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LP OF CHAKMA

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1 Introduction

Chakma, an Indo-Aryan tribal language, uses varoious word formation processes such as derivation, inflection and compunding. In Bardhan (2007) a detailed discussion has been made on *derivational* and *inflectional* affixes and *compounds* and lexical phonological rules operating in Chakma Lexicon. It has also been seen that both stem and suffix controlled VH is operative in Chakma. Besides, some other phonological rules like vowel copying, vowel deletion, consonant deletion, gemination and obstruent voicing, etc. apply after the morphological operations.

The present study attempts to provide two things: (a) a model of the LP of Chakma based on the interaction of morpho-phonological processes operative in Chakma. Section 2 deals with the preliminary investigation of the interface of morphology and phonology in Chakma. In section 3 we try to establish the levels within the LP of Chakma,

2 Morphology-phonology interface

The present section attempts to establish phonology-morphology interface in Chakma as well as provide a structure of the lexicon of Chakma within the framework of LP theory as developed by Kiparsky (1982, 1985), Mohanan (1982, 1986), Pandey (1991), and other works on this theoretical framework as cited in the bibliography.

Before we proceed, we would like to state once again that we have not looked at the Chakma stress/prominence pattern and its effect on word formation in Chakma. On the basis of our preliminary observation of Chakma data we perceive that in Chakma, like other Indo-Aryan languages such as Assamese (Mahanta 2001) and Bengali (Mitra 2002), stress is not phonemic as it is in English (e.g. $^{1}present_{Adj}$, $pre^{1}sent_{V}$). Stress in Chakma, so far as our observation goes, is phonetically realized and it is not affected by the attachment of a particular set of affixes, as we find in the case of English (e.g., ^{1}*photograph*, *pho*^{1}*tography*, *photo*^{1}*graphic*).

A critical analysis of morphology-phonology interface in Chakma will help us to establish its LP model. We begin our explanation of LP of Chakma by looking at the phenomenon of VH. We have already noticed that in Chakma, as in Jingulu (Pensalfini 2002), harmony only occurs across a morpheme boundary. That is, there is no harmonic requirement on roots themselves. Roots can freely mix high and low vowels, as we have seen earlier in Chapter II of Bardhan (2007). Chakma harmony is, thus, a derived environment effect (in the sense of Kiparsky 1973a), a system that affects only polymorphemic words.

In Chakma, VH takes place when a low vowel sound is preceded or followed by a [+high, -cons] sound in a derived environment. However, the low vowels of *all* the affixes do not undergo harmony even when they occur in the derived environments (as seen in the case of derivational prefixation discussed in Bardhan (2007) in Chapter II section 2.6 and in number and definiteness suffixations discussed in Chapter IV sections 4.2.2 and 4.2.3 respectively). Even in compounding harmony is not allowed to apply as seen in section 4.3 of Chapter IV of Bardhan (2007). It is, thus, evident that we need an LP model of Chakma where harmony is allowed to apply only at a particular cylce wiothin a level. To begin with, we propose that Chakma has two levels within its lexicon:

(1) Level 1: Derivation

Level 2: Inflection, Compounding

Within the Chakma Lexicon, Level 1 comprises derivation and Level 2 comprises inflection and compounding. We suspect that there is an ordering within the levels as well. In the following section we shall look at each of these levels in some detail.

2.1 Derivation

We shall first look at the derivational affixes and see if there is need to order them with respect to each other within a level in terms of morphological operations. We assume that derivation belongs to Level 1 of Chakma Lexicon. We find that an adjectival suffix can be attached to nominal forms (2a) and a negative prefix can be attached to the derived adjectival forms as seen in (2b). Both are derivational affixes in Chakma as we had seen earlier in Chapter II (2007).

(2) a i.	[aḍaŋɛ]$_N$ja]$_A$	'fearful'	b i.	[ɒn[aḍaŋɛja]$_A$]$_A$	'not fearful'
ii.	[bhol]$_N$ja]$_A$	'productive'	ii.	[ɒ[bholja]$_A$]$_A$	'unproductive'
iii.	[ʃugh]$_N$ɪ]$_A$	'happy'	iii.	[ɒ+ǰughɪ]$_A$]$_A$	'unhappy'
iv.	[alab]$_N$ɪ]$_A$	'talkative'	iv.	[ɒn+alabɪ]$_A$]$_A$	'not talkative'

However, if the prefix is attached first, then the prefixed forms do not undergo adjectival ([-ja] or [-ɪ]) suffixation. For instance,

(3) i.	[ɒ[hɒḍha]$_N$]$_N$	'bad word'	but not *[ɒhɒḍhɛ]$_N$ja]$_A$
ii.	[ɒn[alap]$_N$]$_N$	'no discussion'	but not *[ɒnalab]$_N$ɪ]$_A$

Similarly, the adjectival stems derived as a result of the [-jɛ] suffixation to the verbal stems undergo prefixation as shown below:

(4) a i.	[[ʃun]$_V$jɛ]$_A$	'heard'	b i.	[ɒ[ǰunjɛ]$_A$]$_A$	'unheard'
ii.	[[bol]$_V$jɛ]$_A$	'spoken'	ii.	[ɒ[boljɛ]$_A$]$_A$	'unspoken'
iii.	[[an]$_V$jɛ]$_A$	'brought'	iii.	[ɒn[anjɛ]$_A$]$_A$	'not brought'

However, we do not find any examples where verbal roots undergo prefixation. Hence the forms like (5a) and (5b) are ill formed in Chakma

(5) a i	*[ɒ[ǰun]$_v$]$_v$	b i	*[[ɒǰun]$_v$jɛ]$_A$
ii	*[ɒ[bɒl]$_v$]$_v$	ii	*[[ɒbol]$_v$jɛ]$_A$
iii	*[ɒn[an]$_v$]$_v$	iii	*[[ɒnan]$_v$jɛ]$_A$

What we find is that both the nominal and verbal roots behave alike so far as adjectival suffixation followed by prefixation is concerned. Both allow prefixation after they undergo adjectival suffixation. We can, therefore, assume that the adjectival suffixes are ordered before prefix [ɒn-] in Chakma Lexicon as shown below:

(6) a	[ɒn-][ʃun] [-jɛ] ;	[ɒn-] [phɒl] [-ja]	UR
	[ʃun]$_V$jɛ]$_A$	[phol]$_N$ja]$_A$	Suffixation
	[ɒ[ǰunjɛ]$_A$]$_A$	[ɒ[bholja]$_A$]$_A$	Prefixation
	[ɒǰunjɛ]	[ɒbholja]	PR
	'unheard'	'unproductive'	

b	[ɒn-][ʃun] [-jɛ] ;	[ɒn-] [phɒl] [-ja]	UR
	*[ɒ[ɟun]$_V$]$_V$	[ɒn[bhɒl]$_N$]$_N$	Prefixation
	*[ɒɟun]$_V$jɛ]$_A$	*[ɒbhɒl]$_N$ja]$_A$	Adj. Suffixation
	*[ɒɟunjɛ]	*[ɒbhɒlja]	PR

In (6a) we find that prefixation prior to suffixation yields wrong outputs. Interestingly, we find that other derivational suffixes such as [-pona] and [-gorɪ] can be attached to those prefixed forms (2b & 4b) which have already undergone derivational suffixation. But after the [-pona] and [-gorɪ] suffixations, no other affixation takes place so far as derivational affixation is concerned. For instance,

(7) a	[ɒn-][ʃun] [-jɛ][-gorɪ] ;	[ɒn-] [phɒl] [-ja][-pona]	UR
	[ɒ[ɟunjɛ]$_A$]$_A$	[ɒ[bholja]$_A$]$_A$	Prefixation
	[[ɒɟunjɛ]$_A$gorɪ]$_{Ad}$	[[ɒbholja]$_A$pona]$_N$	Suffixation
	[ɒɟunjɛgorɪ]	[ɒbholjapona]	PR
	'unheard'	'unproductive'	
b	[ɒn-][ʃun] [-jɛ][-gorɪ] ;	[ɒn-] [phɒl] [-ja][-pona]	UR
	[[ʃunjɛ]$_A$gorɪ]$_{Ad}$	[[phɒlja]$_A$pona]$_N$	Suffixation
	*[ɒ[ɟunjɛgorɪ]$_{Ad}$]$_{Ad}$	*[ɒ[phɒljapona]$_N$]$_N$	Prefixation
	*[ɒɟunjɛgorɪ]	*[ɒphɒljapona]	PR

This clearly implies that derivational suffixes and prefix are ordered with respect to each other within Level 1as shown below:

(8)	[ɒn] [aḍaŋa] [-ja] [-gorɪ];	[ɒn] [alap] [-ɪ] [-pona]	UR
	[[aḍaŋa]$_N$ja]$_A$	[[alab]$_N$ɪ]$_A$	Adj. Suffixation
	[ɒn[aḍaŋɛja]$_A$]$_A$	[ɒn[alabɪ]$_A$]$_A$	Prefixation
	[[ɒnaḍaŋɛja]$_A$gorɪ]$_{Ad}$	[[ɒnalabɪ]$_A$pona]$_N$	Suffixation
	[ɒnaḍaŋɛjagorɪ]	[ɒnalabɪbona]	PR
	'not fearfully'	'no talkativeness'	

On the other hand, the wrong outputs will derive if the order of affixes is reversed as shown in (9):

(9)	[ɒn] [aḍaŋa] [-ja];	[ɒn] [alap] [-ɪ]	UR
	[ɒn[aḍaŋa]$_N$]$_N$	[ɒn[alap]$_N$]$_N$	Prefixation
	*[ɒnaḍaŋa]$_N$ja]$_A$	*[ɒnalab]$_N$ɪ]$_A$	Adj. Suffixation
	*[ɒnaḍaŋaja]	*[ɒnalabɪ];	PR

Other derivational verbal nominal suffixes i.e. gerundial suffix [-Vna], instrument noun forming suffix [-Vnɪ], nominalising suffix [-ɪbar] and agentive suffix [-ɪjɛ] are attached to the verbal roots, (not to derived stems) and they do not feed any other derivational suffixes or prefixes as illustrated by the forms in (10). Therefore, these suffixes are ordered after all other affixes as they do not feed any other affixation.

(10) a	[ḍækh][-Vna];	[ḍɒl][-Vnɪ];	[bæl][-ɪjɛ];	[ha] [ɪbar]	UR
	[[ḍægh]$_V$ana]$_N$	[[ḍol]$_V$anɪ]$_N$	[[bæl]$_V$ɪjɛ]$_N$	[[ha]$_V$ɪbar]$_N$	Verbal
					Nominal Suffixation
	*[[ḍæghanɛ]$_N$ja]$_A$	*[[ḍolanɪ]$_N$ja]$_A$	*[[bɛlɪjɛ]$_N$ja]$_A$	*[[hɛɪbar]$_N$ja]$_A$	Suffixation
	*[ḍæghanɛja]	*[ḍolanɪ]a]	*[bɛlɪjɛja]	*[hɛɪbarja]	PR

b	[ḍækh][-Vna];	[ḍɒl][-Vnɪ];	[bæl][-ɪjɛ];	[ha] [ɪbar]	UR
	[[ḍægh]$_V$ana]$_N$	[ḍol]$_V$anɪ]$_N$	[[bæl]$_V$ɪjɛ]$_N$	[[ha]$_V$ɪbar]$_N$	Verbal
					Nominal Suffixation
	*[ɒ[ḍæghana]$_N$]$_N$	*[ɒ[ḍolanɪ]$_N$]$_N$	*[ɒ[bɛlɪjɛ]$_N$]$_N$	*[ɒ[hɛɪbar]$_N$]$_N$	Prefixation
	*[ɒḍæghana]	*[ɒḍolanɪ]	*[ɒbɛlɪjɛ]	*[ɒhɛɪbar]	PR

It is evident from the above observation that three affixes can be attached maximally at Level 1 as illustrated by (6, 7 & 8). We propose that within Level 1, word formation takes place maximally in three cycles: (verbal and nominal) adjectival suffixation at Cycle I, negative prefixation at Cycle II and adjectival nominal/adverbial suffixation at Cycle III. As the verbal nominal suffixes like [-Vna], [-Vnɪ], [-ɪbar] and [-ɪjɛ], as seen above, do not feed any other derivational affixes and are also added only to the nonderived stems, we can say that the these verbal nominal forms will also be derived in the in first cycle.

Based on the above observation, we propose that Level 1 affixes attach in the following order:

(11)

Level 1: Derivation	Cycle I: Verbal Nominal Suffixes:	[-Vna], [-Vnɪ], [-ɪbar], [-ɪjɛ]
	(Verbal and Nominal) Adjectival Suffixes:	[-ja], [-ɪ], [-jɛ]
	Cycle II: Negative Prefix:	[ɒn-]
	Cycle III: Adjectival Nominal Suffix	[-pona]
	Adverbial Suffix:	[-gorɪ]

In (11) there is no ordering between adjectival nominal suffix [-pona] and adverbial suffix [-gorɪ]. Only one of them can attach at a time. Hence forms like *[[[pholja]$_{A}$pona]$_{A}$gorɪ]$_{Ad}$ are ill formed in Chakma.

Let us now look at the phonological rule applications after these morphological operations. In Chapter II of Bardhan (2007) we had seen that the stem controlled VH and VC rules applied after the attachment of the verbal nominal suffixes such as gerundial and instrument suffixes. These rules applied at different environments and hence they were not ordered with respect to each other. We also found that the suffix controlled VH applied as a result of attachment of other verbal nominal suffixes like [-ɪjɛ] and [-ɪbar] and the adjectival suffixes like [-ja], [-ɪ] and [-jɛ]. All these suffixes, as we have already seen in (11), belong to Cycle I of Level 1. We, therefore, propose that VH and VC rules will also apply in Cycle I. Similarly, in section 2.3 of Chapter II we have seen that consonant deletion (CD) rule had applied after [ɒn-] prefixation. In (11) we have proposed that the prefix is attached in Cycle II of Level 1. Therefore, we can safely conclude that CD belongs to Cycle II of Level 1.

We found that the rule for obstruent voicing (OV) applied whenever obstruents occurred in the in intervocalic position. In principle, this rule could apply in the all the cycles of Level 1. We propose that it applies as late as possible and so have placed it in Cycle III of Level 1. We also saw that the default rules applied to derive /a/ for the realization of the suffix initial underspecified vowel of gerundial and instrument suffixes when they were added to stems ending in nonhigh vowels in closed syllables.

Since the default rule generally applies as late as possible, we propose that it is the last rule to apply in Cycle III of Level 1. The phonological rules applying as a result of derivational affixations can be ordered as given in (12).

(12)
1 Vowel Harmony Rule (VH Rule)/Vowel Copying Rule (VC Rule)
2 Consonant Deletion Rule (C D Rule)
3 Obstruent Voicing Rule (O V Rule)
4 Default Rule (D Rule)

As the VH and VC rules apply in different environments, they are not ordered. We have put a slash between VH and VC rules in order to show that either VH or VC will apply to a particular set of data. Both the rules do not apply to the same set of data. We can now represent the Level 1 of the LP of Chakma as in (13):

(13)

Level 1 Derivation

Cycle I: Verbal Nominal Suffixes: [-Vna], [-Vnɪ], [-ɪbar], [-ɪjɛ]	← VH/VC Rule
(Verbal and Nominal) Adjectival Suffixes: [-ja], [-ɪ], [-jɛ]	
Cycle II: Negative Prefix: [ɒn-]	← C D Rule
Cycle III: Adjectival Nominal Suffix [-pona]	← O V Rule
Adverbial Suffix: [-gorɪ]	← D Rule

The derivation (14) below illustrates this process. (Recall that we had represented the underspecified vowels as fully specified vowels (though they were underspecified for the feature [low]) when the VH rule applied. This was done deliberately in order to show how the raising of low vowels to mid vowels took place as a result of VH. In the instances where the VC rule and default rules had applied we had represented the underspecified vowels as [V]). In (14) we find that in Cycle I no suffixes are attached after [-Vna], [-Vnɪ] and [-ɪbar] suffixations. These suffixes also cannot be after any other suffixation. Similarly, the (verbal and nominal) adjectival suffixes [-jɛ], [-ja] and [-ɪ] do not feed each other or the verbal nominal suffixations. They are added directly to the nonderived stems. If we look at the phonological rules applying in this cycle, we find that both the stem and suffix controlled VH (and VC) are applying in (14b) in Cycle I.

Only the prefix [ɒn-] is attached in Cycle II and the only rule for CD applies in this cycle. The adverbial suffix [-gorɪ] and the adjectival nominal suffix [-pona] are attached at the end as they can feed the adjectival suffixes and the prefix but are not fed by any suffixes. The rule for OV and the default rules are the last rules to apply in Cycle III of Level 1.

(14) a [ɒn-] [aḍaŋa] [ja] [-pona]; [ɒn-] [ʃun] [jɛ]gorɪ]; [bɒl] [-ɪbar] UR

Cycle I: Suffixation			
[aḍaŋa+ja]	[ʃun+jɛ]	[bɒl+ɪbar]	WFR
[aḍaŋɛ+ja]	------	[bol+ɪbar]	VH Rule
Cycle II: Prefixation			
[ɒn+aḍaŋɛja]	[ɒn+ʃunjɛ]	--------	WFR
--------	[ɒ+ʃunjɛ]	--------	CD Rule
Cycle III: Suffixation			
[ɒnaḍaŋɛja+pona]	[ɒʃunjɛ+gorɪ]	--------	WFR
[ɒnaḍaŋɛja+bona]	[ɒ̆junjɛ+gorɪ]	--------	OV Rule
[ɒnaḍaŋɛjabona]	[ɒ̆junjɛgorɪ]	[bɒlɪbar]	PR
'not fearfully';	'unheardly';	'talking';	

b [gɒ] [-Vna]; [buk] [-ana]; [gɒr] [-Vnɪ]; [ɒn-] [phɒl] [-jɛ] [-pona] UR

Cycle I: Suffixation				
[gɒ+Vna];	[buk+ana];	[gɒr+Vnɪ];	[phɒl+jɛ]	WFR
[gɒ+ɒna]	--------	---------	----------	VC Rule
--------	[buk+ona]	---------	----------	VH Rule
--------	---------	----------	[phol+jɛ]	VH Rule
Cycle II: Prefixation				
--------	---------	----------	[ɒn+pholjɛ]	WFR
--------	---------	----------	[ɒ+pholjɛ]	OV Rule
Cycle III: Suffixation				
--------	---------	----------	[ɒpholjɛ+pona]	WFR
--------	[bug+ona]	----------	[ɒpholjɛ+bona]	OV Rule
-------	--------	[gɒr+anɪ]	---------	D Rule
[gɒɒna]	[bugona]	[gɒranɪ]	[ɒpholjɛbona]	PR
'singing'	'carrying'	'means of doing'	'unproductiveness'	

We find that in (14), the VH (and VC) rules apply only when verbal nominal and adjectival suffixes are attached in the Cycle I of derivation. The prefix [ɒn-] and the suffixes such as [-gorɪ] and [-pona] are attached in Cycle II and Cycle III respectively. The VH (and VC) rules do not apply during these affixations. We can, therefore, conclude that VH (and VC) rules apply only in Cycle I of Level 1 and not in later cycle(s).

In the next section we shall deal with the morphology-phonology interface so far as inflectional suffixation is concerned and state why derivation needs to be at a higher level than inflection.

2.2 Inflection

In the previous section we that Level 1 of Chakma Lexicon comprises three cycles and VH (and VC) rules apply in the first cycle and not later. Like other languages such as English, Hindi, Malayalam, Bengali, etc., in Chakma also inflectional suffixes occur after the derivational operations take place but not vice versa. Hence we find that agentive nouns derive after [-jɛ] derivational suffixation undergo nominal inflectional suffixation and not vice versa as illustrated in (15).

(15) i [gɒr+ ɪjɛ +gun]
Do +er +s
Derivation + Nominal Inflection
'doers'
Nut not *[gɒr+gun + ɪjɛ]
ii [gɒr+ ɪjɛ +gun +ræ]
Do +er +s
Derivation + Nominal Inflection + Nominal Inflection
'to doers'
Nut not *[gɒr+gun +ræ + ɪjɛ]
iii [gɒr+ ɪjɛ +wo]
Do +er +the
Derivation + Nominal Inflection
'the doer'
Nut not *[gɒr+wo + ɪjɛ]
iv [gɒr+ ɪjɛ +wo +ræ]
Do +er +the
Derivation + Nominal Inflection + Nominal Inflection
'to the doer'
Nut not *[gɒr+wo +ræ + ɪjɛ]

Thus, once the inflectional suffixes are attached, these forms do not undergo further attachments confirming the general pattern that the derivational affixes are attached prior to the inflectional affixes and that the inflectional affixes do not feed further affixation. We can, therefore, conclude that in Chakma the derivational affixes apply before the inflectional suffixes as nothing can be attached inflectional affixation. We propose that inflection belongs to a level lower than the level to which derivation belongs. In other words, inflection belongs to Level 2.

In Chapter III and IV of Bardhan (2007) we had seen that Chakma two types of inflectional suffixes: verbal and nominal. We do not find any instances of verbal inflections feeding derivation or being fed by derivation. In other words, the following examples are not found in Chakma.

(16) i *[ʃun+ ona +ɒŋ]
Derivation) +Verbal Inflection
ii *[man+ jɛ +ɪb +ak]
Derivation +Verbal Inflection+ Verbal Inflection
iii [gɒr+ ɒŋ +jɛ]
Verbal Inflection + Derivation
iv *[man + ɪb +ak +ani]
Verbal Inflection + Verbal Inflection + Derivation

Interestingly, verbal inflection also does not feed nominal inflection (17a), nor is it fed by nominal inflection (17b). Hence the following examples are not found in Chakma.

(17) a. i *[ʃun +oŋ + ræ]
Verbal Inflection + Derivaton
ii *[man+ ɪb +ak +ogan]
+Verbal Inflection + Verbal Inflection + Nominal Inflection
B i *[ʃɛr +or + ɒŋ]
Nominal Inflection +Verbal Inflection
ii *[phɒl +gun +j +ɒŋ]
Nominal Inflection +Verbal Inflection +Verbal Inflection

These phenomena suggest that verbal inflection could be either on the same level as derivation or on the same level as nominal inflection. But we have seen above in (15) that nominal inflections do feed derivation and are not fed by derivation. It is, therefore, clear that nominal inflection is at a lower level than derivation. This

suggests two possibilities: one, to keep derivation at Level 1and both verbal and nominal inflections at Level 2 as shown in (18):

(18) Level 1: Derivation

Level 2: Verbal Inflection, Nominal Inflection

and the second, to keep derivation and verbal inflection at one level and nominal inflection at another as shown in (19):

(19) Level 1: Derivation, Verbal Inflection

Level 2: Nominal Inflection

So far we have not come across any such proposal where (a) regular inflectional affixes are at the same level as derivation, and (b) inflectional affixes have been divided into two sets: verbal and nominal.

We propose to keep verbal inflection at Level 1 as this kind of ordering is supported by the phonological rules we have discussed below. In addition, when we look at compounds (in section 2.3), we find that verbal inflection should be at a higher level than nominal inflection.

In the following two sections we shall deal first with the verbal inflection and then the nominal inflection and see (a) how they interact with phonology, (b) if there is a need to order suffixes within verbal (and nominal) inflections and (c) if they need to be ordered with respect to each other.

2.2.1 Verbal inflection

All the verbal stems in Chakma undergo verbal inflectional suffixations like tense, agreement and aspect as discussed in Chapter III. In sections 3.3.1.2, 3.3.1.3 and 3.3.1.4 of Chapter III of Bardhan (2007), we have seen that the past tense, habitual past tense and future tense VG formations took place in two cycles: in the first cycle tense suffixes were attached to the verbal stems and in the second cycle the PNAgr suffixes were attached to the tense marked verbal stems. We also saw that since simple present tense did not have an overt marker in Chakma, the PNAgr suffixes were attached to the [-ϕ] suffixed present tense verbal stems in order to derive the

simple present tense VGs. We had also seen that for the simple present tense and past tense there was one set of PNAgr suffixes and for the habitual past tense and future tense there was another set of PNAgr suffixes. In addition, progressive suffix was added only to the simple present tense verbal forms in the third cycle. We also saw that only progressive marker [-t̪ɒn] was attached to 3Pl subjects, while the progressive marker [-ɒr] was attached to all other subjects. None of the tense marked verbal forms underwent progressive suffixation. In (20) below, we have arranged verbal inflectional suffixes in the order in which they attach.

(20)

Level 2: Verbal Inflection	Cycle I: Tense Suffixes:	Present Tense: [-ϕ] Past tense: [-j], Habitual past tense [-ɪd̪], Future tense: [-ɪb]
	Cycle II: PNAgr Suffixes (For Present and Past Tense):	1Sg: [-ɒŋ], 1Pl: [-ɪ] 2Sg: [-ɒč], 2Pl: [-ɒ], 3Sg: [-ɛ], 3Pl:[- ɒn]
	PNAgr Suffixes (for Habitual Past & Future Tense):	1Sg: [-ɒŋ], 1Pl: [-ɒŋ] 2Sg: [-ɛ], 2Pl: [-a], 3Sg: [-ɒ], 3Pl:[-ak]
	Cycle III: Progressive Suffix:	[-ɒr], [-t̪ɒn]

Based on the above observations, we shall now look at the phonological processes applying after the attachment of verbal inflectional suffixes. Recall that in case of verbal inflection, VH (and VC) rules had applied only in the first cycle of suffixation the verbal stems had undergone tense suffixation and not in the second cycle when they underwent PNAgr suffixations as discussed in sections 3.3.1.2, 3.3.1.3 and 3.3.1.4 of Chapter III. We also saw that only when verbal inflection took place, VH (and VC) were followed by suffix initial vowel deletion (SIVD) in order to satisfy

bimoraicity constraint as discussed in section 3.3.1.1, 3.3.1.3, 3.3.1.4 and 3.3.2 of Chapter III of Bardhan (2007). SIVD applied in every cycle of verbal inflection whenever its environment was created by suffixation. We could not shift the SIVD rule to the last cycle (as we had done with the OV rule) because non-application of the rule resulted in the wrong output after each cycle. SIVD was clearly cyclic rule. We find that in Chakma the bimoraicity constraint was followed very rigidly at all levels and cycles.

In addition, verbal inflectional suffixations triggered the application of the OV rule in the intervocalic position. As proposed earlier, this rule applied in the last cycle. We also found that in case of verbal inflection, the default rule applied for the realisation of the low vowel /ɒ/. As before, we assume that the default rule will be the last rule to apply in Cycle III. Thus, the phonological rules applying after the Level 2 verbal inflectional suffixation can be ordered as follows:

(21) 1 Vowel Harmony Rule (VH Rule)/Vowel Copying Rule (VC Rule)
2 Suffix Initial Vowel Deletion Rule (SIVD Rule)
3 Obstruent Voicing Rule (OV Rule)
4 Default Rule (D Rule)

The interaction between morphology and phonology in case of verbal inflection is represented below:

(22)

Level 2: Verbal Inflection	Cycle I: Tense Suffixes:	Present Tense: [-ɸ]	← VH/VC Rule
		Past tense: [-j],	← SIVD Rule (applying in all ycles)
		Habitual past tense [-ɪd̪]	
		Future tense: [-ɪb]	
	Cycle II: PNAgr Suffixes (for Present and Past Tense):	1Sg: [-ɒŋ], 1Pl: [-ɪ]	
		2Sg: [-ɒč], 2Pl: [-ɒ],	
		3Sg: [-ɛ], 3Pl:[- ɒn]	
	PNAgr Suffixes (for Habitual Past & Future Tense):	1Sg: [-ɒŋ], 1Pl: [-ɒŋ]	
		2Sg: [-ɛ], 2Pl: [-a],	
		3Sg: [-ɒ], 3Pl: [-ak]	← OV Rule
	Cycle III: Progressive Suffix:	[-ɒr], [-t̪ɒn]	← D Rule

Let us now look at how morphological and phonological operations take place at Level 2 verbal inflection as shown in (23). In (23a) we find that in Cycle I, first the VH rule applies and then the SIVD rule applies to satisfy the bimoraicity constraint. We see that VH applies in the first cycle in case of future, past and habitual past tense VG formation. In the second cycle the PNAgr suffixes are attached and only the OV rule can apply. In (23b) we find that both stem controlled and suffix controlled VH and VC rules are applying in Cycle II. This is against what we have been saying throughout. However, we feel that since there is no overt present tense marker in Chakma, for the purpose of the VH rules the second cycle is perceived as the first cycle. We, therefore, show only two cycles for present tense, PNAgr and progressive suffixations in (23c). We also find that after progressive suffixation in Cycle II in (23c) SIVD rule applies *iteratively* to follow the bimoraicity constraint. Other rules like the OV and default rules also apply in this cycle.

(23) a [ʃa] [-ɪb][-ɒŋ]; [gɒp][-ɪb][-ɒŋ]; [bɛhɒ] [-ɪb][-ak] UR

Cycle I: Future Tese Suffixation

[ʃa+ɪb]	[gɒp+ɪb]	[bɛhɒ+ɪb]	WFR
[ʃɛ+ɪb]	[gop+ɪb]	[bɛho+ɪb]	VH Rule
[ʃɛ+b]	--------	[bɛho+b]	SIVD Rule

Cycle II: PNAgr Suffixation

[ʃɛb+ɒŋ]	[gopɪb+ɒŋ]	[bɛhob+ak]	WFR
--------	[gobɪb+ɒŋ]	--------	OV Rule
[ʃɛbɒŋ]	[gobɪbɒŋ]	[bɛhobak]	PR
'(I) will see'	'(I) will talk'	'(They) will select'	

b [d̪ha][-Vŋ][-ɒr]; [d̪ha][-ɪ][-ɒr]; [gɒr][-V][-ɒr]; [ʃɪp][-ɒŋ] [-ɒr] UR

Cycle I: Present Tense Suffixation

[d̪ha+ɸ	[d̪ha+ɸ]	[gɒr+ɸ]	[ʃɪp+ɸ]	WFR

Cycle II: PNAgr Suffixation

[d̪ha+Vŋ]	[d̪ha+ɪ]	[gɒr+V]	[ʃɪp+ɒŋ]	WFR
[d̪ha+ɒŋ]	-------	-------	---------	VC Rule
----------	-------	--------	[ʃɪp+oŋ]	VH Rule
--------	[d̪hɛ+ɪ]	------	------	VH Rule
[d̪ha+ŋ]	-------	-------	-------	SIVD Rule

Cycle III: Progressive Suffixation

[d̪haŋ+ɒr]	[d̪hɛɪ+ɒr]	[gɒrV+ɒr]	[ʃɪpoŋ+ɒr]	WFR
-------	[d̪hɛɪ+r]	[gɒrV+r]	--------	SIVD Rule
-------	[d̪hɛ+r]	------	--------	SIVD Rule
-------	-------	--------	[ʃɪboŋ+ɒr]	OV Rule
-------	--------	[gɒrɒ+r]	--------	D Rule
[d̪haŋɒr]	[d̪hɛr]	[gɒrɒr]	[ʃɪboŋɒr]	PR

'(I) am fleeing'; '(We) are fleeing'; '(You) am doing' '(I) am pressing'

c [d̪ha][-Vŋ][-ɒr]; [d̪ha][-ɪ][-ɒr]; [gɒr][-V][-ɒr]; [ʃɪp][-ɒŋ] [-ɒr] UR

Cycle I: PNAgr Suffixation

[d̪ha+Vŋ]	[d̪ha+ɪ]	[gɒr+V]	[ʃɪp+ɒŋ]	WFR
[d̪ha+ɒŋ]	-------	-------	---------	VC Rule
----------	-------	--------	[ʃɪp+oŋ]	VH Rule
--------	[d̪hɛ+ɪ]	------	------	VH Rule
[d̪ha+ŋ]	-------	-------	---------	SIVD Rule

Cycle II: Progressive Suffixation

[d̪haŋ+ɒr]	[d̪hɛɪ+ɒr]	[gɒrV+ɒr]	[ʃɪpoŋ+ɒr]	WFR
-------	[d̪hɛɪ+r]	[gɒrV+r]	--------	SIVD Rule
-------	[d̪hɛ+r]	------	--------	SIVD Rule
-------	-------	--------	[ʃɪboŋ+ɒr]	OV Rule
-------	--------	[gɒrɒ+r]	--------	D Rule
[d̪haŋɒr]	[d̪hɛr]	[gɒrɒr]	[ʃɪboŋɒr]	PR

'(I) am fleeing'; '(We) are fleeing'; '(You) am doing' '(I) am pressing'

In the following section we shall deal with how nominal inflectional suffixes are ordered with respect to each other and also how they interact with phonology.

2.2.2 Nominal inflection

To begin with, the nominal inflectional suffixes do not feed verbal inflection and are also not fed by it as illustrated by (17) in section 2.2. We, therefore, do not find any valid reason to order nominal inflection and verbal inflection with respect to each other. (However, later (in section 2.3) we will see that compounding in Chakma feeds nominal inflection but not verbal inflection.)

Let us now see how the nominal inflectional suffixes are ordered with respect to each other. There are four types of nominal inflectional suffixes: gender, number, definiteness and case. We find that the gender suffix attaches only to the nonderived stems. It can feed other nominal inflectional suffixes like number, definiteness and case suffixes but in turn is not fed by them. For instance,

(24) i [ol+ɪɪ+wo+ræ] 'to the female cat'
*[ɒl+wo+ræ+ɪɪ]
ii [d̪ɛb+ɪɪ+gun+or] 'of old women'
*[d̪æba+gun+or+ɪɪ]

This observation suggests that the gender suffix and other nominal inflectional suffixes are ordered with respect to each other within Level 2. We can say that within Level 2 gender occurs before all other nominal inflectional suffixes.

We also notice that number and definiteness suffixes in Chakma feed case suffixes but are not fed by case suffixes as shown below in (25):

(25) i [[[mɪlɛ]$_{N}$gun]$_{Pl}$ræ]$_{Obj}$ 'to girls'
*[[[mɪlɛ]$_{N}$ræ]$_{Obj}$gun]$_{Pl}$

ii [[[pɛk]$_{N}$wo]$_{Def}$ræ]$_{Obj}$ 'to the bird'
*[[[pɛk]$_{N}$ræ]$_{Obj}$ wo]$_{Def}$

At the same time, we find that the number and definiteness suffixes do not feed each other as seen in (26):

(26) i *[[[mɪlɛ]$_{N}$gun]$_{Pl}$wo]$_{Def}$
ii *[[[pɛk]$_{N}$wo]$_{Def}$gun]$_{Pl}$

We, therefore, propose to order the gender, number, definiteness and case suffixes as shown in (27):

Level 2: Nominal Inflection	a. Gender b. Number, Definiteness c. Case

We also find that maximally three nominal inflectional suffixes can be attached to a (nonderived) stems as illustrated by (28).

(28) a	[ɒla] [ɪɪ][-Cun][-or];	[t̪hɒk][ɪɪ][-Cun][-or]	UR
	[[ol]$_{ɪɪ}$]$_{F}$	[[t̪hok]$_{ɪɪ}$]$_{F}$	Gender
	[[olɪɪ]gun]$_{Pl}$	[[t̪hogɪɪ]gun]$_{Pl}$	Number
	[[olɪɪgun]or]$_{Pos}$	[[t̪hogɪɪgun]or]$_{Pos}$	Case
	[olɪɪgunor]	[t̪hogɪɪgunor]	PR
	'of female cats''	'of female cheats''	
b	[ɒla] [ɪɪ][-wo][-or];	[t̪hɒk][ɪɪ][-wo][-or]	UR
	[[ol]$_{ɪɪ}$]$_{F}$	[[t̪hok]$_{ɪɪ}$]$_{F}$	Gender
	[[olɪɪ]wo]$_{Def}$	[[t̪hogɪɪ]wo]$_{Def}$	Definiteness
	[[olɪɪwo]or]$_{Pos}$	[[t̪hogɪɪwo]or]$_{Pos}$	Case
	[olɪɪwor]	[t̪hogɪɪwor]	PR
	'of the female cats''	'of the female cheats''	

We can now represent nominal inflectional suffixation in three consecutive cycles within Level 2 as shown in (29):

(29)

Level 2: Nominal Inflection	Cycle I:	Gender Suffix:	[-ɪɪ]
	Cycle II:	Number suffixes:	[-Cun], [-Canɪ]
		Definiteness suffixes:	[-wo], [-Can]
	Cycle III:	Case:	
		Nominative case suffix:	[-ϕ]
		Objective case suffix:	[-ræ]
		Possessive case suffix:	[-or]
		Locative case suffix:	[-o̤t̤]
		Ablative case suffix:	[-t̤un]

We saw in section 4.2.4 of Chapter IV of Bardhan (2007) that only the ablative case suffix was attached to the locative case marked nominal stems (e.g., [[bhɛɪ]o̤t̤]$_{Loc}$ 'to brother') and [[[bhɛɪ]o̤t̤]$_{Loc}$t̤un]$_{Abl}$ 'from brother'). Hence the ablative and locative case suffixes were definitely ordered with respect to each other. No such ordering was visible with other case suffixes.

Now let us look at how phonology interacts with morphology so far as nominal inflectional suffixations are concerned. In section 4.2.1 of Chapter IV of Bardhan (2007) we found that after gender suffixation stem final vowel deletion (SFVD) rule was followed by the VH rule. Earlier in the case of verbal inflection we had proposed a SIVD rule but here we find that we need a SFVD rule. There are a few difference between the two rules: (a) SFVD applies *before* VH, whereas SIVD applies *after* VH, (b) SFVD applies from left to right, whereas SIVD applies from right tom left, (c) SFVD applies in Cycle I but SIVD applies in all cycles, (d) SFVD is needed only during nominal inflection but SIVD applies during both verbal and nominal inflections, and (e) in SFVD it is the stem final vowel which gets deleted but in SIVD it is the suffix initial vowel which gets deleted.

In section 4.2.2, 4.2.3 and 4.2.4 of Chapter IV of Bardhan (2007) , we had seen that the rules for consonant deletion (CD) and obstruent gemination (OG) applied in number and definiteness suffixations which belong to Cycle II. We found that the CD

and OG rules applied in different environments and were, therefore, not ordered with respect to each other.

After the attachment of the case suffixes which belongs to Cycle III of nominal inflections, SIVD applies in order to satisfy bimoraicity constraint. We found in section 4.2.4 of Chapter IV of Bardhan (2007) that the SIVD rule applied only once, whereas in the case of verbal inflection when progressive suffixation took place SIVD had to apply *iteratively*. This suggests that VV.VC structure was not allowed in verbal inflection but is allowed in nominal inflection. This is possible because in many languages syllable templates not possible at higher level are possible at lower level. This also suggests that there seems to be an ordering between verbal and nominal inflections. We shall find more illustrations of this difference when we look at the compounds in Chakma. We had also seen in Chapter IV of Bardhan (2007) that the rule for OV applies when it met its structural description. As proposed earlier, we had placed this rule in Cycle III along with the default rule which applies as late as possible.

So far we found that default rule was the last rule and the rule for OV was ordered before the default rule following the general principle of phonological rule application as shown in the previous section. Now we find in (32a) that the default rule is followed by the OV rule. We, therefore, propose that the last rule to apply in the lexical module will be the OV rule. Later, we will see that OV is also a postlexical rule. The ordering of the phonological rules applying after nominal inflections is shown below:

(30) 1 Stem Final Vowel Deletion Rule (SFVD Rule)
2 Vowel Harmony Rule (VH Rule)
3 Consonant Deletion Rule (CD Rule)/ Obstruent Gemination Rule (OG Rule)
4 Suffix Initial Vowel Deletion Rule (SIVD Rule)
5 Default Rules
6 Obstruent Voicing Rule (OV Rule)

We represent morphology-phonology interaction after the nominal inflection in (31):

(31)

Level 2: Nominal Inflection

Cycle I: Gender Suffix:	[-ɪɪ]	← SFVD Rule
		← VH Rule
Cycle II:		
Number suffixes:	[-Cun], [-Canɪ]	← CD/OG Rule
Definiteness suffixes:	[-wo], [-Can]	
Cycle III: Case Suffixes:		
Nominative case suffix:	[-ϕ]	← SIVD Rule
Objective case suffix:	[-ræ]	
Possessive case suffix:	[-or]	← D Rule
Locative case suffix:	[-o̱t̪]	
Ablative case suffix:	[-t̪un]	← OV Rule

In (31) we find that in Cycle I where gender suffix is attached, first the SFVD rule applies (to follow the bimoraicity constraint in Chakma) and then the VH rule applies. In Cycle II, the CD and OG rules apply in separate environments and therefore, we ordered with respect to each other. Cycle III of nominal inflection triggers SIVD to follow the bimoraicity principle. Other rules like the default rule and the OV rule also apply in this cycle. The derivation in (32) shows the interaction of phonology with morphology.

(32) a [ɒla] [ɪɪ][-Cun][-or]; [alaŋ][-Cun][-or]; [t̪hɒk][-Cun][-or] UR

Cycle I: Gender Suffixation

[ɒla+ɪɪ]	--------	---------	WFR
[ɒl+ɪɪ]	--------	---------	SFVD Rule
[ol+ɪɪ]	--------	---------	VH Rule

Cycle II: Number Suffixation

[olɪɪ+ Cun]	[alaŋ+Cun]	[t̪hok+Cun]	WFR
--------	[alaŋ+un]	--------	CD Rule
--------	--------	[t̪hok+ kun]	OG Rule

Cycle III: Case Suffixation

[olɪɪCun+or]	[alaŋun+or]	[t̪hokkun]or]	WFR
--------	--------	--------	SIVD Rule
[olɪɪkun+or]	--------	--------	D Rule
[olɪɪgun+or]	--------	--------	OV Rule
[olɪɪgunor]	[alaŋunor]	[t̪hokkunor]	PR
'of female cats''	'of lovers'	'of cheats''	

b	[ɒla][ɪɪ][-wo][-or]; [alaŋ][ɪɪ][-wo][-or]; [t̪hɒk][ɪɪ][-wo][-or]			UR
	Cycle I: Gender Suffixation			
	[ɒla+ɪɪ]	[alaŋ+ɪɪ]	[t̪hɒk+ɪɪ]	WFR
	[ɒl+ɪɪ]	--------	---------	SFVD Rule
	[ol+ɪɪ]	--------	---------	VH Rule
	Cycle II: Definiteness Suffixation			
	[olɪɪ+ wo]	[alaŋɪɪ+wo]	[t̪hokɪɪ+wo]	WFR
				no rule applies
	Cycle III: Case Suffixation			
	[olɪɪwo+or]	[alaŋɪɪwo+or]	[t̪hokɪɪwo+or]	WFR
	[olɪɪwo+r]	[alaŋɪɪwo+r]	[t̪hokɪɪwo+r]	SIVD Rule
	--------	--------	[t̪hogɪɪwo+r]	OV Rule
	[olɪɪwoor]	[alaŋɪɪwoor]	[t̪hogɪɪwoor]	PR
	'of the female cat'	'of the beloved'	'of the female cheat''	

We can see that VH does not apply after number and definiteness suffixations in spite of the presence of its environment ([[bɒl]un]$_{Pl}$'balls', [[gɒbɒ]wo]$_{Def}$ 'the wild ox'). As seen above, these suffixes are attached after gender suffix and are, therefore, attached in Cycle II. This confirms our claim that VH applies only in the first cycle of suffixation.

2.3 Compounds

Another aspect of word formation in Chakma is compounding. We have seen that derivation feeds compounding but is not fed by it as stated and illustrated in section 4.3 of Chapter IV of Bardhan (2007). For instance,

(33) i	[[pak]$_V$jɛ]$_A$	[hɛč]$_N$	[[pakjɛ]$_A$[hɛč]$_N$]$_N$
	'ripe'	'hair'	'grey haired man'
ii	[bɪlɛɪ]$_N$	[ʃokh]$_N$j a]$_A$	[[bɪlɛɪ] $_N$[ʄokhj a] $_A$]$_N$
	'cat'	'eyed'	'a name'

Compounds in turn do not undergo derivational affixation. For example, the adjectival suffix [-ja] or [-jɛ] cannot be added to the above compounds and forms like those given in (34) are wrong outputs in Chakma.

(34) i	*[[bɪlɛɪʄokhja]jɛ]	b i.	*[pakjɛhɛč+ja]
ii	*[[bɪlɛɪʄokh]ja]		*[pakjɛhɛč]jɛ]

A careful look at (33) and (34) will reveal that derivation can occur inside compounds such as [pakjɛhɛč] and [bɪlɛɪ̆jokhja] but not outside compounds as illustrated in (34). Moreover, compounding feeds the nominal inflectional suffixes like number, definiteness and case. For instance,

(35) i. $[[[pakjɛ]_A[ɦɛč]_N]_Nwo]_{Def}$ 'the grey haired man'
ii. $[[[bhɛɪ]_Nbuṭ]_Nṭun]_{Pl}$ 'nephews'
iii. $[[[haḍɪ]_N[bɪnon]_N]_Nor]_{Pos}$ 'of female dress'

Compounds, however, do not feed gender suffixation and in turn, are not fed by it. Therefore, forms such as $*[[[pakjɛ]_A[ɦɛč]_N]_NII]_F$ and $*[[[pakjɛ]_A[bur]_II]_F]_N$ are not possible. It is, thus, evident that compounding and nominal inflections belong to the same level. Compounds do not feed verbal inflections. This gives us another reason to propose that perhaps verbal inflections are at the higher level than nominal inflections. Since compounds do not feed gender suffix, we assume that it is ordered *after* gender suffix but *before* other nominal suffixes like number, definiteness and case within Level 2 as shown below:

(36)

Level 2: Nominal Inflections & Compounding
a. Gender
b. Compounding
c. Number, Definiteness
d. Case

This is something unique about Chakma (so far as our observation is concerned). We have proposed to keep compounds at the same level as nominal inflections but it seems, there is a need to have a separate level for gender and compounds with respect to other nominal inflectional suffixes.

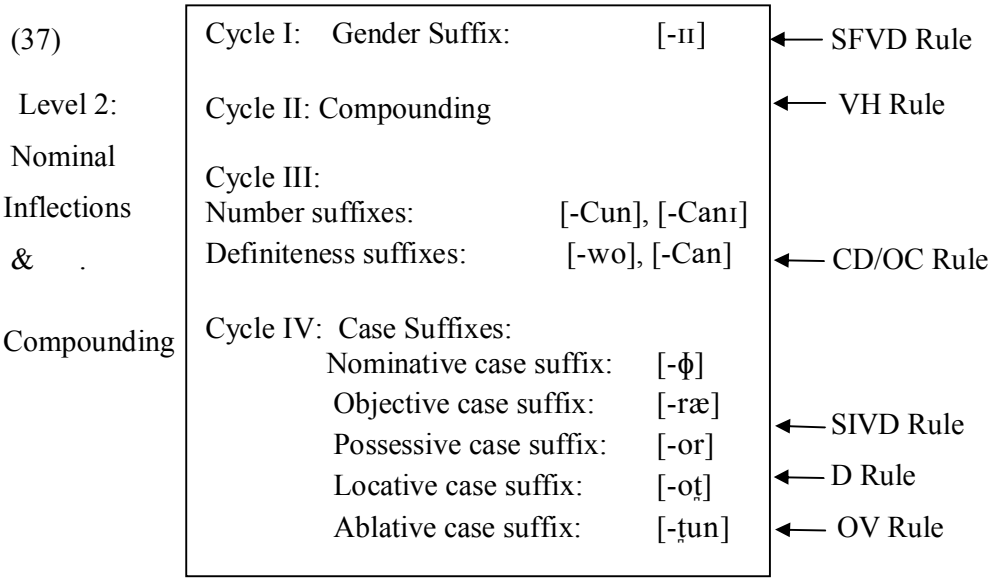
Let us now look at the phonological rules applying at this level. We have seen that only OV rule applies as a result of compounding in section 4.3 of Chapter IV of Bardhan (2007). Based on the observation of morphology-phonology interface during nominal inflection and compounding, we can now modify the representation in (31).

In (37) we show gender suffixation taking place in Cycle I and compounding in Cycle II. The number and definiteness suffixes have been assigned to Cycle III and case, to

Cycle IV. If we look at the phonological rule applications after gender suffixation, we find that in Cycle I, SFVD is followed by VH as stated earlier. In Cycle II after compounding, VH does not apply even though the environment for its application is present as discussed in section 4.3 of Chapter IV of Bardhan (2007). VH also does not apply after number, definiteness and case suffixations in Cycle III and IV as discussed in section 4.2.2, 4.2.3 and 4.2.4 of Chapter IV of Bardhan (2007). We can now account for the non-application of VH after gender suffixation by saying that these morphological operations do not take place at the first cycle of word formation where VH applies. As a result of compounding which belongs to Cycle II as shown in (37), no specific rule applies. Cycle III suffixations trigger the CD and OG rules as shown

earlier in (31). In Cycle IV, SIVD applies along with other rules like default rule and OV rule as discussed earlier.

(37)



We show the derivation in (38) to illustrate morphology-phonology interaction as shown in (37):

(38) [d̪æba][-ɪɪ][-Cun][-or]; [bhɛɪ̪][puṭ][-Cun][-or] UR

Cycle I: Gender Suffixation

[d̪æba+ɪɪ]	-------	WFR
[d̪æb+ɪɪ]	-------	SFVD Rule
[d̪ɛb+ɪɪ]	-------	VH Rule

Cycle II: Compounding

---------	[bhɛɪ̪+puṭ]	WFR

Cycle III: Number Suffixation

[d̪ɛbɪɪ+Cun]	[bhɛɪ̪puṭ+Cun]	WFR
--------	[bhɛɪ̪puṭ+ṭun]	OG Rule
---------	----------	CD Rule

Cycle IV: Case Suffixation

[d̪ɛbɪɪCun+or]	[bhɛɪ̪puṭ̪ṭun+or]	WFR
---------	----------	SIVD Rule
[d̪ɛbɪɪkun+or]	----------	D Rule
[d̪ɛbɪɪgun+or]	[bhɛɪ̪buṭ̪ṭun+or]	OV Rule
[d̪ɛbɪɪgunor]	[bhɛɪ̪buṭ̪ṭunor]	PR
'of old wives'	'of nephews'	

3 LP of Chakma

Based on the above facts of phonological rule applications, it is clear that both nominal inflection and compounding should be ordered after verbal inflection. Within nominal inflection, the gender suffix should be ordered before compounds and the other nominal suffixes such as the number, definiteness and case suffixes should be ordered after compounds as discussed above. It, therefore, appears that the LP of Chakma is ordered as follows:

(39) Level 1: Derivation

Level 2: Verbal Inflection

Level 3: Nominal Inflection (Gender)

Level 4: Compounding

Level 5: Nominal Inflection (Number, Definiteness and Case)

In (39) we have shown that the LP of Chakma comprises five levels: Level 1 consists of derivation, Level 2 consists of verbal inflection, while Level 3 consists of nominal inflection (gender), Level 4 consists of compounds and Level 5 consists of nominal inflections (number, definiteness and case) in respective order.

Since verbal inflections do not feed either derivation or nominal inflections, we can put them at Level 1 along with derivation. This would also fall in line with the phonological restrictions that exist between verbal inflection and nominal inflection. Remember, VV.V sequence is not allowed during verbal inflections but it is possible during nominal inflections.

We can also separate gender, compounds and other nominal inflections such as number, definiteness and case on the basis of morpho-phonological processes. The rule for SFVD must apply before VH in the case of gender suffixation. No other nominal inflections (or even verbal inflections) allow vowel deletion rule to apply before VH. And no other category allows stem final vowel deletion. Again, gender does not feed compounds and also is not fed by them. We can, therefore, put gender and compounds at the same level. Should we then propose that the LP of Chakma has the following hierarchical structure?

(40) Level 1: Derivation, Verbal Inflection
Level 2: Nominal Inflection (Gender), Compounding
Level 3: Nominal Inflection (Number, Definiteness and Case)

Now we find that the LP of Chakma comprises three levels. Level 1 consists of derivation and verbal inflection, Level 2 comprises gender and compounding and Level 3 comprises nominal inflections such as number, definiteness and case.

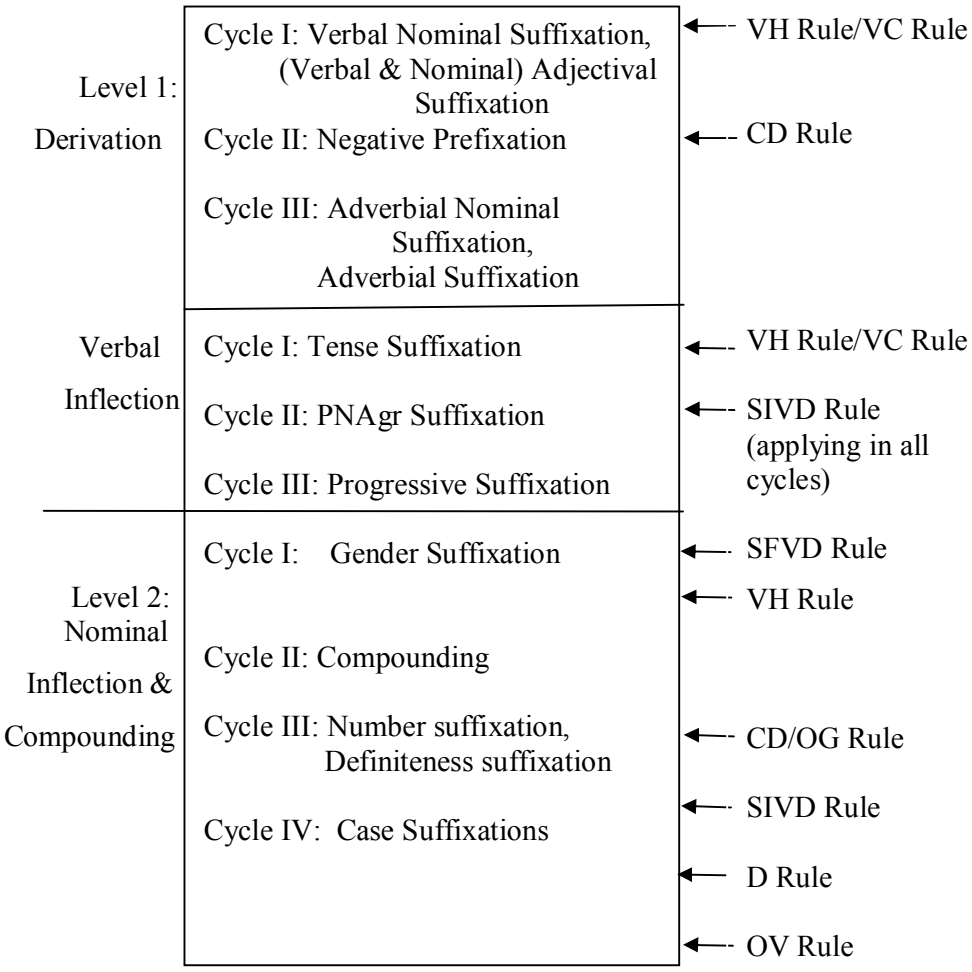
Recall that as shown in (37) (in the previous section), compounding comes within two nominal inflectional suffixes: (a) gender, and (b) number and definiteness. We have proposed another level for number, definiteness and case suffixes within Chakma Lexicon (instead of keeping them with gender and compounding at Level 2 in (40). However, that has resulted in positing three levels for inflectional suffixes (Level 1, 2 and 3). This looks somewhat odd so far as morphological operations are concerned and the proposal of three levels for one type of morphological operation (here inflection) is also not economic. Again, since the morphological rules applying other number, definiteness and case suffixations are lexical, we cannot assign number, definiteness and case suffixes at the postlexical level. Therefore, instead of creating a new lexical level we have put number, definiteness and case suffixes along with gender and compounding at Level 2 as shown in (41):

(41) Level 1: Derivation, Verbal Inflection

Level 2: Nominal Inflection, Compounding

Thus, in the LP of Chakma there are two lexical levels: Level 1 comprises derivation and verbal inflection and Level 2 comprises nominal inflection and compounding. Again, there is an ordering between nominal inflection and compounding (within Level 2), as represented in (37) in the previous section. We can now present the complete picture of the lexical module of Chakma in (42):

(42)



So far we have not established whether the levels (and the rules) as represented in (42) are lexical or postlexical. In LP lexical level precedes postlexical level. Lexical level or module comprises morphological concatenation and subsequent phonological rule applications. At the postlexical level or module lexical items are

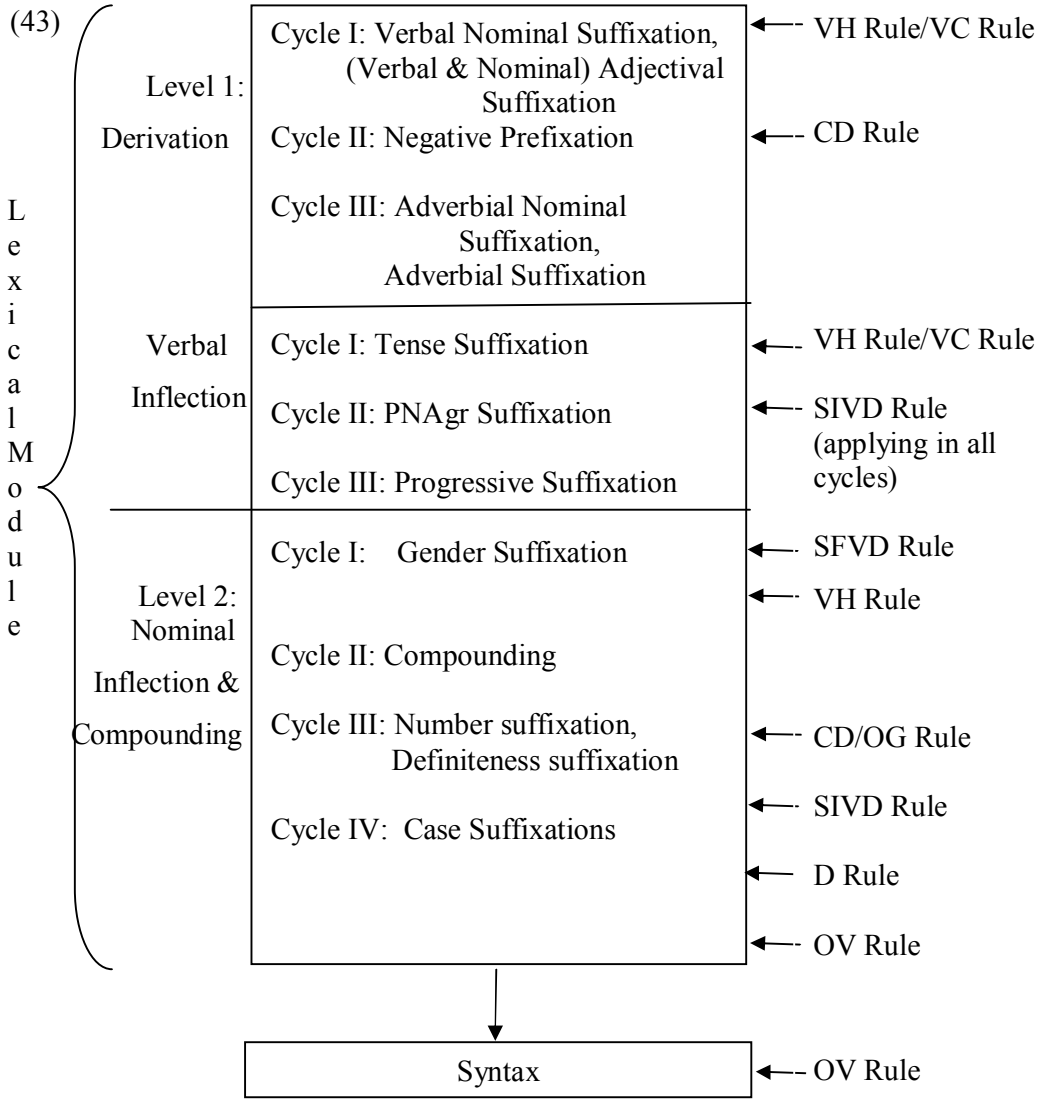
inserted into larger strings called phrase markers or syntactic structures. Lexical rules apply at the lexical level and postlexical rules apply at the postlexical level.

There are certain criteria for determining whether a phonological rule is lexical or postlexical. Lexical rules apply only in *derived environments* (Kiparsky 1973a). Postlexical rules can apply in both derived and nonderived environments whenever their structural descriptions are met and so they are not subject to *strict cycle condition* (SCC) (Kiparsky 1982, 1985). A rule applying before a lexical rule must be a lexical rule. Similarly, a rule applying a postlexical rule must be a postlexical rule. Postlexical rules can create new segment or structure and so they may not obey the principle of *structure preservation* (SP). Lexical rules may also have lexically marked exceptions, but postlexical ones apply only whenever there structural description is met.

Let us examine whether the two levels of Chakma Lexicon in (42) are lexical or not. We have seen what morphological operations and subsequent phonological rule applications take place at these levels. The phonological rules for VH, VC, SFVD, SIVD, CD, and OG, as seen above and in the previous chapters, apply only in derived environments i.e., after the affixes are attached. These rules do not apply in nonderived environments. The application of these phonological rules only in derived environments suggests that these rules are lexical rules, not postlexical rules. We find a set of specific phonological rules applying in a particular cycle. For instance, in Cycle II of Level 1 only the CD rule applies and in Cycle III of Level 2 the rules for CD and OG apply. These cycle specific rules do not apply in other cycles. We also find that the derived environment rules such as VH (and VC) are applying in the first cycle of each of the two levels after the suffixes are attached. AS discussed earlier, SIVD applies after VH (and VC) at Level 1 and SFVD applies before VH at Level 2. This observation indicates that the VH (and VC), the SIVD and SFVD rules refer to word internal structure and they are cyclic in nature. This fact also suggests that the two levels obey SCC and therefore, they are lexical, not postlexical. Similarly, the SFVD rule applies before the VH rule which is a lexical rule and so the SFVD rule must be a lexical rule. Again, the phonological rules such as VH, VC, CD and OG do not create new segment after their applications in respective levels and thus, they obey SP. Therefore, they are lexical rules in Chakma.

We also saw in section 3.3.1.1 of Chapter III of Bardhan (2007) that the application of the VC rule generated the wrong output. Instead of [d̪hɒ+ɒ], our rule generated *[d̪ha+ɒ]. This is in a way an instance of exception to the application of the VC rule. We can, therefore, say that the VC rule is a lexical rule and not a postlexical rule.

So far we have not discussed whether our OV rule is lexical or postlexical in nature. We have seen that the rule for OV applies during morphological operations if its structural description is met. In Chakma the phoneme /h/ does not contrast with its voiced counterpart /ɦ/ in the lexicon. However, we find that the voiced /ɦ/ is derived every time the rule for OV applies. (e.g., [ɒn-] prefixation to a form such as *hal* 'time' yields [ɒ[ɦal]$_N$]$_N$ 'bad time'). This is clearly a violation of the principle of SP. Similarly, the OV rule not only applies within words but also across words whenever its environment is met (e.g., *bɒrɒ pɛk* 'huge bird' is pronounced as *bɒrɒ bɛk*). We have also seen earlier that in case of number and definiteness suffixations, the default rule applies first and then OV rule applies. On the basis of that, we have already assumed that OV applies after all the lexical phonological rule applications take place as shown in (42). Since OV applies both within words and across words and also generates a new segment violating SP, we assume that OV is a postlexical rule also applying at the postlexical level of Chakma. To summarize our findings relating to the distinction between lexical and postlexical rules, we represent Chakma LP as in (43).



In (43) we show the first two levels as the lexical levels which will be followed by the postlexical level where the postlexical rule of OV will apply. In the present study, as mentioned above, we are not looking at the postlexical level of Chakma.

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