected by fin
the penultimat
(3.B) where a r
assigned to fir

7.1.2. Geminate glides:

The behavior of geminate glides in JA is different from that of other geminates. Consider the JA data in (3.A,B).

(3.A): ʕarabíyy-ih "an Arab fem."
badawíyy-ih "a bedouin fem."
nabíyy-ih "a prophet fem."
ʕadáww-ah "an enemy fem."

(3.B): ʕárabiy "an Arab"
bádawiy "a bedouin"
nábiy "a prophet"
ʕádaw "an enemy"

(3.A) shows the feminine nouns corresponding to the masculine nouns in (3.B). In (3.A), the suffix *-ih* marks the noun for the feminine gender and stress is assigned to the vowel preceding the geminate glide the stress rules predict. In (3.B), the masculine nouns are not marked for gender, and stress is assigned to the first vowel as the same stress rules predict. The shift of stress from the penultimate vowel in (3.A) into the first one in (3.B) is merely an adjustment to fit into the new change in the segmental string effected by final glide degemination. In (3.A), stress is assigned to the penultimate vowel which precedes the geminate cluster. But in (3.B) where a rule of final glide degemination has applied, stress is assigned to first vowel. The same rules are applied in the

assignment of stres

In their applic

glide degemination

accounted for by ru

Rule (4):

[-cons] –

[-syl]

Rule (4) of gli

/ʕadaww/, yieldi

there are some da

of glide degemina

(5.A): ʔáww "li

ħáyy "a r

(5.B): láy-y "fo

ʕaláy-y

In (5.A), the

morpheme boun

cluster. Rule (

data in (5.A) ar

glide degemina

constraint (6)

assignment of stress in both (3.A) and (3.B).

In their application, the rules of stress assignment and final glide degemination do not have to be ordered. Glide degemination is accounted for by rule (4).

Rule (4):

$$[-\text{cons}]_{[-\text{syl}]} \longrightarrow \emptyset \;/\; [-\text{cons}]_{[-\text{syl}]} \_\_\_ \#$$

Rule (4) of glide degemination applies to /ʕarabiyy/ and /ʕadaww/, yielding [ʕarabiy] and [ʕadaw], respectively. However, there are some data which are potential counter evidence to rule (4) of glide degemination. Consider the data in (5.A,B).

(5.A): ḏáww "light"
ħáyy "a residential area"

(5.B): láy-y "for-me"
ʕaláy-y "on-me"

In (5.A), the words are monosyllabic. In (5.B), there is a morpheme boundary between the two segments of the geminate cluster. Rule (4) of final glide degemination does not apply to the data in (5.A) and (5.B). To account for the failure of rule (4) of final glide degemination to apply to the data in (5.A,B), we postulate constraint (6).

Constraint (6):

Glide dege

words or a

Constraint (6)

degemination from

to a geminate of w

independent morph

bisyllabic words

The data acco

accounted for by

(7):

[-cons] ---

[-syl]

(8):

[-cons] --

[-syl]

By postulating

(6). Rule (7) ac

(8) for words i

boundary as in

glide degemina

way, we forme

This complies

Constraint (6):

Glide degemination rules do not apply to monosyllabic words or across a morpheme boundary.

Constraint (6) blocks the application of rule (4) of glide degemination from applying to geminates of monosyllabic words or to a geminate of which the second segment represents an independent morpheme as it is the case in the monosyllabic and bisyllabic words *ʔáww,* and *ʕaláy-y,* respectively.

The data accounted for informally by Constraint (6) can also be accounted for by postulating rules (7), and (8).

(7):

$$\begin{matrix}[-\text{cons}] \\ [-\text{syl}]\end{matrix} \longrightarrow \begin{matrix}[-\text{con}] \\ [-\text{syl}]\end{matrix} \;/\; \#\ C\ V \begin{matrix}[-\text{cons}] \\ [-\text{syl}]\end{matrix} \;\_\_\_\;\ \#$$

(8):

$$\begin{matrix}[-\text{cons}] \\ [-\text{syl}]\end{matrix} \longrightarrow \begin{matrix}[-\text{con}] \\ [-\text{syl}]\end{matrix} \;/\; \begin{matrix}[-\text{cons}] \\ [-\text{syl}]\end{matrix} + \_\_\_\;\ \#$$

By postulating rules (7) and (8) we can dispense with Constraint (6). Rule (7) accounts for monosyllabic words as in (5.A) and rule (8) for words in which the geminate glide is split by a morpheme boundary as in (5.B). Rules (7) and (8) properly include rule (4) of glide degemination and apply disjunctively in relation to it. In this way, we formally account for exceptions by properly including rules. This complies with the assumption that all exceptions are

accounted for by p
derivation of som

(9):

/ʕarabiyy/ /
"an Arab"
ʕarabíyy
ʕarabiy

ʕárabiy

[ʕárabiy] [

In (9), rule
because it is a
monosyllabic V
includes rule (
does not apply
these words is
the geminate
the SD of rule
disjunctively
yielding ʕara
assigned to t

accounted for by properly including rules. In (9), we illustrate the derivation of some words which include geminate glides.

(9):

/ʕarabiyy/	/ḍaww/	/layy/	/ʕalayy/	UR
"an Arab"	"light"	"for-me"	"on-me'	
ʕarabíyy	ḍáww	láyy	ʕaláyy	Stress Assignment
ʕarabiy	---	---	---	Rule (4): Glide Degemination
ʕárabiy	---	---	---	Rule (15) in Ch. 3: Stress
[ʕárabiy]	[ḍáww]	[láyy]	[ʕaláyy]	PR

In (9), rule (4) of glide degemination does not apply to [ḍaww] because it is a monosyllabic word; final geminate glides in monosyllabic words are accounted for by rule (7) which properly includes rule (4) and applies disjunctively in relation to it. Rule (4) does not apply to [layy] and [ʕalayy] because the geminate cluster in these words is split by a morpheme boundary; the final segment of the geminate is the pronominal morpheme *-y* "me". This satisfies the SD of rule (8) which also properly includes (4) and applies disjunctively in relation to it. Rule (4') applies to *ʕarabíyy,* yielding *ʕarabiy.* Then stress is adjusted to the change and is assigned to the first syllabic segment as the stress rules predict.

7.1.2.1. Glide delet

Some evidence
two segments can
the rules of interv

7.1.2.1.1. Glide de

The rule of in
intervocalically,
the JA data in (1

(10.A): katab "he
jalas "he

(10.B): xaaf "he
daar "he

(10.C): ṭaar "it
maal "h

The data ir
(10.A,A'). But
in (10.A) it do
geminate glid
intervocalica
are: /xawaf/,

7.1.2.1. Glide deletion, vocalization, and degemination:

Some evidence which argues for the behavior of geminates as two segments can also be obtained from their behavior in respect to the rules of intervocalic glide deletion and glide vocalization.

7.1.2.1.1. Glide deletion:

The rule of intervocalic glide deletion deletes a single glide intervocalically, but it does not delete a geminate glide. Consider the JA data in (10.A-C).

(10.A): katab "he wrote" (10.A'): kattab "he made someone write"
ǰalas "he sat down" ǰallas "he made someone sit"

(10.B): xaaf "he got scared" (10.B'): xawwaf "he scared someone"
daar "he turned" dawwar "he made someone turn"

(10.C): ṭaar "it flew" (10.C'): ṭayyer "he made it fly"
maal "he bent" mayyal "he bent something"

The data in (10.B,C) and (10.B',C') pattern with the data in (10.A,A'). But in (10.B,C) the second radical does not show up, while in (10.A) it does. In (10.B',C'), the second radical shows up as a geminate glide. We take this as evidence that a single glide deletes intervocalically. That is the underlying forms of *xaaf*, and *ṭaar* are: /xawaf/, and /ṭayar/, respectively. This also gives further

evidence that gemi

(11) accounts for i

Rule (11):

[-cons] –

[-syl]

Rule (11) appli

but in (10.B',C'), t

behave as two seg

and (10.C).

7.1.2.1.2. Glide v

Further evide

segments can al

Consider the JA

(12.A): ʔaxuw "

ramuw "

ligiy "h

nisiy "h

(12.B): ʔaxuu-h

ramuu-

ligii-h

nisii-h

evidence that geminates do not behave as a single segment. Rule (11) accounts for intervocalic glide deletion.

Rule (11):

[-cons] ---> Ø / [+syll] --- [+syll]
[-syl]

Rule (11) applies to (10.B,C), deleting an intervocalic single glide but in (10.B',C'), the rule does not apply because geminate glides behave as two segments, not one segment as it is the case in (10.B) and (10.C).

7.1.2.1.2. Glide vocalization:

Further evidence about the behavior of geminates as two segments can also be obtained from a rule of glide voclization. Consider the JA data in (12.A-C).

(12.A): ʔaxuw "brother"
ramuw "they threw"
ligiy "he found"
nisiy "he forgot"

(12.B): ʔaxuu-ha "her brother"
ramuu-ha "they threw it"
ligii-ha "he found it"
nisii-ha "he forgot it"

(12.C): ǰaww "ligh

ǰaww "sky

ħayy "resi

čayy "burn

(12.D): ǰaww-na

ǰaww-na

ħayy-na "

čayy-na "

In (12.A), we

by a vowel. In (1

to the data in (1

preceding vowel

In (12.D), where

not vocalize as

in (12.C,D) cont

(12.A,B); the gl

(12.C,D) behave

glides, we post

Rule (13):

[-syl]

[-con

In rule (13

(12.C): ʔaww "light"

ǰaww "sky; weather"

ħayy "residential area"

čayy "burn with a hot iron rod"

(12.D): ʔaww-na "our light"

ǰaww-na "our sky; weather"

ħayy-na "our residential area"

čayy-na "our burn with iron"

In (12.A), we have glides of one segment word-finally preceded by a vowel. In (12.B), where a consonant-initial suffix is attached to the data in (12.A), the glide vocalizes, merging with the preceding vowel. In (12.C), we have geminate glides word-finally. In (12.D), where a consonant-initial suffix is attached, the glides do not vocalize as it is the case in (12.B). This argues that the glides in (12.C,D) contrast with those in the corresponding positions in (12.A,B); the glides in (12.A,B) behave as one segment while those in (12.C,D) behave as two segments. To account for the vocalization of glides, we postulate rule (13) of glide vocalization.

Rule (13):

$$\begin{bmatrix}-syl\\-cons\end{bmatrix} \longrightarrow \begin{bmatrix}+syll\\ \alpha F\end{bmatrix} \;/\; \begin{bmatrix}+syll\\-low\\ \alpha F\end{bmatrix} \_\_\_\_ [+cons]$$

In rule (13), [+cons] does not equal [#]. Rule (13) of glide

vocalization predi

preceding [-low] v

identical to rule (

convenience. Here

vocalize in the co

assume that they

these forms do n

no evidence for s

or a lexical restr

vowel word-fina

data which contr

Word-medially,

preceded by a lo

(14.A): gool (/g

moot (/m

beet (/b

ɓeef (/ɓ

(14.B): (ʔi)-gw

(ʔi)-mw

(ʔi)-by

(ʔi)-ɓy

(14.C): filim

jisim

gisim

vocalization predicts the vocalization of glides in the context of a preceding [-low] vowel and a following consonant. Rule (13) is identical to rule (4) in Chapter 2 and is repeated here for convenience. Here, the question arises whether single glides vocalize in the context of a preceding low vowel. In principle, we assume that they do. But the problem is that at the surface level these forms do not show up word-medially. Word-finally, there is no evidence for such forms. There seems to be a kind of lexical gap or a lexical restriction on having a single glide preceded by a low vowel word-finally. Accordingly, we lack the evidence to provide data which contrast with the geminate glides in (12.D).

Word-medially, we can provide some evidence for single glides preceded by a low vowel. Consider the JA data in (14.A,B,C,D).

(14.A): gool (/gawl/) "saying"
moot (/mawt/) "death"
beet (/bayt/) "home"
ɓeef (/ɓayf) "guest"

(14.B): (ʔi)-gwaal "sayings"
(ʔi)-mwaat "dead people"
(ʔi)-byuut "houses"
(ʔi)-ɓyuuf "guests"

(14.C): filim "film"
ǰisim "body"
gisim "part"

ʔilim "scien

(14.D): (ʔi)-flaam

(ʔi)-jsaam

(ʔi)-gsaam

(ʔi)-ʕlaam

The data in (1

the words are ver

root is a vocalize

data in (10.B-C) a

corresponding si

form, the second

(14.B), the secon

appear in the co

with the preced

plural forms, th

of glide vocaliz

preceding short

the long vowels

glide preceded

postulate in (1

(14.B). On thes

from the corre

(14.A'): /gawl

/maw

ʕilim "science; news"

(14.D): (ʔi)-flaam "films"

(ʔi)-ǰsaam "bodies"

(ʔi)-gsaam "parts"

(ʔi)-ʕlaam "sciences; news"

The data in (14.A,B) pattern with the data in (14.C,D). In (14.A), the words are verbal nouns in which the second consonant of the root is a vocalized glide as we have argued in the analysis of the data in (10.B-C) above. The data in (14.B,D) are the plural of the corresponding singular forms in (14.A,C), respectively. In the plural form, the second stem consonant is followed by a long vowel. In (14.B), the second stem consonant is a glide. This glide does not appear in the corresponding singular form; the glide has vocalized with the preceding vowel, yielding the long mid vowel [ee,oo]. In the plural forms, the glide does not vocalize because the SD of rule (13) of glide vocalization is not met; glides vocalize in the context of a preceding short vowel and a following consonant. This shows that the long vowels [ee] and [oo] in (14.A) derive from an underlying glide preceded by a low vowel. The underlying glide which we postulate in (14.A) shows up in the corresponding plural forms in (14.B). On these grounds, we assume that the data in (14.A) derive from the corresponding underlying forms in (14.A').

(14.A'): /gawl/

/mawt/

/bayt/

/ʔayf/

Rule (4) of gli

and repeat here fo

of vowel raising

yielding [gool], [m

Rule (4):

[-syl] –

[-cons]

The underl

glides preceded

following conso

the glides in (1

of a preceding

hand, the data

geminate glide

However, t

evidence to rul

(15.A,B).

(15.A): dáluw

láðuw

ǰáliy

/bayt/

/ʔ̆ayf/

Rule (4) of glide vocalization which we postulated in Chapter 2 and repeat here for convenience applies in conjunction with rule (3) of vowel raising in Chapter 2 to the underlying forms in (14.A'), yielding [gool], [moot], [beet], and [ʔ̆eef], respectively.

Rule (4):

$$\begin{bmatrix}-\text{syl}\\-\text{cons}\end{bmatrix} \longrightarrow \begin{bmatrix}+\text{syl}\\ \alpha F\end{bmatrix} \;/\; \begin{bmatrix}+\text{syl}\\-\text{low}\\ \alpha F\end{bmatrix} \_\_\_\_ \; [+\text{cons}]$$

The underlying form in (14.A') show that the single segment glides preceded by a low vowel vocalize in the context of a following consonant. In this way, the glides in (14.A') pattern with the glides in (12.B), above, where the glides vocalize in the context of a preceding high vowel and a following consonant. On the other hand, the data in (14.A') show that single glides contrast with geminate glides in the context of a preceding low vowel as in (12.D).

However, there are some data which are potential counter evidence to rule (13) of glide vocalization. Consider the JA data in (15.A,B).

(15.A): dáluw "bucket"

láðuw "gossip"

ǰáliy "cleaning; brightening"

ságiy "irri

(15.B): dáluw-hun

láðuw-hun

jáliy-hum

ságiy-hum

The data in (1

vocalization. Ho

the glide in (15.

categorize this

analysed in chap

grounds, we ass

apply to the dat

rules of epenth

Thus rule (13) a

have not applie

(13) of glide vo

(16): ʔaww-na

ʔaxúu-na

láðuw-na

(17): /ʔaww-

ʔáww-

ságiy "irrigation"

(15.B): dáluw-hum "their bucket"
láðuw-hum "their gossip"
ǰáliy-hum "their cleaning; brightening"
ságiy-hum "their irrigation"

The data in (15.B) present counter evidence to (13) of glide vocalization. However, it has to be noted that the vowel preceding the glide in (15.B) fails to be assigned stress. Accordingly, we categorize this vowel with the alternating high vowel which we analysed in chapter 3 and argued that it is epenthetic. On these grounds, we assume that rule (13) of glide vocalization does not apply to the data in (14.B) because as we have previously argued rules of epenthesis are late rules which do not feed other rules. Thus rule (13) applies at the level where the rules of epenthesis have not applied yet. In (17), we illustrate the application of rule (13) of glide vocalization in the derivation of the JA data in (16).

(16): ǰ̣aww-na "our light"
ʔaxúu-na "our brother"
láðuw-na "our talk; gossip"

(17):	/ǰ̣aww-na/	/ʔaxuw-na/	/laðw-na/	UR
	ǰ̣áww-na	ʔaxúw-na	láðw-na	Rule (15): Stress assignment

[ʔáww-na]

7.1.2.1.3. Glide d

In JA, a rule
geminate glides
again the JA dat

(18.A): ʕárabiy
bádawiy
ʔájnabiy
ʕádaw (

(18.B): ʕarabíyy
badawíy
ʔajnabí
ʕadáww

In (18.A),
corresponding
preceded by a
is very comm
The data in (

---	ʔaxúu-na	---	Rule (13): Glide vocalization
---	---	lá*ð*uw-na	Rule (32) in ch. 4: Epenthesis
[ʕ̰áww-na]	[ʔaxúu-na]	[lá*ð*uw-na]	PR

7.1.2.1.3. Glide degemination:

In JA, a rule of glide degemination applies to word-final geminate glides but not to word-medial geminate glides. Consider again the JA data in (18.A,B).

(18.A): ʕárabiy "Arabic"
bádawiy "a bedouin"
ʔáǰnabiy "a foreigner"
ʕádaw (~ʕadúww = MSA) "an enemy"

(18.B): ʕarabíyy-ih "Arabic fem."
badawíyy-ih "A bedouin fem."
ʔaǰnabíyy-ih "A foreigner fem."
ʕadáww-ah "an enemy fem."

In (18.A), the word-final single glides derive from the corresponding geminate glides in (18.B). Note that w-glides preceded by a low vowel are very rare. The native JA form *ʕádaw* is very commonly replaced by the corresponding MSA word, *ʕadúww*. The data in (18.A,B) argue that geminate glides word-finally

undergo a rule of

degemination whi

convenience.

(4):

[-cons] ---

[-syl]

In rule (4), a

glide degeminati

/ʕadaww/, yield

application of ru

of the segmetal

effects a stress

7.1.3. Geminate

The represe

and as one long

of stress assig

(19.A): sakát-t

naħát-

(19.B): maħáll

mamár

undergo a rule of glide degemination. This is rule (4) of glide degemination which we postulated above and repeat here for convenience.

(4):

$$[-\text{cons}]_{[-\text{syl}]} \longrightarrow \emptyset \;/\; [-\text{cons}]_{[-\text{syl}]} \_\_\_\_ \#$$

In rule (4), again, [#] does not equal a consonant. Rule (4) of glide degemination applies to geminate glides as in /ʕarabiyy/ and /ʕadaww/, yielding *ʕarabiy* and *ʕadaw*, respectively. The application of rule (4) of glide degemination changes the structure of the segmetal string to which the stress rules apply. This change effects a stress shift which we discuss in 7.1.3.

7.1.3. Geminates and stress:

The representation of geminates as two segments underlyingly and as one long segment phonetically raises no problems to the rules of stress assignment. Consider the JA data in (19.A,B,C,D).

(19.A): sakát-t "I stopped talking"
naħát-t "I carved"

(19.B): maħáll "place; room"
mamárr "passage; way"

(19.C): ʕárabiy "A

ʕádaw "er

(19.D): ʕarabíyy-

ʕadáww-ə

In (19.A,B,D)

represented as t

the predictions

a rule of glide d

segment and str

derivation of so

(20):

/sakatt/

sakátt

[sakátt]

7.1.4. Geminat

The analys

segments. Bu

(19.C): ʕárabiy "Arabic"

ʕádaw "enemy"

(19.D): ʕarabíyy-ih "Arabic fem."

ʕadáww-ah "enemy fem."

In (19.A,B,D), under the assumption that geminates be represented as two segments, stress is assigned in compliance with the predictions of the stress assignment rules. But in (19.C) where a rule of glide degemination applies, the geminate becomes one segment and stress is adjusted accordingly. In (20), we present the derivation of some JA words which involve geminates.

(20):

/sakatt/	/maħall/	/ʕarabiyy/	UR
sakátt	maħáll	ʕarabíyy	Rule (15): Stress assignment
---	---	ʕarabiy	Rule (4): Glide degemination
---	---	ʕárabiy	Rule (15): Stress assignment
[sakátt]	[maħáll]	[ʕárabiy]	PR

7.1.4. Geminates and epenthesis:

The analyses in 7.1.1 argue that geminates behave as two segments. But the representation of geminates as two segments

presents counter e

the insertion of a

word-finally or th

data in (21.A,B,B'

(21.A): sádd "he

márr "he

máll "he

kátt "he

hass "he

(21.B): gasátt "

sajátt "

fagátt "

samátt

jalátt "

(21.B'): gasádit

sajádit

fagádit

samádi

jaládit

(21.C): sakátt

nakátt

şamát

lafátt

presents counter evidence to the rules of epenthesis which predict the insertion of a high vowel in the context of two consonants word-finally or three consonants word-medially. Consider the JA data in (21.A,B,B',C,C').

(21.A): sádd "he closed"
márr "he passed by"
máll "he got bored"
kátt "he shook something"
ħáss "he woke up"

(21.B): gaʂátt "I sat down"
saǰátt "I bent down in doing my prayer"
fagátt "I lost"
saʂátt "I ground wheat"
ǰalátt "I whipped"

(21.B'): gaʂádit "I sat down"
saǰádit "I bent down in doing my prayer"
fagádit "I lost"
saʂádit "I ground wheat"
ǰaládit "I whipped"

(21.C): sakátt "I stopped talking"
nakátt "I wiped off"
ṣamátt "I kept quiet"
lafátt "I drew the attention of someone"

naħátt "I c

(21.C'): sakátit "I

nakátit "I

ṣamátit "

lafátit "I

naħátit "

The data in (

the first type, th

(21.A) are not se

type present cou

predict the inse

consonants wor

second type as

cluster are sep

first segment

of assimilatio

one. Evidence

in (21.B') in wh

does not apply

In underlying

separated by

epenthesis. T

where an eper

To accoun

respect to ep

naħátt "I carved"

(21.C'): sakátit "I stopped talking"

nakátit "I wiped off"

ṣamátit "I kept quiet"

lafátit "I drew the attention of someone"

naħátit "I carved"

The data in (21) show that there are two types of geminates. In the first type, the two segments of the geminate cluster as in (21.A) are not separated by a morpheme boundary. Geminates of this type present counter evidence to the rules of epenthesis which predict the insertion of a high vowel in the context of two consonants word-finally or three consonants word-medially. In the second type as provided in (21.B), the two segments of the geminate cluster are separated by a morpheme boundary. In this type, the first segment of the geminate cluster is derived by an optional rule of assimilation which assimilates the first segment to the second one. Evidence for this can be obtained from the corresponding data in (21.B') in which epenthesis takes precedence and assimilation does not apply. When epenthesis applies, no geminates are formed. In underlying (21.C), the two segments of the geminate cluster are separated by a morpheme boundary. As in (21.B), there may be epenthesis. This is illustrated in the corresponding data in (21.C') where an epenthetic vowel is inserted.

To account for the behavior of the two types of geminates in respect to epenthesis, we assume that there are true and fake

geminates. True g
boundary between
first type illustra
inseparable long
blocked as the Ad
(Guerssel, 1977:

"The Adjac
Given two
can alter
identity o

Two consonants
morpheme boun
identical if the
1977: 283-284
are considered
Fake gemin
between the fi
type illustrate
without violat
As for ger
assimilation,
morpheme bou
Guerrsel's (1

geminates. True geminates are those which have no morpheme boundary between the first and second segment as is the case in the first type illustrated in (21.A). True geminates behave as an inseparable long segment. In this type of geminates, epenthesis is blocked as the Adjacency Identity Constraint (AIC) predicts (Guerssel, 1977: 284).

"The Adjacency-Identity constraint (AIC):

Given two segments A_1A_2 where $A_1=A_2$, a phonological rule can alter the adjacency of A_1A_2 if and only if it alters the identity of A_1 or A_2."

Two consonants are adjacent if no other segment, word-boundary or morpheme boundary intervenes between them. Two segments are identical if they have the same feature specfications (Guerssel, 1977: 283-284). Non-linear constraints on epenthesis in geminates are considered in 7.3.2.

Fake geminates are those which have a morpheme boundary between the first and second segment as it is the case in the third type illustrated in (21.C,C'). Epenthesis applies to fake geminates without violating the AIC.

As for geminates of the second type which are created through assimilation, they behave as true geminates with the deletion of the morpheme boundary. This can be accounted for by reference to Guerrsel's (1978: 233) Condition on Assimilation Rules (CAR).

Constraint

"Given a fe

if the focu

determine

Y and Z in

According to

assimilation beh

morpheme bound

evidence in supp

metrical phonol

(1988: 60). In h

partial and com

epenthesis. Th

apply to the ge

which created

does not apply

late rules. In

vacuously.

The option

geminates can

Principle pres

fake geminate

will be forme

a syllabic seg

principle is n

are not split

Constraint on Assimilation Rules:

"Given a feature-changing rule of the form X ---> Y / Z, if the focus X takes on some or all of the features of the determinant Z, then any boundary which intervenes between Y and Z in the output of that rule is deleted by convention."

According to this condition, geminates which are derived by assimilation behave as true geminates; boundaries including morpheme boundary delete at the site of assimilation. Further evidence in support of Guerssel's CAR can be obtained from the metrical phonology analysis of Palestinian Arabic by Abu-Salim (1988: 60). In his analysis, Abu-Salim argues that rules of both partial and complete assimilation block the application of rules of epenthesis. This explains the failure of the rules of epenthesis to apply to the geminates in (21.B) in which the rule of assimilation which created the geminate cluster has already applied. Epenthesis does not apply before assimilation because rules of epenthesis are late rules. In (21.C), assimilation may be considered to have applied vacuously.

The optional application of the rules of epenthesis to fake geminates can also be explained in reference to the Peak of Sonority Principle presented in Chapter 4. The two segments which form the fake geminate are identical. Hence, no peaks or valleys of sonority will be formed between any two consecuetive syllabic segments or a syllabic segment and a word-boundary. Thus the scale of sonority principle is not violated and the grammaticality of geminates which are not split by epenthesis follows. In 7.3.2, we present the

analysis of gemina

framework of CV

7.2. Geminates in

In MSA, gemin
geminates may ap
inflectional endi
the end of a sent
analysis of gemi
geminates.

7.2.1. Represent

The represe
potential counte
postulated in ch
representation
because in MSA
geminates be r
long segment p

(22.A):

kátab-a "he
ʔákal-a "he
dáras-a "he
rákaḑ-a "he

analysis of geminates in reference to epenthesis within the framework of CV phonology.

7.2. Geminates in MSA:

In MSA, geminates appear mainly word-medially. Word-finally, geminates may appear in the context where the word-final inflectional ending in optional. Inflectional endings are optional at the end of a sentence, mainly before pause. Accordingly, our analysis of geminates in MSA will be limited mainly to word-medial geminates.

7.2.1. Representation:

The representation of geminates as one segment would be potential counter evidence to the rules of stress assignment postulated in chapter 3. In respect to epentheses, the representation of geminates does not raise any problems in MSA because in MSA rules of epenthesis do not apply. We argue that geminates be represented as two segments underlyingly and as one long segment phonetically. Consider the MSA data in (22.A-C).

(22.A):

kátab-a	"he wrote"
ʔákal-a	"he ate"
dáras-a	"he studied'
rákaḍ-a	"he ran"

(22.A'):

káttab-a	"he made someone write"
ʔákkal-a	"he made someone eat"
dárras-a	"he taught"
rakkaḍ-a	"he made someone run"

(22.B):

kátab-a "he wr
dáras-a "he st
ṭálab-a "he rec
sálab-a "he ro

(22.C):

šádd-a "he tig
sádd-a "he cl
ħáll-a "he sol
šáqq-a "he sp

The data in
data in (22.A'),
non-geminates
(22.B,B',C,C'), t
from the perfe
compared with
which derive f
(22.B). The ge
as their partic

7.2.2. Geminat

The behav
geminate glid
single glides

(22.B):

kátab-a	"he wrote"
dáras-a	"he studied"
ṭálab-a	"he requested"
sálab-a	"he robbed"

(22.B'):

maktúub-un	" something written"
madrúus-un	"something studied"
maṭlúub-un	"something requested"
maslúub-un	"something robbed"

(22.C):

šádd-a	"he tightened"
sádd-a	"he closed"
ħáll-a	"he solved"
šáqq-a	"he split"

(22.C'):

mašdúud-un	"something tightened"
masdúud-un	"something closed"
maħlúul-un	"something solved"
mašqúuq-un	"something split"

The data in (22.A) minimally contrast with the corresponding data in (22.A'). This argues that geminates contrast with non-geminates phonetically and phonologically word-medially. In (22.B,B',C,C'), the derivation of the passive participles in (22.C') from the perfect verbs with a final geminate as in (22.C) is compared with the derivation of the passive participles in (22.B) which derive from the perfect verbs which have no geminates as in (22.B). The geminates of (22.C) derive from roots of $C_1C_2C_2$ types as their participles show.

7.2.2. Geminate glides:

The behavior of geminate glides in MSA is similar to that of geminate glides in JA in respect to intervocalic glide deletion; single glides in both JA and MSA delete intervocalically while

geminate glides c

in respect to glid

MSA, one segmen

vowel and a follo

Geminate glides

differ from glid

word-finally, ge

in JA.

7.2.2.1. Glide de

In MSA, sin

glides do not.

(23.A):

katab-a "he

jalas-a "he

(23.B):

xaaf-a "he

daar-a "he

(23.C):

ṭaar-a "it

maal-a "he

The MSA

geminate glides do not. But glides in MSA differ from glides in JA in respect to glide vocalization and final glide degemination. In MSA, one segment glides vocalize in the context of a preceding high vowel and a following consonant, and so do single glides in JA. Geminate glides do not vocalize in both varieties. But glides in MSA differ from glides in JA in respect to glide degemination: word-finally, geminate glides do not degeminate in MSA but they do in JA.

7.2.2.1. Glide deletion:

In MSA, single glides delete intervocalically, but geminate glides do not. Consider the MSA data in (23).

(23.A):

katab-a "he wrote"

jalas-a "he sat down"

(23.A')

kattab-a "he made someone write"

jallas-a "he made someone sit"

(23.B):

xaaf-a "he got scared"

daar-a "he turned"

(23.B'):

xawwaf-a "he scared someone"

dawwar-a "he made someone turn"

(23.C):

ṭaar-a "it flew"

maal-a "he bent"

(23.C'):

ṭayyer-a "he made it fly"

mayyal-a "he bent something"

The MSA data in (23) are similar to the JA data in (10).

Accordingly, the
presented in 7.1.
deletion in MSA.

7.2.2.2. Glide vo

In MSA, unli
preceding high
vocalize in the
glides vocalize
(12.A,B) and pr
glides in both
(24.A-C).

(24.A): ʂiid "f
diin "r
ruuħ "
suur "

(24.B): qawm
lawħ
bayt "
ṭayr "

(24.C): film
qism
sirb

Accordingly, the analysis of intervocalic glide deletion in JA presented in 7.1.2.1.1. applies to the analysis of intervocalic glide deletion in MSA.

7.2.2.2. Glide vocalization:

In MSA, unlike JA, single glides vocalize in the context of a preceding high vowel and a following consonant. But they do not vocalize in the context of a preceding low vowel. In JA, single glides vocalize in the context of preceding high vowels as in (12.A,B) and preceding low vowels as in (14.A), as well. Geminate glides in both JA and MSA do not vocalize. Consider the MSA data in (24.A-C).

(24.A): ʕiid "festival"	(24.A'): ʔaʕyaad "festivals"
diin "religion"	ʔadyaan "religions"
ruuḥ "spirit"	ʔarwaaḥ "spirits"
suur "wall"	ʔaswaar "walls"
(24.B): qawm "people"	(24.B'): ʔaqwaam "peoples"
lawḥ "board"	ʔalwaaḥ "boards"
bayt "line of poetry"	ʔabyaat "lines of poetry"
ṭayr "bird"	ʔaṭyaar "birds"
(24.C): film "film"	(24.C'): ʔaflaam "films"
qism "part"	ʔaqsaam "parts"
sirb "a flock"	ʔasraab "flocks"

jism "bod

(24.D): siyyaarah

xayyaal "

sawwaaħ

suwwaaħ

The data in (

In (24.A), the un

plural forms in

high vowel and

preceding low v

context, the beh

that of one segm

vocalize wheth

further evidenc

with that of no

behavior of ger

similar to that

above.

7.2.2.3. Glide d

In MSA, ge

word-medial

(25): sarabíyy

ǰism "body" ʔaǰsaam "bodies"

(24.D): siyyaarah "a car"

xayyaal "a horseman"

sawwaaħ "a tourist"

suwwaaħ "tourists"

The data in (24.A,A') and (24.B,B') are like the data in (24.C,C'). In (24.A), the underlying glide which appears in the corresponding plural forms in (24.A') has vocalized in the context of a preceding high vowel and a following consonant. But in the context of a preceding low vowel as in (24.B) the glide does not vocalize. In this context, the behavior of one segment glides in MSA is different from that of one segment glides in JA. In (24.D), geminate glides do not vocalize whether the preceding vowel is high or low. This gives further evidence that the behavior of geminate glides contrasts with that of non-geminate glides. It also gives evidence that the behavior of geminate glides in MSA in respect to vocalization is similar to that of geminate glides in JA as we have shown in 7.1.2.2, above.

7.2.2.3. Glide degemination:

In MSA, geminate glide do not degeminate in either word-final or word-medial contexts. Consider the MSA data in (25).

(25): ʕarabíyy~ʕarabíyy-un "an Arab(-nom.)"

badawíyy~b

nabíyy~nab

ʕadúww~ʕa

The data in (
geminate glides
which marks ca
glides do not un
the behavior of

geminate glides
degemination, t
the stress rule
position. Stres
cluster as the

7.2.3. Geminat

The analys
as two segme
stress assign
is assigned as

7.2.4. Gemina

In MSA, t
two consonan
have three co

badawíyy~badawíyy-un "a bedouin(-nom.)"

nabíyy~nabíyy-un "a prophet(-nom.)"

ʕadúww~ʕadúww-un "an enemy(-nom.)"

The data in (25) show that it is possible to have word-final geminate glides in MSA in the context where the inflectional ending which marks case is optional. The data also show that word-final glides do not undergo a rule of glide degemination. This shows that the behavior of geminate glides in JA is different from that of geminate glides in MSA. Due to the absence of a rule of glide degemination, there is no change in the segmental string to which the stress rules apply. Accordingly, stress does not shift to a new position. Stress is assigned to the vowel preceding the geminate cluster as the stress rules predict.

7.2.3. Geminates and stress:

The analysis of geminates as one long segment phonetically and as two segments underlyingly raises no problems to the rules of stress assignment. In the contexts which involve geminates, stress is assigned as the stress rules postulated in Chapter 3 predict.

7.2.4. Geminates and epenthesis:

In MSA, the question of epenthesis does not arise. MSA allows two consonant clusters word-finally. Word-medially, MSA does not have three consonant clusters. Geminates are not directly followed

by consonants. T

segments does s

word-medially.

7.3. The analyse

In CV phono

the CV tier and

within the fram

assignment, epe

7.3.1. Geminate

In CV phono

the CV tier and

with the Oblig

representation

tier. In the an

reference to t

consonantal s

feature matic

on the melodi

trees, gemina

7.3.2. Gemina

Within th

by consonants. Thus, the representation of geminates as two segments does satisfy the SD of the rules of epenthesis word-medially.

7.3. The analyses of geminates in CV phonology:

In CV phonology, geminates are represented as two segments on the CV tier and as one segment on the melodic tier. Following, within the framework of CV phonology, we analyze stress assignment, epenthesis, glide vocalization, and glide degemination.

7.3.1. Geminates and stress assignment:

In CV phonology, geminates are represented as two segments on the CV tier and as one segment on the melodic tier; in compliance with the Obligatory Contour Principle (OCP) which prohibits the representation of two adjacent identical segments on the melodic tier. In the analysis of stress in CV phonology, there is no explicit reference to the melodic tier. It refers only to vocalic and consonantal segments on the CV tier; there is no reference to the feature matices associated with the vocalic and consonantal slots on the melodic tier. Accordingly, in the building of the metrical trees, geminates are represented as two segments on the CV tier.

7.3.2. Geminates and epenthesis:

Within the framework of CV phonology, the failure of epenthetic

vowels to split a

predictions of th

lines. The insert

violates the well

between the CV t

crosses the asso

epenthesis does

"reply". In fake

there is a morph

geminate cluste

geminate cluste

represented on

sakátit. In (26

the CV tier and

words *rádd*, a

(26.A):

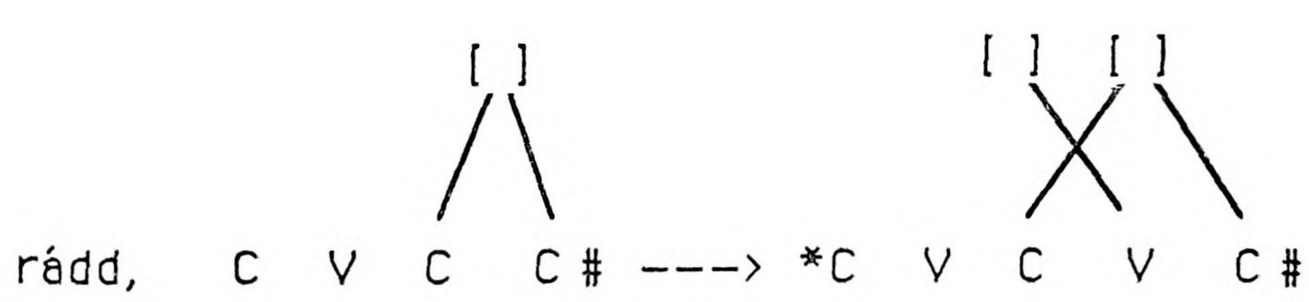
rádd,

(26.B):

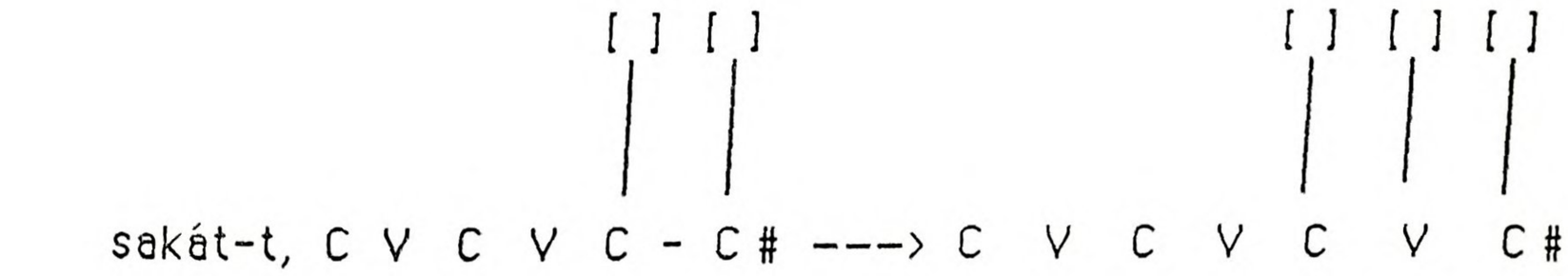
sakát-t,

vowels to split a true geminate cluster follows from the predictions of the Well Formedness Condition (WFC) on association lines. The insertion of an epenthetic vowel in a true geminate violates the well formedness condition. The association line between the CV tier and the melodic tier of the epenthetic vowel crosses the association lines of the geminate cluster. Accordingly, epenthesis does not apply to true geminate clusters as in **rádid* "reply". In fake geminates as in *sakát+t* "I stopped talking". where there is a morpheme boundary between the two segments of the geminate cluster, epenthesis is allowed since the segments of the geminate cluster belong to different morphemes which are represented on separate tiers. This explains the grammaticality of *sakátit.* In (26.A,B), we illustrate the association lines between the CV tier and the melodic tier of the geminate clusters in the JA words *rádd,* and *sakátt.*

(26.A):



(26.B):



In (26.A), the
epenthesis. Acc
(26.B), the assoc
CV phonology ac
fake geminates.
absence of epen
in *rádd* ; CV ph
before epenthes
line crossing (H

In my linear
geminates is ac
Geminate clust
geminate clust
equal sonority

7.3.3. Geminate

The JA rul
context of a fo
Within the fra
glide vocaliza
involves a vio
"Association
exhaustive" (H
glide vocaliz
tier to distin
carry out the

In (26.A), the association lines cross each other as a result of epenthesis. Accordingly, **rádid* is ruled ungrammatical. But in (26.B), the association lines do not cross each other. In this way, CV phonology accounts for the optional application of epenthesis in fake geminates. This explains the grammaticality of *sakátit.* The absence of epenthesis in words like *sakatt,* (=sakat-t)$_{it}$ explains as in *rádd* ; CV phonology here assumes that assimilation has applied before epenthesis to yield the branching structure which disallows line crossing (Hayes, 1986: 327).

In my linear analysis, the optionality of epenthesis in fake geminates is accounted for by reference to the scale of sonority. Geminate clusters do not violate the PSP; the segments of the geminate cluster do not create a sonority peak because they have equal sonority values, so epenthesis is optional.

7.3.3. Geminates and glide vocalization:

The JA rule of glide vocalization which vocalizes glides in the context of a following consonant does not apply to geminate glides. Within the framework of CV phonology according to Hayes (1986), glide vocalization is blocked from applying to geminates because it involves a violation of the Linking Constraint (LC) which says, "Association lines in structural description are interpreted as exhaustive" (Hayes, 1986: 331). According to Hayes (1986: 334) "... glide vocalization rules necessarily refer to two tiers: the melodic tier to distinguish glides from other consonants, and the CV tier to carry out the structural change C --> V ". Hayes adds that glide

vocalization res

geminates, supp

vocalization in

Constraint pred

morpheme boun

alterable as the

332-334). This

vocalization ru

"he gets arrest

In MSA, gli

and a following

non-linear glid

Rule (27):

C –

Before ru

which has the

merging the r

glide (Hayes'

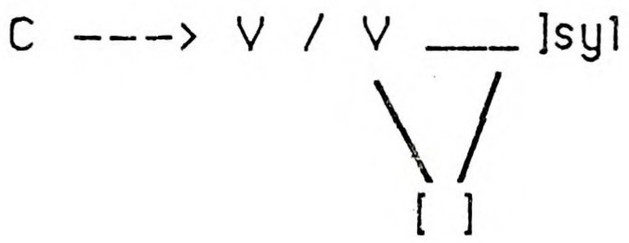
to MSA /yu-y

fails to applu

vocalization respects the distinction between true and fake geminates, supporting his assumption with evidence from glide vocalization in Berber. A true geminate is inalterable as the Linking Constraint predicts. But a fake geminate which is split by a morpheme boundary does permit glide vocalization and so it is alterable as the Linking Constraint would predict (Hayes, 1986: 332-334). This is illustrated by the application of non-linear glide vocalization rules in the derivation of the MSA words /yu-wqaf-u/ "he gets arrested" and /xuwwifa/ "he got scared".

In MSA, glides vocalize in the context of a preceding high vowel and a following unidentical consonant. This is rule (27) of non-linear glide vocalization.

Rule (27):



Before rule (27) applies, Hayes (1986: 335) assumes that a rule which has the effect of the Obligatory Contour Principle must apply, merging the melodic representations of the vowel and the following glide (Hayes' did not formally provide such a rule). Rule (27) applies to MSA /yu-wqaf-u/ "he gets arrested", yielding [yuuqafu] but it fails to apply to MSA *xúwwifa* "he got scared".

Rule (27) applies to /yu-wqaf-u/, yielding *yuuqafu* without violating the Linking Constraint; one feature matrix on the melodic tier has two association lines to link it with the preceding vowel

and the vocalized
because here one
and the two cons
in (28) (Hayes, 1

(28):



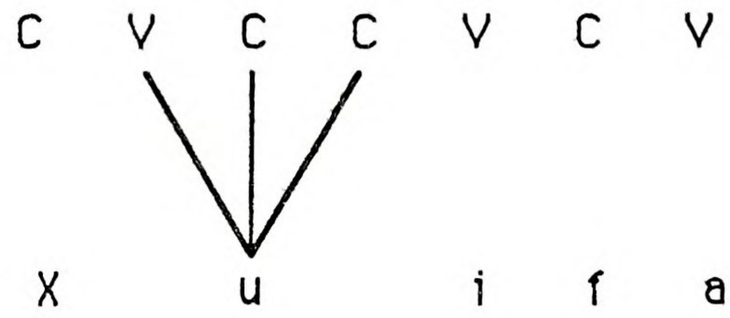
In (28), the
vocalization w
association lin
of (27) are not

Within the
questions coul
geminate in X
analyzes gemi
analysis does
argues that t
verbs belong

It has to b

and the vocalized glide. But the rule cannot apply to *xuwwifa* because here one feature matrix will have three links, to the vowel and the two consonants of the geminate cluster. This is illustrated in (28) (Hayes, 1986: 335).

(28):



In (28), the application of rule (27) of non-linear glide vocalization would be in violation of the LC, according to which association lines are interpreted exhaustively. Thus the two lines of (27) are not found in the representation (28).

Within the framework of this non-linear analysis, some questions could be raised in reference to the identification of the geminate in *xuwwifa*. Hayes, in line with McCarthy (1981), analyzes geminates in Form II verbs as true geminates. This type of analysis does not take into consideration some evidence which argues that the two segments of the geminate cluster in Form II verbs belong to two different morphemes.

It has to be noted that McCarthy (1979: 388) analyzed both segments of the geminate of form II verbs as part of one morpheme, namely, the stem morpheme. In doing so, McCarthy denies that the root consists of the three consonants (usually referred to as the

three radicals) a

tri-radical root.

l verb, the root

which is a Form

káttab, is an af

the same way t

analyzed as an

káttab, and *ká*

McCarthy's ana

his analysis of

in *ʔa-sraʕ* "he

"he talked" wh

received (visit

morphemes (M

that the two s

which is a for

Accordingly, t

geminate. In

vocalization t

LC because [u

This means t

ungrammatic

However,

of Form II ve

three radicals) and that other consonants cannot be part of the tri-radical root. For example, in *kátab* "he wrote", which is a Form I verb, the root is //ktb// and in *káttab* "he made someone write", which is a Form II verb, the root is still //ktb//. The second /t/ in *káttab,* is an affix which represents an independent morpheme in the same way the initial /n/ in *nkáttab* which is a Form VII verb, is analyzed as an independent morpheme. *kátab* contrasts with *káttab,* and *káttab* contrasts with *nkátab.* This shows that McCarthy's analysis of the affix in Form II verbs is inconsitent with his analysis of the affixes in the other verb forms. The affixes */ʔ/* in *ʔa-sraʂ* "he hurried" which is a Form IV verb, /t/ in *ta-kallam* "he talked" which is a Form V verb, and */s/* in *ʔis-taqbal* "he received (visitors)",Form X,are all analysed as independent morphemes (McCarthy, 1981: 388-389). On these grounds, I argue that the two segments of the geminate glide in words like *xáwwaf* which is a form II verb belong to two different morphemes. Accordingly, the geminate glide in this form would be a fake geminate. In this case, the application of rule (27) of glide vocalization to *xuwwifa* will not be considered a violation of the LC because [u] would be associated with just two association lines. This means that the LC is incapable of accounting for the ungrammaticality of *[xuuifa].

However, we have to take into consideration that the derivation of Form II verbs is not exactly the same as the derivation of the other verb forms. In Form II verbs, the affix morpheme is marked by a consonant which is always identical to the second stem consonant. The affix consonant always takes the identity of the stem

consonant. In o
the geminate cl
this case, it ca
assimilation fo
the CV tier.

Another pr
vocalization re
effect of the O
and the follow
non-linear glid
identical featu
application of
glide vocaliza
vocalized glid

7.3.4. Geminat

In JA, a r
word-finally
framework o
principles ap
this is the a
in Attic in r
/ss/ degemi
a two-tier r
He argues th
which simp

consonant. In other words, it assimilates to it. On these grounds, the geminate cluster in Form II verbs is created by assimilation. In this case, it can be argued that rule (27) is blocked after assimilation forms a true geminate which is not a VC sequence on the CV tier.

Another problem with the CV phonology approach to glide vocalization relates to the postulation of a rule which has the effect of the OCP to merge the melodic representation of the vowel and the following glide. Such a rule which supplements rule (27) of non-linear glide vocalization assumes that vowels and glides have identical feature matrices on the melodic tier before the application of the rule of glide vocalization itself. It is rule (27) of glide vocalization itself which has the effect of merging the vocalized glide with the preceding vowel.

7.3.4. Geminates and glide degemination:

In JA, a rule of degemination applies only to geminate glides word-finally. Our analysis of glide degemination in JA within the framework of CV phonology will be based on the CV phonology principles applied in the analysis of other geminates. Related to this is the analysis of Hayes (1986:346-347) of /ss/ degemination in Attic in reference to the Linking Constraint. In his analysis of /ss/ degemination in Attic, Hayes argues that /ss/ degemination is a two-tier rule which involves both the CV tier and the melodic tier. He argues that /ss/ degemination is different from /s/ deletion which simply deletes /s/ before another consonant. In (29) and (30)

we present the rule

deletion, respectiv

(29): /ss/-Degemi

C ---> Ø

(30): /s/-Deletion

C ---> Ø

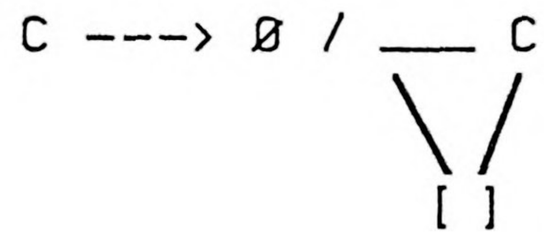
Rule (29) is a
segment. In this
of the rule and n
Accordingly, he
Constraint. In (
following conso
consonant are n

The problem
happens to the
the CV tier wi
have to assum

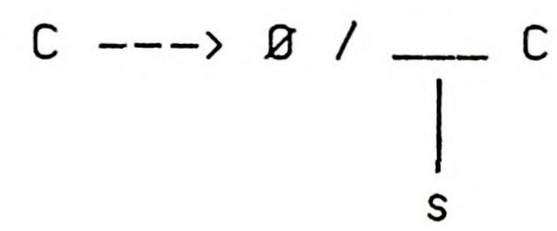
In line wit
account for gl

we present the rules he postulated for /ss/ degemination and /s/ deletion, respectively (Hayes, 1986: 346).

(29): /ss/-Degemination



(30): /s/-Deletion



Rule (29) is a two-tier rule which alters only half of a long segment. In this rule, the multiple linkings are mentioned in the SD of the rule and match one-to-one with those of a geminate /ss/. Accordingly, he concludes, the rule does not run a foul of the Linking Constraint. In (30), /s/ is not linked to the representation of the following consonant on the CV tier because /s/ and the following consonant are not a geminate as it is the case in (29).

The problem with this analysis is that it is not clear about what happens to the association line which links the deleted segment on the CV tier with its feature matrix on the melodic tier. Here, we have to assume that it automatically deletes by convention.

In line with the analysis of Hayes, we postulate rule (31) to account for glide degemination in JA.

(31): Glide Degemi

C ---> Ø

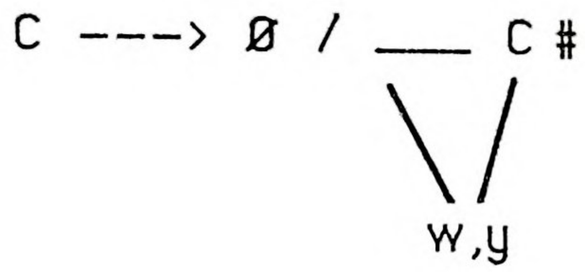
Rule (31), app

/ʕarabiyy/ "Arabi

7.4. Summary:

To sum up, ge
stress assignme
as two segments
vowel preceding
as two segments
from MSA and JA
non-geminates.
This is supporte
vocalization an
epenthesis, we
and fake gemin
identical segm
geminates do n
and CAR (Guer
Constraint (He

(31): Glide Degemination



Rule (31), applies to the JA glides in /ʕadaww/ "enemy" and /ʕarabiyy/ "Arabic", yielding *ʕadaw,* and *ʕarabiy,* respectively.

7.4. Summary:

To sum up, geminates do not present counter evidence to the stress assignment rules postulated in Chapter 3. Geminates behave as two segments underlyingly. Hence stress is assigned to the vowel preceding geminates word-finally. The analysis of geminates as two segments is supported by phonetic and phonological evidence from MSA and JA data. Phonetically, geminates contrast with non-geminates. Phonologically, geminates behave as two segments. This is supported by their behavior in respect to the rules of glide vocalization and intervocalic glide deletion. In respect to epenthesis, we recognize two types of geminates: true geminates and fake geminates. True geminates are adjacent; they consist of identical segments and are not split by a morpheme boundary. True geminates do not allow epenthesis as both the AIC (Gurresel, 1977) and CAR (Guerssel, 1978) in segmental phonology, and the Linking Constraint (Hayes,1986) in CV phonology predict. True geminates

also include gemi

does not apply to

Constraint postul

geminates allow

predict.

The behavior

respect to glides.

of final glide deg

words and across

which apply disj

to account for m

geminate is split

the context of a

includes the con

glide degeminat

applies only in t

also include geminates created by assimilation rules. Epenthesis does not apply to assimilated geminates as the Assimilation Constraint postulated by Abu-Salim (1988) predicts. Fake geminates allow epenthesis as the AIC and the Linking Constraint predict.

The behavior of geminates in JA differs from that of MSA in respect to glides. Word-finally, glides degeminate in JA. The rule of final glide degemination applies in JA except for monosyllabic words and across morpheme boundary. Properly including rules which apply disjunctively in relation to other rules are postulated to account for monosyllabic words and words in which the final geminate is split by a morpheme boundary. In JA, glides vocalize in the context of a preceding vowel and a following consonant. This includes the context of a preceding low vowel. In MSA, the rule of glide degemination does not apply and the rule of glide vocalization applies only in the context of a preceding high vowel.

In this chapte

according to the

phonemes of each

vowels, and gemi

two varieties wi

In the first secti

MSA. In the seco

and MSA. In the

in JA and MSA, a

JA and MSA. Th

8.1. Inventory of

The analyse

Chapter 2 indic

are similar exc

/q/, /ḍ/, /aw/,

(</aw/). On the

and (1.A'-F'), w

in JA and MSA,

these phones a

Chapter 8

Conclusion

In this chapter, we review the comparison of JA and MSA according to the findings of our analysis of the inventory of phonemes of each variety, stress assignment, alternating high vowels, and geminates. Similarities and differences between the two varieties will be illustrated by the analysis of some cognates. In the first section, we review the inventory of phonemes of JA and MSA. In the second section, we compare stress assignment in JA and MSA. In the third section, we compare alternating high vowels in JA and MSA, and in the fourth section, we compare geminates in JA and MSA. The fifth section is a conclusion.

8.1. Inventory of phonemes:

The analyses of the inventory of phonemes in JA and MSA in Chapter 2 indicate that the inventory of phonomes in both varieties are similar except for /q/, /g/, /ḍ/, /č/, /ay/, and /aw/. MSA has /q/, /ḍ/, /aw/, and /ay/ while JA has /g/, /ǰ/, [ee] (</ay/), and [oo] (</aw/). On the other hand JA has /č/ while MSA has /k/. In (1.A-F) and (1.A'-F'), we present the correponding phones of these phonemes in JA and MSA, respectively, and provide some cognates in which these phones appear.

JA

(1.A): [g] [gísim]

B): [č] [čílmih]

C): [ǰ] [ǰamíir

D): [ee] [seef]

E): [oo] [moot]

In (1.A), JA [g

corresponds to M

This indicates a

palatalized in th

Elsewhere, [k] di

corresponds to M

in [ǰulum] corres

a phonemic merg

split in MSA sin

In (1.E,F), JA [ee

respectively. T

glide vocalizati

JA, glides voca

JA [ee] and [oo]

[oo] are the pho

The analys

MSA phones in

between the e

MSA in respec

JA		MSA	
(1.A):	[g] [gísim] "part"	(1.A'):	[q] [qísm-un]
B):	[č] [čílmih] "word"	B'):	[k] [kalímat-un]
C):	[ǰ] [ǰamíir] "conscience"	C):	[ḍ] [ḍamíir-un]
D):	[ee] [seef] "sword"	D):	[ay] [sáyf-un]
E):	[oo] [moot] "death"	E):	[aw] [máwt-un]

In (1.A), JA [g] corresponds to MSA [q]. In (1.B), JA [č] corresponds to MSA [k]. Here, it has to be noted that JA has also [k]. This indicates a phonemic split has occured in JA. In JA, [k] is palatalized in the context of a [+high, -back] vowel, yielding [č]. Elsewhere, [k] did not not change. In (1.D), JA [ǰ] as in [ǰamíir] corresponds to MSA [ḍ] as in [ḍamíirun]. At the same time, JA [ǰ] as in [ǰulum] corresponds to MSA [ǰ] as in [ǰulum]. This indicates that a phonemic merger took place in JA. There cannot be a phonemic split in MSA since CA the direct ancestor of MSA has both [ḍ] and [ǰ]. In (1.E,F), JA [ee] and [oo] correspond to MSA [ay] and [aw], respectively. This indicates a language change in the direction of glide vocalization and other changes in the quality of the vowel. In JA, glides vocalize while in MSA, they do not. It has to be noted that JA [ee] and [oo] have not yet acquired phonemic status. JA [ee] and [oo] are the phonetic realization of /ay/ and /aw/, respectively.

The analyses of the JA phones in (1.A-F) and the corresponding MSA phones in (1.A'-F') indicate that there is hardly any difference between the earlier variety from which JA must have developed and MSA in respect to the inventory of phonems they have. It is possible

to relate the JA p

postulation of his

from MSA forms i

developed from a

phonological feat

To sum up, th

MSA give inconcl

is a descendant

the analyses do

of another Arabi

which MSA has

8.2. Stress assi

The analyse

and MSA have t

respect to the

the stress rule

corresponding

JA

(2.A): sáma "s

(B): ħáya "s

(C): mídrasi

(D): mistám

(E): ʔigraay

to relate the JA phones to the corresponding MSA phones by the postulation of historical rules which indicate a language change from MSA forms into JA forms. It is also possible that JA has developed from an Arabic variety which shares these phonetic and phonological features with MSA.

To sum up, the analyses of the inventory of phonemes in JA and MSA give inconclusive evidence in support of the assumption that JA is a descendant of CA as illustrated in Figure (1). On the other hand, the analyses do not exclude the possibility that JA is a descendant of another Arabic variety which is a sister language to CA from which MSA has developed as illustrated in Figure (2).

8.2. Stress assignment:

The analyses of stress assignment in Chapter 3 indicate that JA and MSA have the same stress rules and that they differ only in respect to the rules which change the segmental string to which the stress rules apply. Consider the JA cognates in (2.A-G) and the corresponding MSA cognates in (2.A'-G').

JA	MSA
(2.A): sáma "sky"	(2.A'): samáaʔun
(B): ħáya "shyness"	(B'): ħayáaʔun
(C): mídrasih "school"	(C'): madrásatun
(D): mistámsih "listener fem."	(D'): mustamísatun
(E): ʔigraayíthum "their reading"	(E'): qiraaʔátuhum

(F): bitnáagašuw

(G): ɕárabiy "Ar

The JA words

(2.A'-G') show the

rules postulated

constantly adjus

the stress rules

assigned are due

segmental string

segmental string

rules account fo

"nominative-ind

indefiniteness,

(2.A-D, G) corre

Synchronic rule

unstressed high

degemination a

accounted for b

accounted for b

for by rule (16

Rule (3):

VV ---->

On the ba

(F): bitnáagašuw "they are discussing" (F'): yatanaaqašúuna

(G): ʕárabiy "Arabic" (G'): ʕarabíyyun

The JA words in (2.A-G) and the corresponding MSA words in (2.A'-G') show that stress is assigned to both varieties as the stress rules postulated in Chapter 3 predict. In both varieties stress constantly adjusts to the changes in the segmental string to which the stress rules apply. The different positions to which stress is assigned are due to the rules which change the structure of the segmental string itself. The rules which involve a change in the segmental string are either historical or synchronic. Historical rules account for the loss of the infectional endings such as [-u-n] "nominative-indefinite" which marks nouns for case and indefiniteness, and the word-final glottal stop in the JA words in (2.A-D, G) corresponding to the MSA words in (2.A'-D', G). Synchronic rules account for vowel shortening as in (2.A-B), unstressed high vowel deletion as in (2.D), and word-final glide degemination as in (2.G). Unstressed high vowel deletion is accounted for by rule (8) (in Ch. 4). Final-glide degemination is accounted for by rule (4) (in Ch. 7). Vowel shortening is accounted for by rule (16) in (Ch. 3) and repeated in (3) for convenience.

Rule (3):

VV ---> V / ___ #

On the basis of the analysis provided above, putting aside

differences in vo

words: *sáma, ħáy*

from: *samáaʔun,*

respectively. The

corresponding MS

these JA words.

related to vowel

feminine marker

appearance of so

in (2.C,D). It is b

issues which are

(4): /samaa/

samáa

sama

sáma

[sáma]

In (4), the

is met. Rule (

vowel shorteni

differences in vowel and consonant quality, we assume that the JA words: *sáma, ħáya, mídrasih,* and *mistámsih* historically derive from: *samáaʔun, ħayáaʔun, madrásatun,* and *mustamíṣatun,* respectively. These postulated JA forms are similar to the corresponding MSA cognates. In (4), we provide the derivation of these JA words. In these derivations, we put aside questions related to vowel or consonant quality such as the change of the feminine marker [t] into [h] word-finally as in (2.C) and the appearance of some vowels in the form of [i] instead of [a] or [u] as in (2.C,D). It is beyond the scope of this study to deal with these issues which are not directly related to the issue under analysis.

(4): /samaa/	/ħayaa/	/midrasih/	/mistamiṣih/	UR
samáa	ħayáa	mídrasih	mistámiṣih	Rule (15): Stress
sama	ħaya	---	---	Rule (3): V-shorten.
sáma	ħáya	---	---	Rule (15): Stress
---	---	---	mistámṣih	Rule (8) (in Ch.4): HVD
[sáma]	[ħáya]	[mídrasih]	[mistámṣih]	PR

In (4), the rules are not ordered. They apply whenever their SD is met. Rule (15) of stress assignment re-applies when rule (3) of vowel shortening has applied. This accounts for the shift of stress

from the second s

sáma, and *ħáya*.

when rule (15) of

In JA *ʔigraayí*

syllabic segment

stress rules pred

is assigned to th

consonant cluste

In JA *bitnáag*

syllabic segment

yatanaaqašúuna

segment as the

conjugational e

plural indicativ

environment fo

appearance of

In JA *ʕárab*

syllabic segme

assigned to th

ending [-un]. T

of the JA rule

In (5), we

ʔigraayíthum,

from the second syllabic segment to the first syllabic segment in *sáma,* and *ħáya.* The SD of rule (8) of high vowel deletion is met when rule (15) of stress assignment has applied.

In JA *ʔigraayíthum* as in (2.E), stress is assigned to the third syllabic segment which is followed by a consonant cluster as the stress rules predict. But in MSA *qiraaʔátuhum* as in (2.E'), stress is assigned to the third syllabic segment which is not followed by a consonant cluster.

In JA *bitnáagašuw* as in (2.F), stress is assigned to the second syllabic segment as the stress rules predict. But in MSA *yatanaaqašúuna* as in (2.F'), stress is assigned to the fifth syllabic segment as the stress rules also predict. In the JA form the conjugational ending [-na] which marks the imperfect verb for the plural indicative is lost. The loss of this suffix provides an environment for rule (4) of glide vocalization, explaining the appearance of word-final [uw] in JA.

In JA *ʕárabiy* as in (2.G), stress is assigned to the first syllabic segment. But in MSA *ʕarabíyyun* as in (2.G') stress is assigned to the third syllabic segment. JA has lost the inflectional ending [-un]. This loss created a new context which satisfies the SD of the JA rule of final-glide degemination.

In (5), we illustrate the derivation of the JA words: *ʔigraayíthum, bitnáagašuw,* and *ʕárabiy.*

(5):

/giraayituhum/

giraayítuhum

graayíthum

igraayithum

ʔigraayíthum

[ʔigraayíthum]

In (5), the

whenever thei

adjusted to th

the applicatio

assignment of

ʕarabíyyun a

derivation of

syllabic segm

qiraaʔátuhum

The assignme

loss of the v

case. The lo

(5):

/giraayituhum/	/bitnaagašuw/	/ʕarabiyy/	UR
giraayítuhum	bitnáagašuw	ʕarabíyy	Rule (15): Stress
graayíthum	---	---	Rule (8): HVD
igraayithum	---	---	Rule (22) (in Ch.4): Word-Initial Epen.
ʔigraayíthum	---	---	Rule (23) (in Ch.4): Glottal Stop Inser.
---	---	ʕarabiy	Rule (4) in (ch.7): Glide Degemination
---	---	ʕárabiy	Rule (15) (in Ch.3): Stress
[ʔigraayíthum]	[bitnáagašuw]	[ʕárabiy]	PR

In (5), the synchronic rules do not have to be ordered. They apply whenever their SD is met. In the derivation of *ʕárabiy,* stress is adjusted to the change in the segmental string which resulted from the application of rule (4) of glide degemination. This explains the assignment of stress to the second syllabic segment in MSA *ʕarabíyyun* and to the third syllabic segment in JA [ʕárabiy]. In the derivation of JA *ʔigraayíthum,* stress is assigned to the second syllabic segment. But in the corresponding MSA cognate *qiraaʔátuhum,* stress is assigned to the third syllabic segment. The assignment of stress to two different positions is due to the loss of the vowel which follows [t] which marks the verbal noun for case. The loss of the case marker created a consonant cluster and

so stress is assig

as the stress rule

stress is assigne

rules predict. Bu

yatanaaqašúuna,

the stress assign

to different posi

suffix [-na] in JA

verbs for the ind

yatanaaqašuw-n

vocalization wh

word, the glide

not. The applica

yatanaaqašuw-

glide yields a l

stress rules pr

the glide does

satisfied; the

Accordingly, n

the third sylla

The above

JA and MSA m

rules. Differe

to which the

changes in th

To sum up

so stress is assigned to the syllabic segment preceding this cluster as the stress rules predict. In the derivation of JA *biynáagašuw,* stress is assigned to the second syllabic segment as the stress rules predict. But in the corresponding MSA cognate *yatanaaqašúuna,* stress is assigned to the fifth syllabic segment as the stress assignment rules also predict. The assignment of stress to different positions in the two varieties is due to the loss of the suffix [-na] in JA. The MSA suffix [-na] which marks imperfect verbs for the indicative has been lost in JA. The MSA word *yatanaaqašuw-na* satisfies the SD of rule (13) (in Ch.7) of glide vocalization while the JA word *bitnaagašuw* does not. In the MSA word, the glide is followed by a consonant but in the JA word it is not. The application of rule (13) of glide vocalization to MSA *yatanaaqašuw-na* yields *yatanaaqašuuna.* The vocalization of the glide yields a long vowel. This long vowel is assigned stress as the stress rules predict. In the corresponding JA cognate, *bitnaagašuw,* the glide does not vocalize because the SD of rule (13) is not satisfied; the loss of the suffix [-na] bleeds the context of rule (13). Accordingly, no long vowel is created and so stress is assigned to the third syllabic segment.

The above analyses of JA and MSA cognates makes it clear that JA and MSA may be considered to have the same stress assignment rules. Differences are only in the structure of the segmental string to which the stress rules apply. Stress rules always adjust to the changes in the segmental string.

To sum up, the analyses of stress in JA and MSA give

inconclusive evid

Figure (1). On the

possibility that J

is a sister langua

illustrated in Fig

8.3. Alternating

The analyses

vowel which app

and three conso

that MSA does n

(6.A-E) and the

JA

(6.A): ħábil "ro

B): dáluw "b

C): yísirfak

D): yúkutbak

In (6.A,B),

dálw in (6.A

to the high vo

high vowels d

position in re

For example,

inconclusive evidence that JA is a descendant of CA as illustrated in Figure (1). On the other hand, the analyses do not exclude the possibility that JA is a descendant of another Arabic variety which is a sister language to CA from which MSA has developed as illustrated in Figure (2).

8.3. Alternating high vowels:

The analyses in Chapter 4 indicate that JA has an epenthetic vowel which appears in the context of two consonants word-finally and three consonants word-medially. The analyses also indicate that MSA does not have this vowel. Consider the JA cognates in (6.A-E) and the corresponding MSA cognates in (6.A'-E').

JA	MSA
(6.A): ħábil "rope"	(6.A'): ħábl
B): dáluw "bucket"	B): dálw
C): yíʕirfak "he knows you"	C): yaʕrífuka
D): yúkutbak "he writes you"	D): yaktúbuka

In (6.A,B), JA *ħábil* and *dáluw* correspond to MSA *ħábl* and *dálw* in (6.A',B'), respectively. The two cognates differ in respect to the high vowels, [i] and [u], which do not appear in MSA. These high vowels differ from other high vowels in the corresponding position in reference to stress assignment and glide vocalization. For example, in the context of a consonant initial suffix as in

dâluw-hum, the
glide does not vo
(15) of stress as
ʔáxuw "brother
yields *ʔaxúu-hu*
(15) of stress as
vocalizes as rul
that the status
of the correspon
suffix, as in *ħa*
presence and ab
calling them "a
from other vow

In (6.C), JA
(6.C'). Here, th
and second con
similar to it
call the JA hig
in the context
knows them".
between the s
we argued tha
Analysis indi
metathesized
metathesized
the structur

dáluw-hum, the vowel is not assigned stress and the following glide does not vocalize, which is contrary to the predictions of rule (15) of stress assignment and rule (13) of glide vocalization. But in *ʔáxuw* "brother", the attachment of a consonant-initial suffix yields *ʔaxúu-hum* in which the vowel is assigned stress as rule (15) of stress assignment predicts, and the following glide vocalizes as rule (13) of glide vocalization predicts. This argues that the status of the high vowel in *dáluw* is different from that of the corresponding one in *ʔáxuw.* In the context of a vowel-initial suffix, as in *ħábl-ak,* and *dálw-ak* the vowel is absent. The presence and absence of the these types of high vowels motivate calling them "alternating". This term is used to distinguish them from other vowels which do not alternate.

In (6.C), JA *yíʂirfak* corresponds to MSA *yaʂrifuka* as in (6.C'). Here, the alternating high vowel appears between the first and second consonants of the stem. In MSA, an unalternating vowel similar to it appears between the second and third radicals. We call the JA high vowel "alternating" because it alternates with zero in the context of a consonant-initial suffix as in *yiʂríf-hum* "he knows them". In MSA, the corresponding vowel always appears between the second and third consonants of the stem. In Chapter 5, we argued that this alternating high vowel cannot be epenthetic. Analysis indicates that the vowel is either underlying or metathesized. The analysis which indicates that the vowel is metathesized has the advantage of capturing more generality about the structure of the imperfect stem vowel. Accordingly, it is

preferred to the a

Differences b

vowels indicate a

vowel insertion i

deletion and the

created unfavour

came to the resc

loss of the inflec

the MSA word ħ

cluster. This cl

(4.5). This type

the MSA forms

JA does not nec

developed.

To sum up,

inconclusive ev

Figure (1). On

possibility tha

is a sister lang

illustrated in

However,

appears in the

consonants wo

conclusive ev

in Figure (2).

accounted for

preferred to the analysis which argues that the vowel is underlying.

Differences between JA and MSA in reference to alternating high vowels indicate a language in which JA inserted these vowels. High vowel insertion is motivated by the rules such as high vowel deletion and the loss of some inflectional endings. These rules created unfavourable consonant clusters, and the rules of insertion came to the rescue by breaking these clusters. For example, the loss of the inflectional ending [-u-n] "nominative-indefinite" from the MSA word *ħabl-un* "rope" resulted in *ħabl* which has a [-bl#] cluster. This cluster is not permitted in JA; it violates the PSP in (4.5). This type of cluster does not arise in MSA. This argues that the MSA forms represents an earlier form of JA. This earlier form of JA does not necessarily have to be CA from which MSA has developed.

To sum up, the analyses of epenthesis in JA and MSA give inconclusive evidence that JA is a descendant of CA as illustrated in Figure (1). On the other hand, the analyses do not exclude the possibility that JA is a descendant of another Arabic variety which is a sister language to CA from which MSA has developed as illustrated in Figure (2).

However, under the assumption that that the vowel which appears in the context of two consonants word-finally or three consonants word-medially is underlying, the analyses give conclusive evidence that JA is not a descendant of CA as illustrated in Figure (2). In this case, the absence of the vowel in CA has to be accounted for by a rule of syncope.

8.4. Geminates:

The analyses
that they behave
segment phoneti
word-finally. JA
while MSA does
(7.A-D) and the

JA

(7.A): ʕárabiy "
B): ʕádaw "e
C): mistaʕíd
D): mistagír

In (7.A,B),
and *ʕadúwwu*
mistagírr co
respectively.
(in Ch.7) appl
degemination
MSA in the d

To sum u
inconclusive
Figure (1).
possibility

8.4. Geminates:

The analyses of geminates in JA and MSA in Chapter 7 indicate that they behave as two segments underlyingly and as one long segment phonetically. But they differ in respect to geminate glides word-finally. JA has a rule of glide degemination word-finally while MSA does not have this rule. Consider the JA cognates in (7.A-D) and the corresponding MSA ones in (7.A'-D').

JA	MSA
(7.A): ʕárabiy "Arabic"	(7.A'): ʕarabíyy-un
B): ʕádaw "enemy"	B'): ʕadúww-un
C): mistaʕídd "ready"	C'): mustaʕidd-un
D): mistagírr "has got settled"	D'): mustaqírr-un

In (7.A,B), JA *ʕárabiy* and *ʕádaw* correspond to MSA *ʕarabíyyun* and *ʕadúwwun*, respectively. In (7.C,D), JA *mistaʕídd* and *mistagírr* correspond to MSA *mustaʕídd* and *mustaqírr*, respectively. In JA, the rule of glide degemination, that is rule (4) (in Ch.7) applies word-finally. In MSA, the rule of glide degemination does not apply. This indicates a language change from MSA in the direction of JA.

To sum up, the analyses of geminates in JA and MSA give inconclusive evidence that JA is a descendant of CA as illustrated in Figure (1). On the other hand, the analyses do not exclude the possibility that JA is a descendant of another Arabic variety which

is a sister langu

illustrated in Fi

8.5. Conclusion:

The analyse

phonemes, stre

geminates indi

phonemes, the

[oo]. MSA [ḍ] a

the other hand

[aw], respecti

varieties have

which change

Alternating hi

two-consonan

Word-mediall

Accordingly t

those which

word-finally

related to hi

that geminat

underlyingly

in respect to

degeminatio

monosyllabi

is a sister language to CA from which MSA has developed as illustrated in Figure (2).

8.5. Conclusion:

The analyses of JA and MSA in reference to the inventory of phonemes, stress assignment, alternating high vowels, and geminates indicate these findings. In reference to the inventory of phonemes, the two varieties differ in respect to [ḍ], [g], [č], [ee], and [oo]. MSA [ḍ] and [q] correspond to JA [ǒ], and [g], respectively. On the other hand, JA [č], [ee], and [oo] correspond to MSA [k], [ay] and [aw], respectively. In reference to stress assignment, the two varieties have the same stress rules. Differences are in the rules which change the segmental string to which the stress rules apply. Alternating high vowels appear only in JA. MSA allows two-consonant clusters word-finally while JA does not. Word-medially, three consonant clusters do not appear in MSA. Accordingly the analyses of alternating high vowels are limited to those which appear in JA in the context of two consonants word-finally and three consonants word-medially. Thus questions related to high vowel alternation do not arise. The study argues that geminates in both JA and MSA behave as two segments underlyingly and as one long segment phonetically. But they differ in respect to the behavior of geminate glides. JA has a rule of glide degemination which applies to word-final geminate glides except in monosyllabic words, while MSA does not have such a rule.

The analyse
the segmental
(15) of stress
framework of
prediction. St
model (McCArt
incorporation
1982) into Mc
prediction.

The analys
indicate that
the other appe
between the f
accordingly w
related to the
that in this c
the first radi

In nouns,
it is epenthet
and in the co
vowel is dete
consonants.
or velar and
preceding co
the vowel po
rules. The v

The analyses of stress assignment in both JA and MSA argue for the segmental linear approach against the metrical approach. Rule (15) of stress assignment which is formulated within the framework of linear phonology in Chapter 3 yields the correct prediction. Stress assignment on the basis of McCarthy's metrical model (McCArthy, 1979) fails to yield the correct prediction. The incorporation of Hayes' principle of extrametricality (Hayes, 1981, 1982) into McCarthy's model fails also to yield the correct prediction.

The analyses of alternating high vowels which appear in JA indicate that they are of two types. One type appears in nouns and the other appears in verbs. In verbs, the vowel which appears between the first and second radical is unpredictable and accordingly we argue that it is underlying. Here, there is a question related to the failure of the vowel to be assigned stress. We argue that in this context stress is assigned to the prefix vowel preceding the first radical by a morphologically conditioned rule.

In nouns, the vowel is predictable and accordingly we argue that it is epenthetic. The vowel is a copy of the preceding high vowel, and in the context of a [-high] preceding vowel, the quality of the vowel is determined by that of the preceding and following consonants. The vowel is [u] in the context of a preceding emphatic or velar and a following emphatic or velar except when the preceding consonant is coronal. Elsewhere, the vowel is [i]. Here, the vowel poses potential counter evidence to the stress assignment rules. The vowel is not assigned stress contrary to the predictions

of the stress ru

rules which ap

evidence in sup

obtained from

ʔáxuw when t

yielding *ʔaxúu*

because in *ʔáx*

epenthetic. Th

stress applies

The study

phonotactic co

does not allow

syllabic segm

syllabic segm

Regarding

phonology, the

analysis of A

prediction. T

vowel in the

consonant as

velars as in [

non-linear m

arrangement

will be funde

Epenthes

by a morpher

of the stress rules, and I assume that rules of epenthesis are late rules which apply after and do not feed stress or other rules. Some evidence in support of epenthesis following other rules can be obtained from rule (13) of glide vocalization. The rule applies to *ʔáxuw* when the consonant-initial suffix [-hum] is attached, yielding *ʔaxúuhum.* But the rule fails to apply to *dáluw-hum* because in *ʔáxuw* the vowel is underlying while in *dáluw* it is epenthetic. This indicates that the rule of glide vocalization like stress applies at a level where there are no epenthetic vowels.

The study argues that rules of epenthesis apply to satisfy a phonotactic constraint in compliance with the PSP. This principle does not allow the occurence of peaks of sonority between two syllabic segments, and when they do, epenthesis applies, inserting a syllabic segment which represents a peak.

Regarding epenthesis within the framework of non-linear phonology, the study argues that the non-linear phonological analysis of Alghazo (1987) does not always yield the correct prediction. The analysis fails to account for the appearance of the vowel in the form of [i] in the context of a preceding emphatic consonant as in [baṭin] " tummy", and the appearance of [i] before velars as in [nagid] "criticism". If Alghazo chooses to patch up the non-linear model he will have to take into consideration the linear arrangement of vowels and consonants. In this case, his patching up will be fundamentally linear in nature.

Epenthesis optionally applies to fake geminates which are split by a morpheme boundary. The optional application of epenthesis to

fake geminates
geminate clust
epenthesis does
indivisible unit
applies to fake
Well-Formedne
between the CV
other; fake ger
geminates, epe
to the same ti
the crossing o
Well-Formedn

In the appl
and other rela
their SD is me
rules are allo
the principle
morphologica
other rules, a
which do not

Regarding
JA and MSA d
of CA as Figu
exclude the p
variety whic
has develope

fake geminates does not violate the scale-of-sonority principle; the geminate cluster does not have a sonority peak. In true geminates, epenthesis does not apply because true geminates make one indivisible unit. Within the framework of CV phonology, epenthesis applies to fake geminates because it does not violate the Well-Formedness Condition according to which association lines between the CV tier and the melodic tier should not cross each other; fake geminates belong to two separate tiers. In true geminates, epenthesis does not apply because true geminates belong to the same tier. Hence, the application of epenthesis will result in the crossing of the association lines which is a violation of the Well-Formedness Condition.

In the application of the rules of epenthesis, stress assignment, and other related rules, the study argues that rules apply whenever their SD is met. However, constraints on the application of the rules are allowed in the form of general principles. This includes the principle of Proper Inclusion Precedence, the principle that morphologically conditioned rules take disjunctive precedence over other rules, and the principle that rules of epenthesis are late rules, which do not provide input for other rules.

Regarding the relation between JA and MSA, the analyses of the JA and MSA data give inconclusive evidence that JA is a descendant of CA as Figure (1) predicts. At the same time, the analyses do not exclude the possibility that JA is a descendant of another Arabic variety which is a sister language to CA the variety from which MSA has developed.

Abdo, Daud A.
approach.

Abumdas, Abd
dissertati

Abu-Salim, Is
Lingua 74

Al-Ani, Salm
Arabic. I
Blooming

Alghazo, M.
non-line
Urbana-

Al-Kunaim,
?al-kita
?al-mak

References

Abdo, Daud A. 1969. On stress and Arabic phonology, a generative approach. Beirut: Khayyats.

Abumdas, Abdul Hamid Ali. 1985. Libyan Arabic Phonology. Ph.D dissertation, University of Michigan, Ann Arbor.

Abu-Salim, Isam M. 1988. Consonant assimilation in Arabic. Lingua 74: 45-66.

Al-Ani, Salman. 1978. The phonological structure of the syllable in Arabic. In Salman Al-Ani (ed.), Readings in Arabic linguistics. Bloomington, Indiana: Indiana University Linguistics Club.

Alghazo, M. 1987. Epenthesis and syncope in Levantine Arabic: A non-linear approach. Ph.D dissertation, University of Illinois at Urbana-Champaign.

Al-ðunaim, ṣaaliħah Rashid ðunaim. 1985. ʔal-lahaǰaat fii ʔal-kitaal li-Sibawayh ʔaṣwaatan wa bunyatan. ǰeddah: daar ʔal-makna.

Anis, Ibrahim.
Maṭbaʿat L

___. 1971. ʾ
ʾal-ʾanjlo

Brame, Michae
of Langua

___ 1974. T
and Spani

Chomsky, Noa
New York

Guerssel, Mo
Linguisti

___ 1978.
4: 223-

Hayes, Bruce
disserta

___. 1986.

Hogg, Richa

Anis, Ibrahim. 1952. fii ʔal-laha̮jaat ʔal-ʕarabiyyah. Cairo: Maṭbaʕat La̮jnat ʔal-bayaan ʔal-ʕarabiyy.

Hooper, Joan B. 1972. The syllable in

——. 1971. ʔal-ʔṣwaat ʔal-luðawiyyah. Cairo: Maktabat ʔal-ʔnjlo ʔal-miṣriyyah.

Brame, Michael K. 1971. Stress and Arabic phonology. Foundations of Language 7: 556-91.

—— 1974. The cycle in phonology: Stress in Palistinian, Maltese, and Spanish. Lingua 5.1: 39-60.

Chomsky, Noam and Moris Halle. 1968. The sound pattern of English. New York: Harper and Row.

Guerssel, Mohammed. 1977. Constraints on phonological rules. Linguistic Analysis 3:267-305.

—— 1978. A constraint on assimilation rules. Linguistic Analysis 4: 223-54.

Hayes, Bruce. 1980. A metrical theory of stress rules. Ph.D dissertation, MIT.

——. 1986. Inalterability in CV phonology. Language 62: 331-51.

Hogg, Richard and C. B. McCully. 1987. Metrical phonology: a

coursebo

Hooper, Joan
48: 525-4

___. 1976. A
Academi

Hudson, Grov
tiers. Jo

Ibrahim, Moh
Prestigi
Jonathan
Linguist
Universi

Irshied, Oma
Bedouin
Illinois,

Jernudd, Bj
Arabi

Koutsoudas,
phonol

coursebook. Cambridge: Cambridge University Press.

Hooper, Joan B. 1972. The syllable in phonological theory. Language 48: 525-40.

____. 1976. An introduction to natural generative phonology. Academic press.

Hudson, Grover. 1985. Arabic root and pattern morphology without tiers. Journal of Linguistics 22:85-122.

Ibrahim, Mohammad H. 1984. On the notions 'Standard' and Prestigious' in Arabic sociolinguistics. In Issam Abu-Salim and Jonathan Owens (eds.), Proceedings of the Third Annual Linguistics Conference. Department of English, Yarmouk University, Irbid, Jordan.

Irshied, Omar. 1984. The phonology of Arabic: Bani Hassan - A Bedouin Jordanian dialect. Ph.D dissertation, University of Illinois, Urbana-Champaign.

Jernudd, Bjorn H. and Mohammad Ibrahim (eds.). 1986. Aspects of Arabic sociolinguistics. New York: Mouton de Gruyter.

Koutsoudas, A., Sanders, G. and Noll, C. 1974. The application of phonological rules. Language 50: 1-28.

McCarthy, Jo

Inquiry 1

___ 1979b.

Ph.D diss

Linguisti

___ 1981. A

Linguist

Semaan, Kha

points o

—— 1968.

Sibawayh (

Sibaway

Reimpre

Vennemann,

Linguis

—— 198

Mouton

Zwicky, Ar

Linguis

McCarthy, John. 1979a. On stress and syllablfication. Linguistic Inquiry 10:443-465.

___ 1979b. Formal problems in Semitic phonology and morphology. Ph.D dissertation, MIT. Bloomington: Indiana University Linguistics Club, 1982.

___ 1981. A prosodic theory of non-concatenative morphology. Linguistic Inquiry 12: 373-418.

Semaan, Khalil. 1963. Arabic phonetics: Ibs Sina's Risaalah on the points of articulation of the speech sounds. Lahore.

___ 1968. Linguistics in the middle ages. Leiden: E. J. Brill.

Sibawayh (ʕali Bišr bin 9amr, died by 180 A.H. or 797 A.D.). Kitaab Sibawayh. vol. 2 distributed by Aj-Muthanna Library, Baghdad. Reimpression: Bulaq Press 1316 A.H. (Islamic Lunar Calender).

Vennemann, Theo. 1972. On the theory of syllabic phonology. Linguistic Berichte 18:1-18.

___ 1988. Preference laws for syllable structure. Berlin: Mouton de Gruyter.

Zwicky, Arnold M. 1972. Note on a phonological hierarchy in English. Linguistic change and generative phonology, Robert P. Stockwell

and Rona

Universi

and Ronald K. S. Macaulay, eds., 275-301. Bloomington: Indiana University Press.

MICHIGAN STATE UNIV. LIBRARIES
31293009108758