6.1. Segmental constraints

(a) The segments /θ/ and /ð/ occur in English but not in Dimasa. To express it differently, segments having the following feature specifications are not allowed in Dimasa:

- continuant
- nasal
- anterior
- coronal
- strident

(b) English has eight non-nasal [-continuant] segments. They are /p,b,t,d,k,g,Ɔ,ʃ/. Out of these eight segments /p,b,t,d,k,g/ are [-delayed release] while /ʃ/ and /ʒ/ are [+delayed release]. Dimasa has also the segments /p,b,t,d,k,g/ which are [-delayed release]. But Dimasa has both phonetic and phonologic constraints for [+delayed release] segments /ʃ/ and /ʒ/. Thus no segment having the following feature specifications can occur in Dimasa:

- continuant
- nasal
- anterior
- coronal
- strident
(c) Dimasa has only two [+strident] segments while English has eight. The segments /s/ and /z/ having the following feature specifications occur in English and Dimasa both phonologically as well as phonetically:

- [+continuant]
- [−nasal]
- [+anterior]
- [+coronal]
- [+strident]

Examples from English:
- Class: /klæs/ \[klæs\]
- Singer: /sɪŋə/ \[sɪŋə\]

Examples from Dimasa:
- /sansa/ \[sansa\] child
- /sɛɾa/ \[sɛɾa\] who

But the segments \[æ] and \[ɛ̃] having the following feature specifications occur both phonologically as well as phonetically in English but only phonetically in Dimasa:

- [+continuant]
- [−nasal]
- [−anterior]
- [+coronal]
- [+strident]
Examples from English:

- she /ʃi/ [ʃi]
- pressure /presər/ [prəsr]
- vision /viʃən/ [viʃən]

Examples from Dimasa:

- /gisim/ [giːsɪm] black
- /sibul/ [sɪbul] man
- /simi/ [sɪmi] cloud

It is evident from the above examples that Dimasa has a phonological constraint for [ə] and [ə] but there is no phonetic constraint for their occurrence.

(d) /p/ having the following feature specifications occurs in both English and Dimasa:

- [−continuant]
- [−nasal]
- [−anterior]
- [−coronal]
- [−voice]

The aspirated variety of /p/ occurs phonetically in both the languages. Thus [pʰ] having the following feature specifications has a phonological constraint in both the language though there is no such phonetic constraint².
The feature aspirated is redundant for /p/ in both the languages. In English /p/ is always aspirated if it occurs morpheme-initially. In Dimasa /p/ is aspirated if it is followed by a non-high vowel in a morpheme-initial position.

When followed by a high vowel morpheme-initially Dimasa /p/ is realized differently from that of English. Whether followed by a high vowel or a non-high vowel English /p/ is always phonetically \( [p^h] \) if it occurs morpheme-initially. But when followed by a high vowel morpheme-initially Dimasa /p/ becomes phonetically \( [\varnothing] \) which has the following feature specifications:

Examples from English:

<table>
<thead>
<tr>
<th>Word</th>
<th>Phoneme</th>
<th>Feature Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>pin</td>
<td>( /p\in/ )</td>
<td>( [p^h\in] )</td>
</tr>
<tr>
<td>pen</td>
<td>( /p\in/ )</td>
<td>( [p^h\in] )</td>
</tr>
</tbody>
</table>

Examples from Dimasa:

<table>
<thead>
<tr>
<th>Word</th>
<th>Phoneme</th>
<th>Feature Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>/pai/</td>
<td>( [p^h\ai] )</td>
<td>come</td>
</tr>
<tr>
<td>/por\oh\</td>
<td>( [p^h\or\oh] )</td>
<td>morning</td>
</tr>
</tbody>
</table>

continuant
nasal
+anterior
+coronal
voice
+aspirated
Examples of Dimasa /p/ becoming $\overset{\phi}{p}$

/gupu/ $\overset{\phi}{gupu}$ white
/pinba/ $\overset{\phi}{Inba}$ to turn

The behaviour of /p/ proves that identical underlying forms may have different surface realizations in different languages (Sec. 2.3. of Chapter II). At the abstract level /p/ has identical feature specifications in both English and Dimasa but they are not realized identically in both the languages.

(a) The segment /b/ having the following feature specifications occurs in both the languages:

-continuant
-nasal
-anterior
-coronal

But the surface realization of this segment differs in the two languages. In English the surface realization of /b/ does not involve any change in feature specifications. But in Dimasa /b/ followed by a high vowel
becomes a [+continuant] segment symbolized as [b] which has the following feature specifications:

+continuant
-nasal
+anterior
-coronal
+voice

Examples of English /b/

big /big/ [big]
bid /bid/ [bid]

Examples of Dimasa /b/

bima [bima] mother
bip [bip] hide

(f) As pointed out in (d) and (e) above in English there is both phonologic and phonetic constraints for bilabial fricatives /ʃ/ and /θ/. In Dimasa, however, there is only phonologic constraint for the occurrence of /ʃ/ and /θ/ but not phonetic constraint for these two sound segments.

(f) In English the segment /l/ is [+consonantal, +vocalic] while in Dimasa it is [+consonantal, -vocalic]. Besides this difference, the segment /l/ has the following common feature specifications in Dimasa and English:
The surface realization of /l/ is different in the two languages. In English /l/ becomes velarized phonetically when it occurs before back vowels or low vowels or when it occurs at the end of a word. It is phonetically symbolized as [+] which has the following feature specifications:

[+consonantal]  
[+sonorant]  
[+continuant]  
[-nasal]  
[-anterior]  
[+coronal]  
[+voice]  
[-strident]

In Dinaasa /l/ is always realized as [l] whereas English /l/ may be either [l] or [l]. This fact implies that Dinaasa has both phonetic and phonologic constraint for velarized [+] while English has only phonologic constraint for this segment [+] but no phonetic constraint. The discussions on /l/ also indicate that both at the abstract as well as the surface levels there are differences between English /l/ and Dinaasa /l/.
Examples of /i/ in English:

- class /klas/  
- null /nil/  

Examples of /i/ in Dimasa:

- /laa/  
- /lugu/  
- /nei/  

(g) The feature [tense] is distinctive in English but not in Dimasa. Phonetically Dimasa has five tense vowels: They are [i], [e1], [e2], [u1], and [o1]. But in Dimasa there is a phonologic constraint for the occurrence of these tense vowels. In English, however, there is neither phonologic nor phonetic constraint for tense vowels.

Dimasa /i/, for example, has the following feature specifications in the phonologic level:

\[
\begin{bmatrix}
+\text{vocalic} \\
+\text{high}
\end{bmatrix}
\]

But at the phonetic level /i/ is realized as [i:] when it occurs word finally in monosyllabic words. Dimasa phonetic segment [i:] has the following feature specifications:
6.2. Segment structure conditions

(a) Both English and Dimasa vowels are nasal and hence the following Segment Structure Conditions (abbreviated as SgSc) is common to both the languages:

\[ I(c) \quad \begin{array}{c}
\text{+vocalic} \\
\text{+high} \\
\text{-round} \\
\text{+tense}
\end{array} \quad \]

\[ T(c) \quad \begin{array}{c}
\text{-nasal}
\end{array} \quad \]

(b) That vowels in both the languages are voiced is expressed by the following SgSc:

\[ I(c) \quad \begin{array}{c}
\text{+vocalic} \\
\text{-consonantal}
\end{array} \quad \]

\[ T(c) \quad \begin{array}{c}
\text{+voice}
\end{array} \quad \]

(c) The feature [round] is distinctive in Dimasa but not in English. In English all non-low back vowels are rounded but in Dimasa all non-low back vowels are not rounded, hence the following
SgSc is applicable to English vowels only:

\[
\begin{array}{c}
\text{I(c)} \\
\begin{array}{c}
\text{+vocalic} \\
-\text{consonantal} \\
+\text{back} \\
-\text{low}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\text{T(c)} \\
\begin{array}{c}
\text{+round}
\end{array}
\end{array}
\]

(d) In Dimaasa all rounded vowels are [+back] and hence the feature back is redundant for Dimaasa rounded vowels. Though the feature round is not distinctive in English like Dimaasa rounded vowels English rounded vowels are also [+back]. The following SgSc is common in both the languages:

\[
\begin{array}{c}
\text{I(c)} \\
\begin{array}{c}
\text{+vocalic} \\
-\text{consonantal} \\
+\text{round}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\text{T(c)} \\
\begin{array}{c}
\text{+back}
\end{array}
\end{array}
\]

(e) Both English and Dimaasa have three nasals each: /n/, /m/ and /l/. The following SgSc is applicable to the nasals of both the languages:

\[
\begin{array}{c}
\text{I(c)} \\
\begin{array}{c}
\text{+nasal}
\end{array}
\end{array}
\]

\[
\begin{array}{c}
\text{T(c)} \\
\begin{array}{c}
\text{+nasal}
\end{array}
\end{array}
\]
(f) In English the three nasal segments are [−continuant],
while in Dinka these nasals are [−continuant]. The following SGSC is applicable to English nasals only:

I(c)  \[ +nasal \]

T(c)  \[ +consonantal \]
     \[ +vocalic \]
     \[ +sonorant \]
     \[ −low \]
     \[ +voice \]
     \[ −strident \]

(g) Both Dinka /n/ and English /n/ which are [−nasal, −anterior] are also [−coronal]. The SGSC common to both the languages is as follows:

I(c)  \[ +nasal \]
     \[ −anterior \]

T(c)  \[ −coronal \]
(h) A nasal segment which is [+coronal] must be [+anterior]
in both the languages. The following ScSc is applicable to the nasals
of both the languages:

\[
\begin{array}{c}
I(c) \\
[+nasal] \\
[+coronal] \\
\downarrow \\
T(c) \\
[+anterior]
\end{array}
\]

(i) As already stated in (f) of Sec. 6.1, English /r/ and
/l/ differ from Dimasa /r/ and /l/ in the feature[vocalic]. In English
/r/ and /l/ can be syllabic but Dimasa /r/ and /l/ cannot be syllabic.
Dimasa ScSc states that

\[
\begin{array}{c}
I(c) \\
[+syllabic] \\
\downarrow \\
T(c) \\
[+vocalic] \\
[+consonantal]
\end{array}
\]

But this rule is not applicable to English because in English if a
segment is [+syllabic] it may be [+consonantal] as well.

(j) In English [-consonantal, -vocalic, -high] segment /h/ is
[+low] but in Dimasa [-consonantal, -vocalic, -high] segment /h/ is
The fact that a particular segment occurs in both the languages is not all significant unless we find out the nature of that segment with reference to segment structure conditions. That there is no nasal vowel in both the languages can be found out by comparing the SgSc of both the languages.
6.3. Sequence Structure Conditions

(a) In English a morpheme may begin with as many as three consonants. The Sequence structure condition (SqSc in brief) of English states:

\[ I(c) \quad \# \begin{array}{l} \scriptstyle \neg \text{consonantal} \end{array} \begin{array}{l} \scriptstyle \neg \text{consonantal} \end{array} \begin{array}{l} \scriptstyle \text{consonantal} \end{array} \]

\[ T(c) \quad \begin{array}{l} \scriptstyle \neg \text{delayed release} \end{array} \begin{array}{l} \scriptstyle \text{vocalic} \end{array} \begin{array}{l} \scriptstyle \text{consonantal} \end{array} \]

But a Dimasa morpheme cannot begin with a consonant cluster. Dimasa SqSc states that if a morpheme begins with two segments and the first one happens to be \( \neg \text{consonantal} \) the second one must be \( \text{vocalic} \).

The SqSc of Dimasa is as follows:

\[ I(c) \quad \# \begin{array}{l} \scriptstyle \text{consonantal} \end{array} \begin{array}{l} \scriptstyle \text{segment} \end{array} \]

\[ T(c) \quad \text{vocalic} \]

(Examples are given in Sec. 3.4.1. and Sec. 5.4.)

(b) In English a morpheme may end with as many as four consonants. English SqSc states that if a morpheme ends with four consonants, the last three must be voiceless. The SqSc is as follows:

---
Dimaasa SqSc does not allow any consonant cluster word finally.

Dimaasa SqSc states

$I(c) \quad \begin{cases} \text{[consonantal]} \\ \text{[consonantal]} \\ \text{[consonantal]} \\ \text{[consonantal]} \end{cases} \neq$

$T(c) \quad \begin{cases} \text{[-voice]} \\ \text{[-voice]} \\ \text{[-voice]} \end{cases}$

(Examples are given in Sec. 3.4.1. and Sec. 5.4.1.)

(c) In both English and Dimaasa a nasal segment occurring

morpheme-initially must be $\text{[+anterior]}$. The SqSc common to both the

languages is as follows:

$\begin{cases} \text{[+nasal]} \end{cases}$

$I(c) \quad \neq$

$T(c) \quad \text{[anterior]}$

Examples from English:

noon
mark
noon
name
Examples from Dimasa:

/ra/  tiger
/si/  one
/na/  fish
/na/  baby

(d) In Dimasa [+strident] segments /s/ and /a/ do not occur morpheme-finally. But in English [+strident] segments /s/ and /a/ can occur morpheme-finally. The following square is applicable to Dimasa stridents and not to English stridents:

\[
\begin{array}{c}
p \in \text{[+consonantal]} \\
\Downarrow \\
p \in \text{[-strident]}
\end{array}
\]

Examples from English:

texts
books
prompts
dogs
hands
eggs
Following forms are not allowed in Dissanu:

*nis
*kiis
*lis
*mee

(c) In English \([-\text{delayed release}]\) segments can occur both
morpheme-initially and morpheme-finally. That English \(/p, b, t, d, k, g/\)
can occur both morpheme-initially and morpheme-finally are proved
by the following words:

<table>
<thead>
<tr>
<th>English</th>
<th>Dissanu</th>
</tr>
</thead>
<tbody>
<tr>
<td>pit</td>
<td>bip</td>
</tr>
<tr>
<td>bit</td>
<td>cab</td>
</tr>
<tr>
<td>tin</td>
<td>neat</td>
</tr>
<tr>
<td>deep</td>
<td>bead</td>
</tr>
<tr>
<td>king</td>
<td>think</td>
</tr>
<tr>
<td>gain</td>
<td>big</td>
</tr>
</tbody>
</table>

In Dissanu \(/p, b, t, d, k, g/\) are \([-\text{continuant}, \text{-nasal}, \text{-strident}]\) which
can be specified as \([-\text{delayed release}]\) as well. But Dissanu SqSe
states that morpheme finally only \(/b/\) and \(/k/\) can occur, others cannot.

The SqSe rule is as follows:

\[
\begin{align*}
I(c) & \quad \text{[-delayed release]} \quad \# \\
T(c) & \quad \text{[-coronal]} \\
\end{align*}
\]
Examples of /p/ and /k/ in Dimasa:

/psai/  come
/hai/  dance
/kia1/  flower
/giai/  black
/dip/  hide
/bisik/  daughter

Following are some impossible forms of Dimasa:

*gisib
*kat
*bad
*mig

(f) In English all the vowels can occur morpheme-initially as well as morpheme-finally. But in Dimasa out of the six vowels /ə/ cannot occur morpheme-initially or finally. The following two sequence structure rules are applicable to Dimasa vowels only:

(1) I(c) # [+vocalic]  
   T(c)  
   { [+round] }  
   { [-back] }  
   { [+low] }
Examples of Dimasa vowels:

/ili/  like this
/ibu/  this (animate)
/ea/   mat
/eraha/ here
/se/   net
/ak/   I
/ansa/ child
/uzaHke/ that way
/ulaie/ like that
/cm/   yes
/cohe/ and
/to/   he

following are some impossible forms of Dimasa:

* sai
* laN
* salai
* bah
6.4. Syllable types

(a) The syllable type #V# occurs in both the languages. This syllable type indicates that only one vocalic segment can form a word in Dinama as well as in English.

Examples of Dinama #V#: 

/i/  
this (inanimate)

/e/  
alas

Examples of English #V#: 

a
she

(b) The syllable type #CV# is common to both the languages.

Examples of Dinama #CV#: 

/ri/  
cloth

/so/  
speak

Examples of English #CV#: 

he
she

(c) The syllable type #VC# also occurs in both English and Dinama.
Examples of Dimasa # VC #:

/əm/  yes
/am/  I

Examples of English # VC #:

in
up

(d) The syllable types # CCV # and # CCCV# occur only in English but not in Dimasa.

Examples of English # CCV # and # CCCV #:

free
glee
split
scream

(e) The syllable type # CVC # occurs in both the languages.

Examples of Dimasa # CVC #:

/xim/  flower
/zen/  start

Examples of English # CVC #:

cup
path
With reference to the syllable types # VC # and # CVC # occurring in Dimasa and English it is noticed that in English the final 'C' may be any [+consonantal] segment but in Dimasa the final 'C' must be one of the following segments:

/p,k,m,n,r,l/

Examples of English consonants in # VC # or # CVC #:

- p: cup
- b: cab
- t: bit
- d: bid
- k: lack
- g: leg
- c: batch
- j: edge
- f: laugh
- v: love
- θ: path
- ð: with
- s: peace
- z: glasses
- x: dish
- s: garage
- m: dumb
- n: sign
- N: sing
- l: pull
- r: car
Examples of Dimasa consonants in # VC # or # CVC #:

- p /bi:/ hide
- k /bisik/ daughter
- a /kia/ flower
- n /kin/ fear
- i /nin/ you
- r /kor/ night
- l /mel/ gathering

(f) As already mentioned in Sec. 6.3, the following syllable type occurs only in English, not in Dimasa:

# CVCCGGG #

Examples of English consonants in # CVCCGGG #:

- /-kets/ texts
- /-kets/ prompts

6.5. **Phonological Processes**

(a) In English nasals assimilate in both coronality and anteriority to a following tautosyllabic obstruent. The rule is as follows:

\[
\begin{align*}
\text{[nasal]} & \rightarrow [\text{coronal}] / \text{[coronal]} \\
\text{\text{-sonorant}} & \text{\text{-sonorant}} \text{\text{-sonorant}}
\end{align*}
\]

In Dimasa nasals assimilate only in anteriority to a following tautosyllabic obstruent. The rule is as follows:
Examples of English nasals:

- indiscrete /ɪnˈdɪskrɪt/
- implausible /ɪmˈplɔːsəbl/
- inconceivable /ɪnkənˈsɪvəbl/

Examples of Dimasa nasals:

- /daini/ one month
- /daiɲgin/ two months
- /peɪnpinba/ to resell
- /peائنtaɾba/ to sell all
- /peائنkalaba/ to sell a little part

(b) In English sonorants are nasalized when they occur directly before a nasal segment. The rule is as follows:

\[ ^{+\text{sonorant}} \rightarrow ^{+\text{nasal}} \]

In Dimasa only the vowels (not all sonorants) are nasalized when they occur in a vowel cluster and is followed by a nasal segment. The rule is as follows:

\[ ^{+\text{vocalic}} \rightarrow ^{+\text{nasal}} \]

Examples of sonorant nasalization in English:

- hand /hænd/
- pen /pɛn/
- farm /fɑːm/
Examples of vowel nasalisation in Dimasa:

/dain/  [dain]  moon
/sambahili/  [sambahili]  evening
/halilga/  [halilga]  marriage

(c) In English /p,t,k/ are aspirated when they occur morpheme-initially before a stressed vowel. The rule is as follows:

\[
\begin{array}{c}
\text{-delayed release} \\
\text{-voice}
\end{array} \quad \rightarrow \quad \begin{array}{c}
\text{aspirated} \\
\#
\end{array} \quad \begin{array}{c}
\text{-consonantal} \\
\text{+vocalic} \\
\text{+stress}
\end{array}
\]

In Dimasa also /p,t,k/ are aspirated when they occur morpheme-initially before non-high vowels. The aspiration rule which is applicable to Dimasa /p,t,k/ uniformly is as follows:

\[
\begin{array}{c}
\text{-delayed release} \\
\text{-voice}
\end{array} \quad \rightarrow \quad \begin{array}{c}
\text{aspirated} \\
\#
\end{array} \quad \begin{array}{c}
\text{+vocalic} \\
\text{-high}
\end{array}
\]

Examples of aspiration in English:

king \[ k^h \text{in} \]  
pen \[ h \text{en} \]

Examples of aspiration in Dimasa:

pai \[ p^h \text{ai} \]  come
kao \[ k^h \text{ao} \]  sit
taw \[ t^h \text{aw} \]  go
(e) In English velar plosive /k/ is fronted either before or after a front vowel. The rule is as follows:

\[
\begin{align*}
\text{[delayed release]} & \quad \ast \\
\text{[anterior]} & \quad [\text{back}] \\
\text{[coronal]} & \quad [\text{back}] \\
\text{[voice]} & \quad [\text{voice}] \\
\end{align*}
\]

In Dimaasa velar plosive /k/ becomes its voiced counterpart when it occurs between two high vowels. The rule is as follows:

\[
\begin{align*}
\text{[delayed release]} & \quad [\text{voice}] \\
\text{[anterior]} & \quad [\text{high}] \\
\text{[coronal]} & \quad [\text{high}] \\
\text{[voice]} & \quad [\text{voice}] \\
\end{align*}
\]

Examples of English /k/:

- peak: /pik/  
- keep: /kip/

Examples of Dimaasa /k/:

- /buku/: /bu_ku/  
- /biki/: /bi_ki/  

Waste product

(c) In English epenthetic consonant /p/ occurs between nasal and the following [continuant, voice] segment /t/. The rule is as follows:

\[
\begin{align*}
\text{[continuant]} & \quad \ast \\
\text{[voice]} & \quad [\text{voice}] \\
\end{align*}
\]
In Simasa the segment /p/ or /b/ is inserted between the nasal segment /a/ and the [-continuant] segment /t/ or /d/. The rule is as follows:

Examples of English epenthetic rule:

consume consumption
resume resumption
presume presumption

Examples of Simasa epenthetic rule:

/kiːtəu/  /kʰiaːtəu/ earring
/kiːlɪndu/  /kʰiliːndu/ is bowing
/lumtsi/  /lʊmpʰəi/ small pox
/rəbəsmdi/  /rəbəsθəmədi/ dew drops
1. Some of the constraints shown in this chapter have already been mentioned in Sec. 2.2.3.2. Here they are repeated for the purpose of a contrastive study.

2. In Sec. 3.3.1. and Sec. 5.1.1. the phonological matrices of English and Zimasa were presented, phonetic matrices were omitted for the sake of convenience and economy. In this chapter phonetic segments are individually described on the basis of the features discussed in Chapter II as and when necessary. (The feature aspirated is not mentioned in the matrices presented in Chapter III and V as it is not pertinent phonologically.

3. Vowels appearing in the abstract underlying representations of English are, however, monophthongs and the diphthongs are the result of phonological rules that insert glides in certain positions. Chomsky and Halle (1968) shows that there are six lax vowels in the abstract underlying representations of English.

<table>
<thead>
<tr>
<th></th>
<th>-back -round</th>
<th>+back +round</th>
</tr>
</thead>
<tbody>
<tr>
<td>+high</td>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td>-low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-high</td>
<td>e</td>
<td>o</td>
</tr>
<tr>
<td>-low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+low</td>
<td>ſ</td>
<td>õ</td>
</tr>
</tbody>
</table>
Tense vowels are the tense correlates of the lax vowels shown in the above diagram. (The diagram is taken from Chomsky and Halle's 'The Sound Pattern of English').

4. See Sec. 3.3.3. of Chapter III and Sec. 5.1.3. of Chapter V.

5. See Sec. 3.4.1. of Chapter III and Sec. 5.2.1.3. of Chapter V.

6. See Sec. 3.5. of Chapter III and Sec. 5.4. of Chapter V.

7. Dimasa /t/ and /k/ are aspirated before high vowels as well. See the distribution of /t/ and /k/ in Sec.4.1.2.2. of Chapter IV.