

I. INTRODUCTION

The Hill Madias are an aboriginal people group residing in the heavily forested areas of central India. The majority of them live in the Gadchiroli District of Maharashtra State, chiefly in the tehsils of Etapalli, Bhamragad and Sironcha. Significant numbers are also found in Narainpur tehsil of Bastar Dist. and Bijapur tehsil of Dantewada Dist. in Madhya Pradesh (M.P.). The phonemic analysis presented here is based on the Bhamragad dialect of the language. The data were collected by the authors while actually living in the midst of a Madia¹ community in Arewada village of Bhamragad tehsil, Gadchiroli Dist. The data were elicited from several informants during a total of seven months spent in the village. Before finalizing the analysis, the data were thoroughly checked for correct pronunciation with the main informant.

Following the terminology coined by Grigson (1938), the term “Hill Madia” has been used to refer to this people group and their language, and to distinguish them from the Bison Horn Madias of south Dantewada Dist. (earlier part of Bastar Dist.). Although Grigson used the term to refer mainly to the Madias living in the Abujhmar Hill tract of Narainpur, he has referred to the Madias of Gadchiroli (then Chanda Dist.) as belonging to the same stock.. As Grigson has done so in the title of his work, many also use the term “Madia Gonds” to refer to this people group. The implication is that the Madias constitute a sub-group of the Gonds, the generic name given to the whole family of central Dravidian tribes in this region. If however a tribe can be identified as an endogamous unit, then the authors’ own observations lead to the following conclusions:

- (a) The Hill Madia tribe is distinct from other Gond tribes or sub-tribes with whom they do not intermarry.
- (b) The Hill Madias of Gadchiroli, those of Bijapur and the Abujhmar Madias of Narainpur all belong to the same tribe.

So far two definitive linguistic descriptions of the language have been published. One is a Ph.D. dissertation by Veena (1965), describing Hill Madia phonology and morphology. Her major informant came from the Etapalli area. The other work is a description of the Abujhmaria dialect of Narainpur by Natarajan (1985). It covers phonology, morphology, clause structure and phrase structure. Since the Bhamragad dialect is very much closer to the Etapalli dialect than to the Narainpur dialect (according to a survey conducted by the authors), it is but natural that the analysis presented here closely resembles the phonological analysis carried out by Veena. The phonemic inventory listed below is identical to hers. However there are some differences in the statements

¹ The term “Madia” has also been spelt as “Maria” or “Madiya” in the anthropological and linguistic literature. Phonetically, it is pronounced as [ma:ɽja].

concerning allophonic variation and distribution. Furthermore the theoretical foundation for the present work tends to be generative rather than structural.

The following abbreviations have been used in this manuscript.

ant	anterior feature
ATR	advanced tongue root feature
c.f.	citation form
cons	consonantal feature
cont	continuant feature
cor	coronal feature
impv.	imperative
incl.	inclusive
intrans.	intransitive
lat	lateral feature
mas.	masculine gender
nas	nasal feature
non-mas.	non-masculine gender
pl.	plural
sg.	singular
son	sonorant feature
syll	syllabic feature
trans.	transitive

II. VARIATION AND CONTRAST

Table 2.1 tabulates the consonant phonemes of Hill Madia. The vowel system is outlined in Table 2.2

	<i>Labial</i>	<i>Dental/ alveolar</i>	<i>Retroflexed</i>	<i>Palatal</i>	<i>Velar</i>	<i>Glottal</i>
Stops/affricates:						
voiceless	p	t	ʈ	tʃ	k	ʔ
voiced	b	d	ɖ	dʒ	g	
Fricatives	v	s			ɣ	
Nasals	m	n			ŋ	
Flaps		r	ɽ			
Lateral		l				
Glide				j		

Table 2.1: Consonant phonemes of Hill Madia

	<i>Front unrounded</i>		<i>Central unrounded</i>		<i>Back rounded</i>	
Close	i	i:			u	u:
Half-close	e	e:			o	o:
Open			a	a:		

Table 2.2: Vowel phonemes of Hill Madia

Throughout the rest of this manuscript, the phonetic or surface forms are enclosed in square brackets [], whereas forward slashes / / are used to enclose the phonemic representations.

2.1 Notes on phonetic features and interpretation

Note that the consonant chart has been simplified by reducing the number of columns corresponding to the various points of articulation. Thus the labiodental fricative /v/ is clubbed along with the bilabial consonants in the labial column, and the palato-alveolar affricates are listed in the

same (palatal) column along with the palatal approximant /j/. Similarly, the dental stops /t/ and /d/ are listed along with the alveolar fricative and sonorants in the dental/alveolar column.

The affricates /tʃ/ and /dʒ/ are interpreted as single units mainly because the consonants [ʃ] and [ʒ] never occur independently in Hill Madia. Besides they are subject to the same gemination rule as most of the other single consonants (see Sec. 4.1)). /j/ has been interpreted as a consonant rather than a vowel; treating /j/ as a vowel would have produced vowel clusters that are not otherwise found in Madia.¹

The vowel chart shows five pairs of long and short vowels. Alternatively, one could posit the five vowel phonemes /i/, /e/, /a/, /o/, /u/ and the length phoneme /:/.

2.2 Description of phonemes

The description of each phoneme, along with its surface variants, is given below. All sounds in Hill Madia are articulated with egressive lung air.

2.2.1 Description of consonant phonemes

/p/ the voiceless bilabial stop phoneme is realized as

[pp] voiceless geminated bilabial stop occurring between two short vowels when the first vowel is stressed as in

/epa/	[¹ ɛppa]	“fish scale”
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/tʃopa/	[¹ tʃɔppa]	“corn cob”
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[p] voiceless bilabial stop occurring in all other environments as in

/pi:r/	[pi:r]	“straw”
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/pi:pa/	[¹ pi:pa]	“tin”
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/sipral/	[¹ sɪprəl]	“thin person”
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/poʔpi/	[¹ poʔpi]	“chisel”
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/va:p/	[va:p]	“froth”
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¹ There are phonetic vowel clusters associated with the consonant /ɣ/, whenever it is preceded or followed by a front vowel, e.g. [bɛkkeəɣ] “gum” which is phonemically /bekey/. The vowel [ə] occurs only as a transitional vowel. See the Vowel Insertion Rule on p. 48.

/b/ the voiced bilabial stop phoneme is realized as

[bb] voiced bilabial geminated stop occurring between two short vowels when the first vowel is stressed as in

/kabaɾ/	[¹ kəbbəɾ]	“work”
/deba/	[¹ dɛbba]	“beating”

[b] voiced bilabial stop occurring in all other environments as in

/be:s/	[be:s]	“good”
/dɛ:bla/	[¹ dɛ:bla]	“potbellied male”
/dorbe/	[¹ dɔrbe]	“chaff”
/go:bi/	[¹ go:bi]	“cabbage”
/karab/	[¹ kərrəb]	“bad”

/v/ the labiodental fricative phoneme is realized as

[vv] voiced labiodental geminated fricative occurring between two short vowels when the first vowel is stressed as in

/dʒuva/	[¹ dʒuvva]	“yoke”
/ovur/	[¹ ovvur]	“salt”

[v] voiced labiodental fricative occurring in all other environments as in

/vetʃ/	[vetʃ]	“light”
/nivʃi/	[¹ nivʃi]	“hiccup”
/ilvi/	[¹ ilvi]	“lip”
/dʒi:va/	[¹ dʒi:va]	“heart”
/kev/	[keɪv]	“ear”

/m/ the bilabial nasal phoneme is realized as

[mm] voiced bilabial geminated nasal occurring between two short vowels when the first vowel is stressed as in

/gumuɾ/	[¹ gummuɾ]	“pumpkin”
/dume/	[¹ dumme]	“necklace”

[m] voiced bilabial nasal occurring in all other environments as in

/mi:t/	[mi:t]	“you (pl.)”
/a:mtʃ/	[a:mtʃ]	“new moon”

/ermi/	[¹ ɛrmi]	“buffalo”
/emil/	[¹ e:mil]	“tortoise”
/kum/	[kum]	“stomach”

/t/ the voiceless dental stop phoneme is realized as

[t̪t̪] geminated voiceless dental stop occurring between two short vowels when the first vowel is stressed as in

/mute/	[¹ mʊt̪t̪e]	“wife”
/seta/	[¹ sɛt̪t̪a]	“corpse”

[t̪] voiceless dental stop in all other environments as in

/ti:sa/	[¹ t̪i:sa]	“bottle”
/tʃitral/	[¹ tʃit̪rɛl]	“spotted deer”
/mu:rti/	[¹ mu:r̪ti]	“ever”
/a:to/	[¹ a:t̪o]	“father’s sister”
/mat/	[mɛt̪]	“medicine”

/d/ the voiced dental stop phoneme is realized as

[d̪d̪] geminated voiced dental stop occurring between two short vowels when the first vowel is stressed, as in

/edi/	[¹ ɛd̪d̪i]	“heat; sunlight (c.f.)”
/ode/	[¹ ɔd̪d̪e]	“sorcery”

[d̪] voiced dental stop occurring in all other environments as in

/da:r/	[d̪a:r]	“lentils”
/nidra/	[¹ nɪd̪ra]	“slumber”
/du:ndi/	[¹ du:n̪d̪i]	“storm”
/a:dur/	[¹ a:d̪ur]	“hail”
/id/	[ɪd̪]	“this (non-mas)”

/s/ the alveolar grooved fricative phoneme is realized as

[ss] voiceless geminated alveolar grooved fricative occurring between two short vowels when the first vowel is stressed as in

/oso/	[¹ ɔsso]	“again”
/pisal/	[¹ pɪssəl]	“mad person”

[s] voiceless alveolar grooved fricative occurring in all other environments as in

/sop/	[sɒp]	“sapling”
/usko/	[¹ usko]	“sand”
/pɪɾse/	[¹ pɪɾse]	“bald”
/pi:se/	[¹ pi:se]	“chicken”
/tu:s/	[¹ tu:s]	“portion”

/n/ the alveolar nasal phoneme is realized as

[nn] voiced alveolar geminated nasal occurring between two short vowels when the first vowel is stressed as in

/nine/	[¹ nɪnne]	“yesterday”
/dʒona/	[¹ dʒɔnna]	“corn”

[n̪] voiced alveolar dental nasal occurring before or after a dental consonant²

/undi/	[¹ uɳ̪ɖi]	“one”
/na:ntna/	[¹ na:n̪t̪na]	“to become wet”
/udna/	[¹ uɳ̪na]	“to sit”
/vitna/	[¹ viɳ̪na]	“to run”

[ɳ] voiced alveolar retroflexed nasal occurring before or after a retroflexed stop³ as in

/konɖa/	[¹ kɔɳɖa]	“eye”
/gantʃi/	[¹ gəɳtʃi]	“bell”
/aɳna/	[¹ əɳna]	“to cook”
/paɳɖna/	[¹ pəɳɖna]	“to make”

² The case of /n/ following a dental or retroflex stop invariably occurs when the infinitive suffix {-na} is suffixed to a verb stem ending in that stop.

³ /n/ does not exhibit the retroflex allophone when it follows the retroflex flap; for example, /pa:ɾna/ “old” is realized as [pa:ɾna], not [pa:ɾɳa].

[ɲ] voiced palatal nasal occurring before a palato-alveolar consonant as in

/dɪntʃ/	[d̪ɪɲtʃ]	“water creature”
/andʒaɾ/	[ʰəɲdʒəɾ]	“ascent”

[n] voiced alveolar nasal occurring in all other environments as in

/nu:r/	[nu:r]	“hundred”
/kɒpənbaɣa/	[ˈkɒppənbəɣa]	“spider”
/ankaɾ/	[ˈɛnkəɾ]	“early”
/pa:ɾna/	[ˈpa:ɾna]	“old”
/t̪iɲne/	[ˈt̪iɲne]	“taut”
/sarne/	[ˈsərne]	“surrounded”
/neʔnal/	[ˈneʔnəl]	“nice; good”
/ri:tʃna/	[ˈri:tʃna]	“to cut”
/pu:na/	[ˈpu:na]	“new”
/pɒɣɒn/	[ˈpɒɣɒn]	“above”

/r/ the alveolar flap phoneme is realized as

[rr] voiced alveolar geminated apical flap occurring between two short vowels when the first vowel is stressed as in

/mara/	[ˈmɛrra]	“tree”
/ere/	[ˈɛrrɛ]	“goat”

[r] voiced alveolar apical flap occurring in all other environments as in

/ra:dʒal/	[ˈra:dʒəl]	“king”
/nerv/	[nɛrv]	“breadth”
/be:dʒri/	[ˈbe:dʒri]	“tomato”
/ni:re/	[ˈni:re]	“last year”
/pa:tur/	[ˈpa:t̪ur]	“thin”

/l/ the lateral approximant phoneme is realized as

[l̥] voiced alveolar geminated lateral approximant occurring between two short vowels when the first vowel is stressed as in

/ile/	[¹ il̥le]	“not”
/pila/	[¹ p̥illa]	“girl”

[l̥] voiced dental lateral approximant occurring before or after a dental consonant⁴ as in

/galti/	[¹ g̥al̥ti]	“fault”
/ʔetlam/	[¹ ʔ̥et̥l̥əm]	“upside down”
/udla/	[¹ u̥d̥la]	“for sitting”

[l̥] voiced retroflexed lateral approximant occurring before or after a retroflex stop⁵ as in

/ud̥la/	[¹ u̥d̥la]	“small”
/kḁt̥la/	[¹ k̥ə̥t̥la]	“hassle”
/ba:l̥ti/	[¹ ba:l̥ti]	“bucket”

[l̥] voiced alveolar lateral approximant occurring in all other environments as in

/la:l̥ti/	[¹ la:l̥ti]	“long”
/nulp̥e/	[¹ nulp̥e]	“evening”
/eŋl̥a/	[¹ eŋl̥a]	“tattooed spot”
/u:ɾ̥laʔ/	[¹ u:ɾ̥laʔ]	“for seeing”
/gam̥ela/	[¹ g̥amm̥ela]	“tub”
/usk̥ul/	[¹ usk̥ul]	“saliva”

/t̥/ the voiceless retroflexed stop phoneme is realized as

[t̥t̥] voiceless retroflex alveolar geminated stop occurring between two short vowels when the first vowel is stressed as in

/ḁt̥a/	[¹ ə̥t̥t̥a]	“shoulder”
/p̥it̥e/	[¹ p̥it̥t̥e]	“bird”

⁴ Instances of /l̥/ occurring before /d/ are not found in the data.

⁵ Instances of /l̥/ occurring before /d̥/ are not found in the data.

/t/ voiceless retroflex alveolar stop occurring in all other environments as in

/tʌpla/	[ˈtʌpla]	“clap”
/itʃke/	[ˈitʃke]	“brick”
/toʔtoʔ/	[ˈtoʔtoʔ]	“cattle bell”
/pi:tʰo/	[ˈpi:tʰo]	“story”
/ʔalvatʃ/	[ˈʔɛlvətʃ]	“habit”

/d/ the voiced retroflexed stop phoneme is realized as

/d̪d̪/ voiced retroflex alveolar geminated stop occurring between two short vowels when the first vowel is stressed as in

/koɖama:v/	[ˈkɔd̪d̪ɛma:v]	“antelope”
/aɖam/	[ˈɛd̪d̪ɛm]	“across; bent”

/d/ voiced retroflex alveolar stop occurring in all other environments as in

/ɖuval/	[ˈɖuvvɛl]	“tiger”
/vuɖra/	[ˈvuɖra]	“flood”
/vendʒi/	[ˈvɛndʒi]	“silver”
/ko:ɖa/	[ˈko:ɖa]	“horse”
/dand/	[d̪ɛnd̪]	“fever”

/ɽ/ the retroflex flap phoneme is realized as

[ɽ] voiced retroflex alveolar flap occurring word-medially and word-finally as in

/ɛɽdʒ/	[ɛɽdʒ]	“bear”
/bobɽe/	[ˈbɔbɽe]	“stammerer”
/ku:ɽi/	[ˈku:ɽi]	“leaf plate”
/veɽeʔ/	[ˈvɛɽeʔ]	“neck”
/ikaɽ/	[ˈik̪k̪ɽ]	“darkness”

/tʃ/ the voiceless palato-alveolar affricate phoneme is realized as

[tʃtʃ] voiceless palato-alveolar geminated affricate occurring between two short vowels when the first vowel is stressed as in

/mutʃa/ [ˈmʊtʃtʃa] “thrice”

/itʃaɾ/ [ˈɪtʃtʃɐɾ] “comb”

[tʃ] voiceless palato-alveolar affricate in all other environments as in

/tʃikla/ [ˈtʃɪkla] “slush”

/mutʃna/ [ˈmʊtʃna] “to cover”

/a:ntʃaɾ/ [ˈa:ntʃɐɾ] “woman”

/sa:tʃa/ [ˈsa:tʃa] “brick mould”

/katʃ/ [kɐtʃ] “iron”

/dʒ/ the voiced palato-alveolar affricate phoneme is realized as

[dʒdʒ] voiced palato-alveolar geminated affricate occurring between two short vowels when the first vowel is stressed as in

/mudʒo/ [ˈmʊdʒdʒo] “husband”

/ʔadʒaɾ/ [ˈʔɛdʒdʒɐɾ] “thousand”

[dʒ] voiced palato-alveolar affricate in all other environments as in

/dʒɛtʊɾ/ [ˈdʒɛttʊɾ] “stringed instrument”

/be:dʒri/ [ˈbe:dʒri] “tomato”

/bu:rdʒa/ [ˈbu:rdʒa] “fungus”

/pu:dʒaɾ/ [ˈpu:dʒɐɾ] “sorcerer”

/na:dʒ/ [ˈna:dʒ] “crack”

/j/ the palatal approximant is realized as

[jj] voiced palatal geminated central approximant occurring between two short vowels when the first vowel is stressed as in

/paja/ [ˈpɛjja] “then”

/ejjuŋ/ [ˈɛjjʊŋ] “five (non-mas.)”

[j] voiced palatal central approximant occurring in all other environments⁶ as in

/ja:jal/	[ˈja:jəl]	“mother”
/vajs/	[vəjs]	“age”
/ka:rjal/	[ˈka:rjəl]	“black”
/pi:jal/	[ˈpi:jəl]	“afternoon”
/kaj/	[kəj]	“hand”

/k/ the voiceless velar stop phoneme is realized as

[kk] voiceless velar geminated stop occurring between two short vowels when the first vowel is stressed as in

/ike/	[ˈɪkke]	“here”
/bekey/	[ˈbɛkkɛəy]	“gum”

[k] voiceless velar stop occurring in all other environments as in

/ke:ri/	[ˈke:ri]	“lower rib”
/ekva/	[ˈɛkva]	“more”
/kamka/	[ˈkəmka]	“turmeric”
/pe:kal/	[ˈpe:kəl]	“boy”
/tupak/	[ˈtʊppək]	“gun”

/g/ the voiced velar stop phoneme is realized as

[gg] voiced velar geminated stop occurring between two short vowels when the first vowel is stressed as in

/gogut/	[ˈgɔggʊt]	“cock”
/iga/	[ˈɪgga]	“right here”

[g] voiced velar stop occurring in all other environments as in

/gundral/	[ˈgʊndrəl]	“circle”
/agla/	[ˈɛgla]	“wife’s sister’s husband”
/batga/	[ˈbɛtga]	“rod”
/botiga/	[ˈbɔttɪga]	“entire”
/alag/	[ˈɛllɛg]	“different; separate”

⁶ The first example given, /ja:jal/ is the only example in the data of a word-initial /j/. Strictly speaking, even this word is rather peripheral to the Bhamragad dialect, the word /aval/ being more commonly used for one’s own

/ɣ/ the velar fricative phoneme is realized as

[x] voiceless velar fricative occurring word-medially before any voiceless phone other than [ʔ] as in

/mays/	[mæxs]	“axe”
/nayka/	[næxka]	“night”
/eypi/	[εæxpi]	“separated”
/aytana/	[εxʔəna]	“to tear (trans.)”

[ɣ] voiced velar fricative occurring in all other environments word-medially and word-finally as in

/oyve/	[ɔɣve]	“honeycomb”
/ayʔta/	[εɣʔta]	“tore (trans., non-mas.)”
/tayɣna/	[tɛɣɣna]	“to climb”
/vayoy/	[vεɣoy]	“one (mas.)”
/boy/	[boɣ]	“who”

/ŋ/ the velar nasal phoneme is realized as

[ŋ] voiced velar nasal occurring word-medially and word-finally as in

/iŋka/	[iŋka]	“also”
/eŋla/	[eŋla]	“tattooed spot”
/kiŋna/	[kiŋna]	“to become chill”
/ne:ŋiʔnan/	[ne:ŋgiʔnən]	“I am entering”
/marmi:ŋ/	[mərmi:ŋ]	“wedding”

/ʔ/ the glottal stop phoneme is realized as

[ʔ] glottal stop occurring in all environments as in

/ʔa:mur/	[ʔa:mʊr]	“death”
/aʔtʃna/	[aʔtʃna]	“to press”
/daʔa/	[d̥aʔa]	“ten”
/baʔ/	[baʔ]	“how”

In the speech of some speakers, there appears to be free variation between [ʔ] and [h] in word-initial and intervocalic environments.

2.2.2 Description of vowel phonemes

All vowels in Hill Madia are voiced.

As shown in Table 2.2 above, Hill Madia exhibits five pairs of short and long vowel phonemes. As correctly noted by Veena (1965:27), the difference between short and long vowels is not merely one of length. She remarks

The long vowels may further be analyzed as consisting of a short vowel plus /:/ length. It can be stated that the phoneme /:/ lengthens and decentralises short vowels causing high vowels to be higher, low vowels to be lower, front vowels to be farther front and back vowels to be farther back.

In addition, the authors have also noted that the phonetic realizations of the long back vowels /o:/ and /u:/ are more rounded than their short counterparts.

The description of the vowels below is followed by arguments in favour of the allophonic statements describing the short vowels.

/i/ the short close front vowel phoneme is realized as

[i] close front unrounded vowel occurring word-finally and before the glottal stop /ʔ/ as in

/tiʔtana/	[tiʔtəna]	“to feed”
/niʔtana/	[niʔtəna]	“to fill”
/eni/	[eni]	“elephant”
/mesbuʔi/	[mesbuʔi]	“wrist/ankle”

[ɪ] close front centralized unrounded vowel occurring in all other environments as in

/mokasir/	[mɔkkəsɪr]	“Gondi”
/nisand/	[nɪssənd]	“ladder”
/iŋgo/	[ɪŋgo]	“yes”

/i:/ the long close front vowel phoneme is realized as

[i:] long close front unrounded vowel occurring word-initially and word-medially as in

/i:r/	[i:r]	“small root”
/mi:n/	[mi:n]	“fish”

/siŋgardi:p/ [siŋgərɖi:p] “paradise”

/e/ the short mid front vowel phoneme⁷ is realized as

[e] half-close front unrounded vowel occurring word-finally and before the glottal stop /ʔ/ as in

/pi:se/ [pi:se] “chicken”

/palate/ [pəllət̪e] “outside”

/meʔnat/ [meʔnət̪] “labour”

[ɛ] half-open front unrounded vowel occurring in all other environments as in

/eʔat/ [ɛʔət̪] “sickle”

/pete/ [pɛt̪te] “ant”

/velvele/ [vɛlvɛle] “quickly”

/e:/ the long mid front vowel phoneme is realized as

[e:] long half-close front unrounded vowel occurring word-initially and word-medially as in

/e:ʔuŋ/ [e:ʔuŋ] “seven (non-mas.)”

/be:ke/ [be:ke] “where”

/pəʔdme:nd/ [pəʔdme:nd̪] “all day”

/a/ the short central vowel phoneme is realized as

[a] open central unrounded vowel occurring word-finally and before the glottal stop /ʔ/ as in

/aʔki/ [aʔki] “mortar”

/mandana/ [mənɖəna] “to be”

/vela/ [vɛlla] “many”

[ɐ] half-open central unrounded vowel occurring in all other environments as in

/andʒat/ [ɐndʒət̪] “ascent”

/ajtaram/ [ɐjtərəm] “Sunday”

⁷ Although phonetically, [e] is now termed as a “half-close” vowel, /e/ can best be described *phonemically* as a mid vowel in Hill Madia, especially since it has both half-close and half-open allophones. The same terminology is applied to /e:/, /o/ and /o:/.

/a:/ the long central vowel phoneme is realized as

[a:] long open central unrounded vowel occurring word initially and word-medially as in

/a:tʊm/	[a:tʊm]	“market”
/ka:l/	[ka:l]	“leg”
/e:la:t/	[e:la:t]	“younger sister”

/o/ the mid back vowel phoneme is realized as

[o] half-close back rounded vowel occurring word-finally and before the glottal stop /ʔ/ as in

/goʔu/	[goʔu]	“wheat grain”
/tamo/	[təmmo]	“younger brother”
/ga:tʊ/	[ga:tʊ]	“cooked rice”

[ɔ] half-open back rounded vowel occurring in all other environments as in

/onɔul/	[ɔnɔul]	“smoke”
/got/	[gɔt]	“friend”
/ta:doɣ/	[ta:ɔɣ]	“paternal grandfather”

/o:/ the long mid back vowel phoneme is realized as

[o:] long half-close back rounded vowel occurring word-initially and word-medially as in

/o:ɔa/	[o:ɔa]	“boat”
/dʒo:l/	[dʒo:l]	“falsehood”
/so:maram/	[so:mərəm]	“Monday”

/u/ the short high back vowel phoneme is realized as

[u] high back rounded vowel occurring word-finally and before the glottal stop /ʔ/ as in

/tuʔkna/	[tuʔkna]	“to sneeze”
/guʔju/	[guʔju]	“bamboo stick”
/adiʔku/	[əɖɖiʔku]	“therefore”

[ʊ] centralized high back rounded vowel occurring in all other environments as in

/ukuʔ/	[ʊkkuʔ]	“spoon”
/neɣundʒa:t/	[neɣʊndʒa:t]	“spleen”

/u:/ the long high back vowel phoneme is realized as

[u:] long high back rounded vowel occurring word-initially and word-medially as in

/u:tna/	[u:ṭna]	“to suck”
/pu:na/	[pu:na]	“new”
/tu:ṭana/	[tu:ṭəna]	“to winnow”

A justification for the variation of the short vowels is called for. For this purpose, the allophones [ɪ], [ɛ], [ɐ], [ɔ] and [ʊ] will be termed as the **centralized allophones**; the corresponding **decentralized allophones** are respectively [i], [e], [a], [o] and [u]. The decentralized vowels are found only word-finally and before the glottal stop. The centralized vowels are never found in these environments, but neither are the long vowels. One may therefore ask why the decentralized vowels are treated as allophones of the short vowel phonemes rather than of the long vowel phonemes. Two arguments in favour of the analysis detailed above are presented here.

- (1) A certain class of noun stems that end in a vowel take the plural suffix {-ŋ}. In the plural forms, the stem-final vowel becomes centralized. Observe the following.

Noun stem		Singular form	Plural form
/boka/	“bone”	[bɔkka]	[bɔkkəŋ]
/pete/	“ant”	[pɛṭte]	[pɛṭtɛŋ]
/a:ki/	“leaf”	[a:ki]	[a:kiŋ]
/pi:tɔ/	“story”	[pi:tɔ]	[pi:tɔŋ]
/nusu/	“termite”	[nʊssu]	[nʊssʊŋ]

This phenomenon indicates that the stem-final vowels are underlying short vowels; the centralized allophones surface when the plural suffix is attached.

- (2) From the description of consonant phonemes in Sec. 2.2.1, it is evident that all consonants except /t/, /ʎ/ and /ʀ/ are lengthened or geminated between two short vowels when the first vowel is stressed⁸. This is true when the two vowels are obviously short, being manifested as their centralized allophones.

/gamela/	[¹ gəmmɛla]	“tub”
/pisal/	[¹ pɪssəl]	“mad person”

The gemination rule (see Sec. 4.1 for a formal statement) also applies when the second vowel is decentralized word-finally or before a glottal stop.

⁸ Stress is always on the first vowel of the word in Hill Madia. See Sec. 4.1

/udiʔnan/	[ʰuddiʔnən]	“I sit”
/dɔke/	[ʰdɔkke]	“lizard”

and it does not apply when the second vowel is clearly a long vowel:

/tiri:na/	[ʰtiri:na]	“to go around”
/veli:na/	[ʰveli:na]	“to wander”

This is strong evidence for the decentralized surface vowels being variants of the short vowel phonemes rather than of the long ones.

2.3 Evidence for contrast

This section presents evidence for contrast between phonetically similar segments in analogous and identical environments. The logic in choosing the “suspect pairs” of segments is somewhat along the following lines: if contrast can be established between /t/ and /d/ which differ only in voicing, and between /d/ and /d̥/ which are only one unit apart on the scale of point of articulation, then it is unnecessary to establish contrast between /t/ and /d̥/.

2.3.1 Contrast among the labial consonants

Contrast between /p/ and /b/

/poʔa/	[pɔʔa]	“abdomen”
/boʔa/	[bɔʔa]	“thumb/big toe”
/ʔapla/	[ʔɛpla]	“clap”
/gable/	[gɛble]	“bat”
/pa:pam/	[pa:pəm]	“sin”
/ba:bal/	[ba:bəl]	“(own) father”

Contrast between /b/ and /m/

/bu:la/	[bu:la]	“feather”
/mu:la/	[mu:la]	“corner”
/dobna /	[dɔbna]	“to push”
/tomna/	[tɔmna]	“to rinse”
/kabaʔ/	[kɛbbɛʔ]	“work”
/kamar/	[kɛmmɛʔ]	“blacksmith”

Contrast between /p/ and /m/

/pe:sna/	[pe:sna]	“to come out”
/me:sna/	[me:sna]	“to sharpen”

/rupja/	[rupja]	“rupee”
/gumja/	[gumja]	“gravestone”
/ma:ɽpi/	[ma:ɽpi]	“catfish”
/taɽmi/	[t̪aɽmi]	“ember”
/va:p/	[va:p]	“froth”
/la:m/	[la:m]	“resident son-in-law”

Contrast between /b/ and /v/

/berɛy/	[berɛy]	“river”
/verɛy/	[verɛy]	“neck”
/ga:ban/	[ga:bən]	“pregnant (cattle)”
/da:vət/	[d̪a:vət]	“left”

Contrast between /m/ and /v/

/meʔtana/	[meʔtəna]	“to take for grazing”
/veʔtana/	[veʔtəna]	“to tell”
/no:mna/	[no:mna]	“to observe carefully”
/po:vna/	[po:vna]	“to be spilt/dropped”

2.3.2 Contrast among the coronal stops/affricates

Contrast between /t/ and /d/

/toʔtana/	[t̪oʔtəna]	"to show"
/doʔtana/	[d̪oʔtəna]	"to tie"
/mo:ta/	[mo:t̪a]	"burden"
/ko:da/	[ko:d̪a]	"revenge"
/mat/	[mɛt̪]	"medicine"
/vad/	[vɛd̪]	"net"

Contrast between /t/ and /dʒ/

/manʈa/	[mɛnʈa]	"burning sensation"
/manʈa/	[mɛnʈdʒa]	"pandal/shed"
/pe:tʃi/	[pe:tʃi]	"large box"
/ke:dʒi/	[ke:dʒi]	"banana"

Contrast between /tʃ/ and /dʒ/

/tʃuva/	[tʃuvva]	"well"
/dʒuva/	[dʒuvva]	"yoke"
/mintʃna/	[mɪntʃna]	"to wear on the head"
/mindʒna/	[mɪndʒna]	"to bury oneself"

/dɪntʃ/	[d̪ɪntʃ]	"water creature"
/gændʒ/	[gændʒ]	"vessel"

Contrast between /t/ and /t̪/

/u:tna/	[u:tna]	"to suck"
/u:t̪na/	[u:t̪na]	"sprouting (of tubers)"
/la:ti/	[la:t̪i]	"kick (c.f.)"
/la:t̪i/	[la:t̪i]	"long"
/tæpə/	[t̪æppe]	"father"
/təplə/	[t̪əplə]	"clap"
/bu:t/	[bu:t̪]	"daily wage of grain"
/dʊ:t/	[dʊ:t̪]	"bamboo basket"

Contrast between /d/ and /d̪/

/da:jna/	[d̪a:jna]	"to go"
/d̪a:jna/	[d̪a:jna]	"to cut"
/ko:da/	[ko:d̪a]	"revenge"
/ko:d̪a/	[ko:d̪a]	"horse"
/band/	[bænd̪]	"closed"
/dand/	[d̪ænd̪]	"fever"

Contrast between /t/ and /t̪ʃ/

/mat/	[mæt̪]	"medicine"
/matʃ/	[mæt̪ʃ]	"dew"
/vi:tna/	[vi:t̪na]	"to sow"
/ri:tʃna/	[ri:t̪ʃna]	"to cut"

Contrast between /d/ and /dʒ/

/da:r/	[d̪a:r]	"lentils"
/dʒa:ram/	[d̪ʒa:rəm]	"fisherman caste"
/da:dal/	[d̪a:d̪əl]	"older brother"
/ra:dʒal/	[ra:d̪ʒəl]	"king"
/band/	[bænd̪]	"closed"
/gændʒ/	[gænd̪ʒ]	"vessel"

Contrast between /t̪/ and /t̪ʃ/

/mut̪na/	[mut̪n̪a]	"to fall down"
/mut̪ʃna/	[mut̪ʃn̪a]	"to cover"
/dʒa:t̪a/	[d̪ʒa:t̪a]	"bean"
/sa:t̪a/	[sa:t̪ʃa]	"mould"

Contrast between /d/ and /dʒ/

/mu:nd/	[mu:nd]	"three"
/mu:ndʒ/	[mu:ndʒ]	"black monkey"
/d̪aɖe/	[d̪ɐd̪e]	"one and half"
/dʒaɖi/	[dʒɐd̪i]	"bison"
/pand̪i/	[pɐnd̪i]	"ripe fruit"
/vandʒi/	[vɐndʒi]	"rice paddy"

2.3.3 Contrast among the dental/alveolar consonants

Contrast between /t/ and /s/

/ta:r/	[t̪a:r]	"wire"
/sa:r/	[sa:r]	"furrow"
/u:t̪na/	[u:t̪na]	"to suck"
/u:sna/	[u:sna]	"to boil over"
/ba:t̪a/	[ba:t̪a]	"something"
/va:sa/	[va:sa]	"inclined beam"
/bu:t/	[bu:t̪]	"daily wage of grain"
/tu:s/	[tu:s]	"portion"

Contrast between /d/ and /n/

/deʔtana/	[deʔt̪na]	"to break with teeth"
/neʔtana/	[neʔt̪na]	"to sweep"
/va:jda/	[va:j̪da]	"tax"
/va:jna/	[va:j̪na]	"to come"
/vad/	[vɐd̪]	"net"
/van/	[vɐn]	"also"

Contrast between /d/ and /r/

/degna/	[d̪ɛgna]	"to snap"
/regna/	[rɛgna]	"to descend"
/a:ɖur/	[a:ɖ̪ur]	"hail"
/a:ruŋ/	[a:ruŋ]	"six (non-mas.)"

Contrast between /d/ and /l/

/deʔtana/	[deʔt̪na]	"to break with teeth"
/leʔtana/	[leʔt̪na]	"to untie"
/a:ɖi/	[a:ɖ̪i]	"large flat stone"
/a:li/	[a:li]	"thought"

/me:ndud/	[me:nduḍ]	"pregnant (woman)"
/me:ndul/	[me:nduḷ]	"body"

Contrast between /r/ and /l/

/ra:ji/	[ra:ji]	"pillar"
/la:ji/	[la:ji]	"large red ant"
/pa:re/	[pa:re]	"early"
/pa:le/	[pa:le]	"plough crossbar"
/nu:r/	[nu:r]	"hundred"
/nu:l/	[nu:l]	"thread"

Contrast between /n/ and /r/

/nima/	[nimma]	"you (sg.)"
/rima/	[rimma]	"faintness; intoxication"
/pu:na/	[pu:na]	"new"
/pu:ra/	[pu:ra]	"complete"
/lo:n/	[lo:n]	"house"
/bo:r/	[bo:r]	"who (mas. pl.)"

Contrast between /n/ and /l/

/neʔtana/	[neʔtəna]	"to sweep"
/leʔtana/	[leʔtəna]	"to untie"
/a:ni/	[a:ni]	"and"
/a:li/	[a:li]	"thought"
/udkan/	[uḍkən]	"I will sit"
/udkal/	[uḍkəl]	"we (incl.) will sit"

2.3.4 Other contrasts in the coronal group

Contrast between /d/ and /ɽ/

/paɖa/	[pəḍɖa]	"female calf"
/paɽa/	[pəɽa]	"nursery"
/ke:d/	[ke:d]	"banana"
/ve:ɽ/	[ve:ɽ]	"time"

Contrast between /r/ and /ɽ/

/ku:ri/	[ku:ri]	"hoof (c.f.)"
/ku:ɽi/	[ku:ɽi]	"leaf plate (c.f.)"
/ve:r/	[ve:r]	"these (mas.)"
/ve:ɽ/	[ve:ɽ]	"time"

/ɪrki/	[ɪrki]	"charcoal (c.f.)"
/iɾka/	[iɾka]	"cucumber"

Contrast between /l/ and /ɾ/

/o:lna/	[o:lna]	"to shake (trans.)"
/o:ɾna/	[o:ɾna]	"to spread for drying"
/kali:na/	[kɐli:na]	"to meet"
/kaɾi:na/	[kɐɾi:na]	"to rot"
/pa:l/	[pa:l]	"milk"
/pa:ɾ/	[pa:ɾ]	"fallow"

Contrast between /s/ and /tʃ/

/siʃi/	[sɪʃi]	"whistle"
/tʃiʃi/	[tʃɪʃi]	"letter; vote"
/ka:sna/	[ka:sna]	"to get hot"
/ka:tʃna/	[ka:tʃna]	"to roar"
/be:s/	[be:s]	"good"
/ve:tʃ/	[ve:tʃ]	"light"

2.3.5 Contrast among the back consonants

Contrast between /k/ and /g/

/ko:ʈul/	[ko:ʈul]	"enmity"
/go:ʈul/	[go:ʈul]	"community shed"
/bu:ka/	[bu:ka]	"hole"
/bu:ga/	[bu:ga]	"gill"
/ka:ŋka/	[ka:ŋka]	"sweat"
/na:ŋga/	[na:ŋga]	"some time ago"

Contrast between /k/ and /ɣ/

/ta:kna/	[ʈa:kna]	"to walk"
/va:ɣna/	[va:ɣna]	"to sing"
/pa:k/	[pa:k]	"stack of sheaves"
/ma:ɣ/	[ma:ɣ]	"bamboo mat"

Contrast between /g/ and /ɣ/

/d̪aɣi/	[d̪ɛɣgi]	"heap"
/kaɣi/	[kɛɣɔi]	"plough crossbar (c.f.)"
/ba:gna/	[ba:gna]	"to become tired"
/va:ɣna/	[va:ɣna]	"to sing"

/alag/	[ɛllɛg]	"different; separate"
/taloy/	[tɛllɔy]	"mother"

Contrast between /g/ and /ŋ/

/ba:gna/	[ba:gna]	"to become tired"
/va:ŋna/	[va:ŋna]	"to leak"
/dɔrgna/	[dɔrgna]	"to roll"
/ɔrŋna/	[ɔrŋna]	"to break off"
/alag/	[ɛllɛg]	"different; separate"
/pilang/	[pɪllɛŋ]	"pregnant (dog/pig)"

Contrast between /y/ and /ŋ/

/va:yna/	[va:yna]	"to sing"
/va:ŋna/	[va:ŋna]	"to leak"
/taloy/	[tɛllɔy]	"mother"
/moloŋ/	[mɔllɔŋ]	"nails"

Contrast between /k/ and /ʔ/

/paka/	[pɛkka]	"thoroughly"
/paʔa/	[paʔa]	"break apart (impv. sg.)"
/kemen/	[kɛmmɛn]	"silent"
/ʔemil/	[ʔɛmmɪl]	"kind of greens"
/kiɾkta/	[kiɾkta]	"got dislocated (sg.)"
/piɾʔta/	[piɾʔta]	"fried (non-mas. sg.)"

Contrast between /g/ and /ʔ/

/ga:jta/	[ga:jta]	"Madia"
/ʔa:jna/	[ʔa:jna]	"to die"
/gogur/	[gɔggur]	"cock"
/goʔu/	[goʔu]	"grain of wheat"
/dɔrgta/	[dɔrgta]	"rolled (non-mas. sg.)"
/piɾʔta/	[piɾʔta]	"fried (non-mas. sg.)"

Contrast between /y/ and /ʔ/

/veytana/	[vɛɛxtɛna]	"to growl"
/veʔtana/	[vɛʔtɛna]	"to tell"
/boyu/	[boyu]	"who (c.f.)"
/goʔu/	[goʔu]	"grain of wheat"

2.3.6 Contrast among the nasals

Contrast between /m/ and /n/

/ma:ɣ/	[ma:ɣ]	"mat"
/na:ɣ/	[na:ɣ]	"village; place"
/dobma/	[dɔ̃bma]	"don't push"
/dobna/	[dɔ̃bna]	"to push"
/dʒoma/	[dʒɔ̃mma]	"curry with blood"
/dʒona/	[dʒɔ̃nna]	"corn"
/dʒamem/	[dʒɔ̃mmem]	"suitable"
/kemen/	[kɛmmen]	"silent"

Contrast between /n/ and /ŋ/

/inka/	[ɪnka]	"yet"
/iŋka/	[iŋka]	"also"
/ma:nval/	[ma:nvəl]	"man"
/la:ŋval/	[la:ŋvəl]	"one (mas.) who jumps"
/mi:n/	[mi:n]	"fish"
/marmi:ŋ/	[mərmi:ŋ]	"wedding"

Contrast between /m/ and /ŋ/

/no:msɔr/	[no:msɔr]	"carefully observing"
/po:ŋsɔr/	[po:ŋsɔr]	"flowing"
/ɛrɪmɔɣ/	[ɛrɪmɔɣ]	"wife's elder brother"
/pɪrɪŋɔɣ/	[pɪrɪŋɔɣ]	"pulled (mas. sg.)"
/katam/	[kəttəm]	"completely"
/kotan/	[kɔttən]	"money"

2.3.7 Vowel length contrast

Contrast between /i/ and /i:/

/iɾsna/	[iɾsna]	"to chop"
/i:ɾsna/	[i:ɾsna]	"to drag"
/pɪtɛ/	[pɪtɛ]	"bird"
/pi:tɔ/	[pi:tɔ]	"story"

Contrast between /e/ and /e:/

/ɛrka/	[ɛrka]	"knowledge"
/e:rki/	[e:rki]	"sheaf"

/kere/	[kɛrre]	"parrot"
/ke:ri/	[ke:ri]	"lower rib"

Contrast between /a/ and /a:/

/ata/	[ɐ̃t̪ta]	"she/it went"
/a:ta/	[a:t̪ta]	"she/it became"
/kal/	[kɛl]	"liquor"
/ka:l/	[ka:l]	"leg"

Contrast between /o/ and /o:/

/olna/	[ɔlna]	"to bend (head)"
/o:lna/	[o:lna]	"to shake (trans.)"
/koɣ/	[kɔɣ]	"fowl"
/ko:y/	[ko:y]	"horn"

Contrast between /u/ and /u:/

/usna/	[ʊsna]	"to grind"
/u:sna/	[u:sna]	"to boil over"
/mundʒ/	[mʊndʒ]	"forehead"
/mu:ndʒ/	[mu:ndʒ]	"black monkey"

2.3.8 Contrast among front and central vowels

Contrast between /i/ and /e/

/irk/	[ɪrk]	"mohua flowers"
/erk/	[ɛrk]	"pair"
/vitʃa/	[vitʃtʃa]	"mischief"
/vetʃa/	[vetʃtʃa]	"pond"
/pa:ri/	[pa:ri]	"child's father-in-law"
/pa:re/	[pa:re]	"early"

Contrast between /i:/ and /e:/

/vi:sna/	[vi:sna]	"to thresh"
/ve:sna/	[ve:sna]	"to lay (roofing)"

Contrast between /e/ and /a/

/eʔtʃna/	[eʔtʃna]	"to sift"
/aʔtʃna/	[aʔtʃna]	"to press"
/kel/	[kɛl]	"hair (sg.)"
/kal/	[kɛl]	"liquor"

/ga:re/	[ga:re]	"wheel"
/ga:ra/	[ga:ra]	"mohua fruit"

Contrast between /e:/ and /a:/

/e:ni/	[e:ni]	"elephant"
/a:ni/	[a:ni]	"and"
/pe:tʃi/	[pe:tʃi]	"trunk"
/pa:tʃi/	[pa:tʃi]	"horizontal beam"

2.3.9 Contrast among central and back vowels

Contrast between /a/ and /o/

/aɣjana/	[ɐɣəjəna]	"to tear (intrans.)"
/oɣjana/	[oɣəjəna]	"to toast"
/paʔtana/	[paʔtəna]	"to break apart"
/poʔtana/	[poʔtəna]	"to throw away"

Contrast between /a:/ and /o:/

/a:jna/	[a:jna]	"to become/happen"
/o:jna/	[o:jna]	"to take away"
/ka:kaɫ/	[ka:kəɫ]	"father's younger brother"
/ko:kaɫ/	[ko:kəɫ]	"spouse's younger sister"

Contrast between /o/ and /u/

/a:lo/	[a:lo]	"not enough"
/a:lu/	[a:lu]	"potato"
/oŋɖul/	[oŋɖul]	"smoke"
/uŋɖalaʔ/	[uŋɖəlaʔ]	"for drinking"
/tonɖa/	[tɔŋɖa]	"creeper"
/tunɖna/	[tɔŋɖna]	"to stick (intrans.)"

Contrast between /o:/ and /u:/

/o:tana/	[o:təna]	"to itch"
/u:tana/	[u:təna]	"to give to drink"
/ko:tul/	[ko:tul]	"enmity"
/ku:tal/	[ku:təl]	"lame person"

III. DISTRIBUTION

3.1 Distribution of individual phonemes

The descriptions of the phonemes in Sec. 2.2.1 (for consonants) and Sec. 2.2.2 (for vowels) also give evidence for their distribution. As can be seen from these sections, all consonants occur in word-medial and word-final position. All consonants except /t/, /y/ and /ŋ/ occur word-initially. Short vowels occur in all positions, whereas long vowels do not occur word-finally and immediately preceding the glottal stop.

3.2 Clusters

Phonemic vowel clusters are absent in Hill Madia. Word-initial consonant clusters are also absent.¹ Consonant clusters however are found in word-medial and word-final position.

3.2.1 Two-consonant clusters

The permissible two-consonant clusters are listed in Table 3.1. The vertical axis represents the first member of a cluster, and the horizontal axis represents the second member of a cluster. Permissible clusters within a morpheme are marked with |, while forbidden clusters are unmarked. Clusters that only occur across morpheme boundaries are marked by ?. In the examples shown below, the morpheme boundaries are marked by hyphens to demonstrate clusters that are formed only across morpheme boundaries. All words are written phonemically.

Word-medially

pt	ʔoptundɳa	“to hug”
pr	sipral	“thin person”
pɽ	papɽem	“groaning”
pj	rupja	“rupee”
pl	ɽapla	“clap”
p-k	ke:p-kan	“I will wait”
p-m	ke:p-ma	“don’t wait”

¹ It is worth noting that Veena (1965:46) has presented two examples of word-initial consonant clusters. The authors view both these words as incorrectly transcribed. The words are /peɣke/ "behind" and /teɣina/ "to open", which Veena has written as /pjaʔke/* and /tjaɣina/* respectively. Because of the Vowel Insertion Rule (see Sec. 4.1), the surface forms of the words are [pɽəxke] and [tɽəɣəɳna] respectively, and it is easy to see how the error in transcription would have crept in.

	p	b	t	d	t̥	d̥	tʃ	dʒ	k	g	ʔ	v	s	ɣ	m	n	ŋ	r	ɾ	l	j
p			∣						?			?	?		?	?		∣	∣	∣	∣
b			?						?			?	?		?	?		∣	∣	∣	
t			?						?			?	?		?	?		∣		∣	
d			?						?			∣	?		?	?		∣			?
t̥	∣		?						∣			?	?		∣	?				∣	
d̥																		∣		∣	
tʃ			?				?		?			?	?		?	?					?
dʒ			?										?			?		∣			?
k			?								∣	∣	?		?	∣		∣	∣	∣	
g			?						?			?	?		?	?			∣	∣	
ʔ	∣		?		∣		?		∣			?			?	∣					
v			?		∣							?	∣		?	?			∣		?
s		∣	∣			∣			∣			?	?		∣	?		∣			?
ɣ	∣		?				?		∣			∣	∣		∣	?	∣			?	∣
m	∣		?		?		∣		∣			?	?		?	∣		∣		?	∣
n		∣	?	∣	∣	∣	∣	∣	∣			∣			?						
ŋ			?	?					∣	∣		?	?		∣					∣	
r	∣	∣	∣	∣			?	∣	∣			∣	∣		∣	∣	∣			∣	∣
ɾ	∣	∣	?	∣			?	∣	∣	∣		∣	∣		∣	∣	∣			?	∣
l	∣	∣	∣		∣				∣			∣	∣		?	?	∣			?	
j	∣	∣	∣	∣					∣			∣	∣		?	∣				?	

Table 3.1: Two consonant clusters in Hill Madia

p-n	ke:p-na	“to wait”
p-s	ke:p-sor	“waiting”
p-v	ke:p-val	“one (mas.) who waits”

tr	tʃitral	“spotted deer”
tl	ʔetlam	“upside down”
t-t	vit-ta	“ran (non-mas.)”
t-k	vit-kan	“I will run”
t-m	vit-ma	“don’t run”
t-n	vit-na	“to run”
t-s	vat-sor	“drying (intrans.)”
t-v	vit-val	“one (mas.) who runs”
tp	tʃatpit	“quickly”
tk	itʃke	“brick”
tm	aʃmut	“crumpled”
tl	katla	“hassle”
t-t	aʃ-ta	“cooked (non-mas.)”
t-n	aʃ-na	“to cook”
t-s	aʃ-sor	“cooking”
t-v	aʃ-val	“one (mas.) who cooks”
tʃ-t	mutʃ-ta	“covered (non-mas.)”
tʃ-tʃ	tatʃ-tʃor	“bringing”
tʃ-k	mutʃ-kan	“I will cover”
tʃ-m	ri:tʃ-ma	“don’t cut”
tʃ-n	ri:tʃ-na	“to cut”
tʃ-s	mutʃ-sor	“covering”
tʃ-v	mutʃ-val	“one (mas.) who covers”
tʃ-l	mutʃ-laʔ	“for covering”
kʔ	gokʔa	“spear”
kn	dʒa:kni	“lid”

kr	akra	“eleven”
kɾ	takɾi	“scales”
kv	ekva	“more”
kl	tʃikla	“slush”
k-t	ta:k-ta	“walked (non-mas.)”
k-m	pe:k-ma	“don’t pick”
k-s	ta:k-sor	“walking”
ʔp	poʔpi	“chisel”
ʔt	toʔtoʔ	“cattle bell”
ʔk	aʔki	“mortar”
ʔn	neʔnal	“nice”
ʔ-t	niʔ-tana	“to fill”
ʔ-tʃ	veʔ-tʃor	“telling”
ʔ-m	veʔ-ma	“don’t tell”
ʔ-v	veʔ-val	“one (mas.) who tells”
br	da:bri	“small portion of field”
bɾ	bobɾe	“stammerer”
bl	gable	“bat”
b-t	dob-ta	“pushed (non-mas.)”
b-k	dob-kan	“I will push”
b-m	dob-ma	“don’t push”
b-n	dob-na	“to push”
b-s	dob-sor	“pushing”
b-v	dob-val	“one (mas.) who pushes”
dr	idram	“like this”
dv	sidva	“tax”
d-t	ud-ta	“sat (non-mas.)”

d-k	ud-kan	“I will sit”
d-m	ud-ma	“don’t sit”
d-n	te:d-na	“to rise”
d-s	ud-sor	“sitting”
d-l	ud-la	“for sitting”
ɖɾ	ɡuɖɾa	“hillock”
ɖʌ	uɖʌ	“small”
dʒɾ	be:dʒɾi	“tomato”
dʒ-t	odʒ-ta	“was suitable (non-mas.)”
dʒ-n	odʒ-na	“to be suitable”
dʒ-s	odʒ-sor	“being suitable”
dʒ-l	odʒ-laʔ	“for being suitable”
ɡɾ	dʒagɾam	“fight”
ɡl	agla	“co-brother”
ɡ-t	deg-ta	“snapped”
ɡ-k	reg-kan	“I will descend”
ɡ-m	reg-ma	“don’t descend”
ɡ-n	deg-na	“to snap into two”
ɡ-s	ba:ɡ-sor	“getting tired”
ɡ-v	reg-val	“one (mas.) who descends”
mp	pampe	“stammerer”
mtʃ	umtʃna	“to wipe”
mk	kamka	“turmeric”
mn	dʒamne	“slowly”
mr	tumri	“tendu tree”
mj	ɡumja	“burial stone”

m-t	vam-ta	“sold (non-mas.)”
m-t̥	ki:m-t̥u	“you (pl.) do!”
m-m	vam-ma	“don’t sell”
m-s	vam-sor	“selling”
m-v	vam-val	“one (mas.) who sells”
m-l	vam-laʔ	“for selling”
ntʃ	kantʃur	“skillet”
nʈ	ganʈi	“bell”
nk	mankal	“man”
nb	kopanbaya	“spider”
nd	binde	“pot”
ndʒ	indʒake	“now”
nd̥	pind̥i	“flour”
nv	ma:nval	“man”
n-t	man-ta	“is (non-mas.)”
n-m	tin-ma	“don’t eat”
ŋk	iŋka	“also”
ŋg	iŋgo	“yes”
ŋn	t̥iŋne	“taut”
ŋl	eŋla	“tattooed spot”
ŋ-t	ne:ŋ-ta	“entered (non-mas.)”
ŋ-d	po:ŋ-du	“had been flowing”
ŋ-s	ne:ŋ-sor	“entering”
ŋ-v	ne:ŋ-val	“one (mas.) who enters”
rp	irpi	“mohua flower (c.f.)”
rt	mu:rti	“ever”
rk	erka	“knowledge”

rb	dorbe	“chaff”
rd	girda	“joy”
rdʒ	bu:rdʒa	“fungus”
rm	kurma	“menstruation”
rn	sarne	“around”
rŋ	kirŋindu	“had been getting cold (non-mas.)”
rs	irsa	“twice”
rv	irvur	“two (mas.)”
rj	aɾjul	“chest”
rl	sirlekonɖa	“squint eye”
r-tʃ	te:r-tʃor	“quarrelling”
ɾp	ma:ɾpi	“catfish”
ɾk	iɾka	“cucumber”
ɾb	baɾbaɾ	“slipping”
ɾd	gaɾda	“cave”
ɾdʒ	eɾdʒu	“bear (c.f.)”
ɾg	baɾga	“rod”
ɾm	taɾmi	“ember”
ɾn	pa:ɾna	“old”
ɾŋ	daɾŋindu	“had been getting cool (non-mas.)”
ɾs	piɾse	“bald”
ɾv	koɾvundʒ	“fat”
ɾj	toɾjo	“mud”
ɾ-t	maɾ-tana	“to fold”
ɾ-tʃ	piɾ-tʃor	“frying”
ɾ-l	u:ɾ-laʔ	“for seeing”
vɿ	nivɿi	“hiccough”
vɿ	pa:vɿa	“spade”

vs	pa:vsɪ	“kitchen knife”
v-t	kav-ta	“laughed (non-mas.)”
v-m	kav-ma	“don’t laugh”
v-n	av-na	“to spoil (intrans.)”
v-v	kav-val	“one (mas.) who laughs”
v-j	piv-jana	“to be extinguished”
st	pustak	“book”
sk	uskul	“saliva”
sb	mesbuṭi	“wrist/ankle”
sq ²	kisqaba	“matchbox”
sm	usmal	“pestle”
sr	visrul	“fishing net”
s-n	vi:s-na	“to thresh”
s-s	ra:s-sor	“writing”
s-v	ra:s-val	“one (mas.) who writes”
s-l	ra:s-laʔ	“for writing”
ʏp	oʏpal	“iguana”
ʏk	peʏke	“back; behind”
ʏs	kaysindu	“had been playing (non-mas.)”
ʏv	oʏve	“honeycomb”
ʏŋ	tayŋindu	“had been climbing (non-mas.)”
ʏj	eʏjaṭi	“husband’s brother’s wife”
ʏ-t	veʏ-tana	“to growl”
ʏ-tʃ	ka:ʏ-tʃor	“teaching”
ʏ-m	ka:ʏ-ma	“don't teach”

² This may not be a valid consonant cluster since the example given here appears to be a compound word (from *kis* “fire” and *qaba* “box”) and there is no other occurrence of this cluster in the data.

y-n	a:y-na	“to cool down”
y-l	a:y-laʔ	“for cooling”
jp	pajpaʈ	“anklet”
jt	kojtoy	“man”
jk	kajkaʈi	“gall bladder”
jb	bujbuŋ	“peanut”
jd	ojdul	“stove”
jn	majna	“month”
jv	ejvur	“five (mas.)”
j-m	a:j-ma	“don’t be”
j-l	da:j-laʔ	“for going”
lp	nulpe	“evening”
lt	galti	“fault”
lʈ	ba:lʈi	“bucket”
lk	ʔalkaʈi	“greedy person”
lb	kalbanda	“memorial stone”
ls	a:lsem	“late”
lv	ilvi	“lip”
lj	ka:lʈindu	“had been getting contaminated”
l-m	qol-ma	“don’t die”
l-n	qol-na	“to die”
l-l	qol-laʔ	“for dying”

Word-finally, only the following CC clusters are found:

mtʃ	a:mtʃ	"new moon"
ntʃ	dintʃ	"water creature"
nd	band	"closed"
ndʒ	mundʒ	"forehead"

nd	rend	"two (non-mas.)"
rp	irp	"mohua flower"
rk	erk	"pair"
rv	nerv	"breadth"
rm	arm	"fall (impv.)"
ɾd	poɾd	"sun"
ɾdʒ	eɾdʒ	"bear"
ɾn	iɾn	"below"
ɾs	oɾs	"descent"
sk	a:-sk	"women"
ɣm	koɣm	"ceremonial flour"
ɣs	maɣs	"axe"
ls	mals	"returning"
js	vajs	"age"
jv	va:jv	"sharp"
ɾ-k	goguɾ-k	"cocks"
ɾ-ŋ	guɾ-ŋ	"bamboo sticks"
l-k	kutul-k	"stools"

The following general observations can be made about the two-consonant clusters

- (1) The stops (other than the glottal stop which is a special case) occur least frequently in the clusters. Only three clusters have both members as stops within morphemes.
- (2) The sonorants tend to dominate in clusters, whether as first or second member. The fricatives are less dominant, but more so than the stops. Among the sonorants, the three liquids especially form large numbers of clusters.

The above observations are true of most languages. The following peculiarities are observed particularly in Hill Madia:

- (1) /ɣ/ never occurs as the second member of a cluster; /ʔ/ is found as second member only with /k/ as first member; /ŋ/ is found as second member only with one of the flaps as first member.
- (2) /tʃ/ never occurs as the first member of a cluster except across a morpheme boundary. It occurs as second member only with a nasal as first member (within morphemes).

- (3) The voiced stops generally do not occur as second member when an obstruent is the first member. The only exceptions are /sb/ and /sd/, the latter being a doubtful case (see footnote on page 32).
- (4) Many verbal suffixes begin with /t/, /k/, /v/, /s/, /m/, /n/ or /l/. One of these segments then becomes the second member of a cluster when the relevant suffix is affixed to a verb root ending in a consonant.

3.2.2 Three-consonant clusters

The following three consonant clusters occur in the data. One example is given for each. Morpheme boundaries are marked by hyphens whenever they occur within clusters.

Word-medially,

t-nd	vat-ndu	“had been drying (non-mas.)”
ʔtʃ-t	uʔtʃ-ta	“scraped (non-mas.)”
ʔtʃ-k	uʔtʃ-kan	“I will scrape”
ʔtʃ-m	uʔtʃ-ma	“don’t scrape”
ʔtʃ-n	muʔtʃ-na	“to bark”
ʔtʃ-s	uʔtʃ-sor	“scraping”
ʔtʃ-v	uʔtʃ-val	“one (mas.) who scrapes”
ʔtʃ-l	uʔtʃ-laʔ	“for scraping”
ʔk-t	naʔk-ta	“opened (eyes)”
ʔk-m	koʔk-ma	“don’t hammer”
ʔk-n	tuʔk-na	“to sneeze”
ʔk-s	naʔk-sor	“opening (eyes)”
ʔk-v	koʔk-val	“one (mas.) who hammers”
ʔk-l	koʔk-laʔ	“for hammering”
ʔ-nd	teʔ-ndu	“had been raising (non-mas.)”
vk-t	ʔavk-ta	“killed (non-mas.)”
vk-k	ʔavk-kan	“I will kill”
vk-v	ʔavk-val	“killer (mas.)”

vk-s	ʔavk-sor	“killing”
vk-m	ʔavk-ma	“don’t kill”
vk-n	ʔavk-na	“to kill”
vk-l	ʔavk-laʔ	“for killing”
v-nd	kav-ndu	“had been laughing (non-mas.)”
sk-t	kask-ta	“bit (non-mas.)”
sk-k	usk-kan	“I will spit”
sk-v	kask-val	“one (mas.) who bites”
sk-s	kask-sor	“biting”
sk-m	kask-ma	“don’t bite”
sk-n	usk-na	“to spit”
sk-l	kask-laʔ	“for biting”
ysk	eysk-iʔta	“smells (non-mas.)”
yk-t	meyk-ta	“hardened (non-mas.)”
yk-k	ʔeyk-kan	“I will get stuck”
yk-v	teyk-val	“one (mas.) who rises”
yk-s	ʔeyk-sor	“getting stuck”
yk-m	ʔeyk-ma	“don’t get stuck”
yk-n	ʔeyk-na	“to get stuck”
ʔʔ-t	ayʔ-ta	“tore (trans. non-mas.)”
ys-t	kays-ta	“played (non-mas.)”
ys-k	kays-kan	“I will play”
ys-v	kays-val	“one (mas.) who plays”
ys-s	kays-sor	“playing”
ys-m	oys-ma	“don’t plant”
ys-n	oys-na	“to plant”
ys-l	kays-laʔ	“for playing”
ʔ-nd	tey-ndu	“had been opening (non-mas.)”

ʏŋ-t	tayŋ-ta	“climbed (non-mas.)”
ʏŋ-k	tayŋ-kan	“I will climb”
ʏŋ-v	tayŋ-val	“one who climbs”
ʏŋ-s	tayŋ-sor	“climbing”
ʏŋ-m	tayŋ-ma	“don’t climb”
ʏŋ-n	tayŋ-na	“to climb”
ʏŋ-l	tayŋ-la?	“for climbing”
mtʃ-t	umtʃ-ta	“wiped”
mtʃ-k	umtʃ-kan	“I will wipe”
mtʃ-m	umtʃ-ma	“don’t wipe”
mtʃ-n	umtʃ-na	“to wipe”
mtʃ-s	umtʃ-sor	“wiping”
mtʃ-v	umtʃ-val	“one (mas.) who wipes”
mtʃ-l	umtʃ-la?	“for wiping”
ndʀ	gundʀal	“circle”
nt-n	na:nt-na	“to become wet”
nt-l	na:nt-la?	“for getting wet”
nd-k	e:nd-kan	“I will dance”
nd-m	e:nd-ma	“don’t dance”
nd-n	nind-na	“to fill up (intrans.)”
nd-v	e:nd-val	“one (mas.) who dances”
nd-l	e:nd-la?	“for dancing”
nt-t	va:nt-ta	“distributed (non-mas.)”
nt-k	na:nt-kan	“I will swim”
nt-m	va:nt-ma	“don’t distribute”
nt-n	mont-na	“to spring up”
nt-v	va:nt-val	“one (mas.) who distributes”
nt-s	va:nt-sor	“distributing”

nt-l	va:nt-laʔ	“for distributing”
nd-t	vend-ta	“crossed (non-mas.)”
nd-k	vend-kan	“I will cross”
nd-v	pand-val	“one (mas.) who makes”
nd-s	pand-sor	“making”
nd-l	pand-laʔ	“for making”
nd-m	pand-ma	“don’t make”
nd-n	pu:nd-na	“to drive/chase”
ntʃ-tʃ	mintʃ-tʃor	“putting on head”
ntʃ-k	mintʃ-kan	“I will put on my head”
ntʃ-m	mintʃ-ma	“don’t put on the head”
ntʃ-n	mintʃ-na	“to put on the head”
ntʃ-v	mintʃ-val	“one (mas.) who adorns the head”
ntʃ-l	mintʃ-laʔ	“for putting on the head”
ndʒ-ta	mindʒ-ta	“buried oneself (non-mas.)”
ndʒ-tʃ	mindʒ-tʃor	“burying oneself”
ndʒ-k	undʒ-kan	“I will sleep”
ndʒ-m	undʒ-ma	“don’t sleep”
ndʒ-n	undʒ-na	“to sleep”
ndʒ-v	undʒ-val	“one (mas.) who sleeps”
ndʒ-s	gundʒ-sor	“pulling”
ndʒ-l	undʒ-laʔ	“for sleeping”
rk-n	arkne	“flat”
rsk	tarsk-iʔta	“digs with fingers/claws (non-mas.)”
rɲg	irɲgam	“chillness”
rk-t	park-ta	“searched (non-mas.)”
rk-k	park-kan	“I will search”
rk-v	park-val	“one (mas.) who searches”
rk-s	park-sor	“searching”

rk-m	park-ma	“don’t search”
rk-l	park-la?	“for searching”
rg-t	dʒarg-ta	“moved (intrans. non-mas.)”
rg-k	dʒarg-kan	“I will move (intrans.)”
rg-m	dʒarg-ma	“don’t move (intrans.)”
rg-n	dʒarg-na	“to move (intrans.)”
rg-v	dʒarg-val	“one (mas.) who moves (intrans.)”
rg-s	dʒarg-sor	“moving (intrans.)”
rg-l	dʒarg-la?	“for moving (intrans.)”
rv-t	karv-ta	“got burnt (non-mas.)”
rv-k	arv-kan	“I will read”
rv-v	arv-val	“one (mas.) who reads”
rv-s	karv-sor	“burning”
rv-m	arv-ma	“don’t read”
rv-n	arv-na	“to read/study”
rv-l	arv-la?	“for reading”
rs-t	bers-ta	“grew up (non-mas.)”
rs-k	pors-kan	“I will vomit”
rs-v	pors-val	“one (mas.) who vomits”
rs-s	pors-sor	“vomitting”
rs-m	pors-ma	“don’t vomit”
rs-n	bers-na	“to grow up”
rs-l	bers-la?	“for growing up”
r-nd	te:r-ndu	“had been quarrelling (non-mas.)”
rŋ-t	kirŋ-ta	“cold (non-mas.)”
rŋ-k	kirŋ-kan	“I will get cold”
rŋ-n	kirŋ-na	“to become cold”
rŋ-s	kirŋ-sor	“getting cold”
rŋ-l	kirŋ-la?	“for getting cold”

ɾpn	neɾpnoy	“middle (relative, mas.)”
ɾmt	eɾmtoy	“wife’s elder brother; younger sister’s husband”
ɾnd	muɾnd-iʔta	“sinks (non-mas. intrans.)”
ɾndʒ	guɾndʒ-indu	“had been thundering”
ɾŋg	loɾŋga	“wolf”
ɾp-t	eɾp-ta	“smoothened (non-mas.)”
ɾp-k	eɾp-kan	“I will smoothen”
ɾp-v	eɾp-val	“one (mas.) who smoothen”
ɾp-s	eɾp-sor	“smoothening”
ɾp-m	eɾp-ma	“don’t smoothen”
ɾp-l	eɾp-laʔ	“for smoothening”
ɾd-m	poɾd-me:nd	“all day”
ɾk-t	vaɾk-ta	“spoke (non-mas.)”
ɾk-k	vaɾk-kan	“I will speak”
ɾk-v	vaɾk-val	“one (mas.) who speaks”
ɾk-s	vaɾk-sor	“speaking”
ɾk-m	vaɾk-ma	“don’t speak”
ɾk-n	uɾk-na	“to urinate”
ɾk-l	vaɾk-laʔ	“for speaking”
ɾg-t	doɾg-ta	“rolled (intrans. non-mas.)”
ɾg-k	doɾg-kan	“I will roll (intrans.)”
ɾg-v	doɾg-val	“one (mas.) who rolls (intrans.)”
ɾg-s	doɾg-sor	“rolling (intrans.)”
ɾg-m	doɾg-ma	“don’t roll (intrans.)”
ɾg-n	doɾg-na	“to roll (intrans.)”
ɾg-l	doɾg-laʔ	“for rolling”
ɾʔ-t	piɾʔ-ta	“fried (non-mas.)”
ɾs-t	viɾs-ta	“left (non-mas.)”
ɾs-k	viɾs-kan	“I will leave”
ɾs-v	viɾs-val	“one (mas.) who leaves”

ʃs-s	viʃs-sor	“leaving”
ʃs-m	viʃs-ma	“don’t leave”
ʃs-n	viʃs-na	“to leave”
ʃs-l	viʃs-laʔ	“for leaving”
ʃnd	aʃndu	“had been crying (non-mas.)”
ʃŋ-t	daʃŋ-ta	“cool”
ʃŋ-s	daʃŋ-sor	“getting cool”
ʃŋ-n	piʃŋ-na	“to pull”
ʃŋ-l	daʃŋ-laʔ	“for getting cool”
lp-t	ka:lp-ta	“mixed (non-mas.)”
lp-k	ka:lp-kan	“I will mix”
lp-v	ka:lp-val	“one (mas.) who mixes”
lp-s	ka:lp-sor	“mixing”
lp-m	ka:lp-ma	“don’t mix”
lp-n	ka:lp-na	“to mix”
lp-l	ka:lp-laʔ	“for mixing”
lk-t	ta:lk-ta	“asked (non-mas.)”
lk-k	ta:lk-kan	“I will ask”
lk-v	ta:lk-val	“one (mas.) who asks”
lk-s	ta:lk-sor	“asking”
lk-m	ta:lk-ma	“don’t ask”
lk-n	pe:lk-na	“to defecate”
lk-l	ta:lk-laʔ	“for asking”
lg-t	dalg-ta	“felt”
lg-k	ulg-kan	“I will groan”
lg-v	ulg-val	“one (mas.) who groans”
lg-s	ulg-sor	“groaning”
lg-m	ulg-ma	“don’t groan”
lg-n	ulg-na	“to groan”

lg-l	ulg-laʔ	“for groaning”
ls-t	gels-ta	“won (non-mas.)”
ls-k	gels-kan	“I will win”
ls-v	gels-val	“one (mas.) who wins”
ls-s	gels-sor	“winning”
ls-m	gels-ma	“don’t win”
ls-n	gels-na	“to win”
ls-l	gels-laʔ	“for winning”
l-nd	nal-ndu	“had been beating (non-mas.)”
lɣ-t	ka:lɣ-ta	“got contaminated”
lɣ-s	ka:lɣ-sor	“being contaminated”
lɣ-n	ka:lɣ-na	“to get contaminated”
lɣ-l	ka:lɣ-laʔ	“for getting contaminated”
jɣg	ajɣge	“together”
j-nd	poj-ndu	“had been catching (non-mas.)”

Word-finally,

ʀndʒ	vaʀndʒ	“finger/toe”
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It can be seen that the vast majority of three consonant clusters occur across morpheme boundaries in verbs. Generally such clusters are formed when a verbal suffix that begins with a consonant is affixed to a verb stem ending in a two-consonant cluster. In all such cases, the first member of the cluster is the glottal stop, a fricative or a sonorant. No other stop occurs in this position. A few clusters are formed when one of the imperfect suffixes (such as {-ndu}) is affixed to a verb stem ending in a single consonant.

In the only word-final three-consonant cluster found, the structure is as expected: the first member is a liquid (most sonorant), the second member a nasal (less sonorant) and the third member an affricate (least sonorant).

3.2.3 Four-consonant clusters:

All four-consonant clusters occur word-medially with a morpheme boundary intervening.

ysk-t	eysk-ta	“smelt (intrans. non-mas.)”
ysk-k	eysk-kan	“I will smell (intrans.)”
ysk-v	eysk-val	“one (mas.) who smells (intrans.)”
ysk-s	eysk-sor	“smelling (intrans.)”
ysk-n	eysk-na	“to smell (intrans.)”
ysk-l	eysk-laʔ	“for smelling (intrans.)”
rʔ-nd	arʔ-ndu	“had been weaving (non-mas.)”
rsk-t	tarsk-ta	“dug with fingers (non-mas.)”
rsk-k	tarsk-kan	“I will dig (with fingers)”
rsk-v	tarsk-val	“one (mas.) who digs/scratches”
rsk-s	tarsk-sor	“digging with fingers”
rsk-m	tarsk-ma	“don’t dig/scratch”
rsk-n	tarsk-na	“to dig with fingers”
rsk-l	tarsk-laʔ	“for digging with fingers”
ʔʔ-nd	piʔʔ-ndu	“had been frying (non-mas.)”
ʔnd-t	muʔnd-ta	“sank (non-mas.)”
ʔnd-k	muʔnd-kan	“I will sink”
ʔnd-v	muʔnd-val	“one (mas.) who sinks (intrans.)”
ʔnd-s	muʔnd-sor	“sinking (intrans.)”
ʔnd-m	muʔnd-ma	“don’t sink”
ʔnd-n	muʔnd-na	“to sink (intrans.)”
ʔnd-l	muʔnd-laʔ	“for sinking (intrans.)”
ʔndʒ-t	guʔndʒ-ta	“thundered”
ʔndʒ-tʃ	guʔndʒ-tʃor	“thundering”
ʔndʒ-n	guʔndʒ-na	“to thunder”
ʔndʒ-l	guʔndʒ-laʔ	“for thundering”

With only two exceptions (*rʔ*-nd and *ɾʔ*-nd), all cases involve a suffix beginning with a consonant attached to a verb root with a final three-consonant cluster. In all these cases, the first consonant is a flap or velar fricative, the second consonant is /s/ or /n/, while the third consonant is a stop or affricate. This follows the expected progression from most sonorant to least sonorant. It seems that the velar fricative behaves like a sonorant. Another fact that bears this out can be seen by examining the word-final two-consonant clusters in Sec. 3.2.1 and the morpheme-final two-consonant clusters in Sec. 3.2.2. The general pattern is that the first member of the cluster is more sonorant than the second (the order of sonority from greatest to least being glide > liquid > nasal > voiced fricative > voiceless fricative > voiced stop > voiceless stop). This would imply that /ɣ/ is more sonorant than /s/, /m/ and /ŋ/, i.e. it seems to rank among the liquids rather than the fricatives in the sonority hierarchy. In her description of Muria Gondi, a language closely related to Hill Madia, Andres (1982) has termed this sound as a uvular “scrape” or trill. By the same logic, the glottal stop seems to be more sonorant than the other voiceless stops, since clusters of the glottal stop and another voiceless stop occur morpheme-finally.

3.3 Notes on syllable structure

It is apparent that consonants and consonant clusters that appear word-initially may also comprise syllable onsets. Those that occur word-finally (or even stem-finally) may also comprise syllable codas. From Sec. 3.2, it is evident that consonant clusters do not occur word-initially, whereas clusters of upto three consonants may occur word-finally (or stem-finally). This gives rise to the following possible syllable types. One monosyllabic word is given as evidence of each.

V	/o/	particle used in calling a person
CV	/ma/	“our” (shortened form of /ma:va/)
CVC	/kis/	“fire”
CVCC	/mays/	“axe”
CVCCC	/poɾndʒ/	“female chicken”
VC	/id/	“this (non-mas)”
VCC	/eɾdʒ/	“bear”
VCCC	/iɾndʒ/	“fingernail/toenail”

Based on the data presented in Sec. 3.2, the following constraints on the syllable constituents can be posited.

- (1) The onset is optional, and may consist of a single consonant only. Any consonant other than /ŋ/, /ɣ/ or /ʀ/ is permitted.
- (2) The nucleus is mandatory and can only consist of a single vowel. This may be any of the ten vowels of Hill Madia. However the vowel cannot be long if it is word-final or immediately preceding the glottal stop.
- (3) The coda is optional and may consist of one, two or three consonants.
 - (a) If the coda is a single consonant, any of the 21 consonants is permitted.
 - (b) If the coda has two consonants, the first consonant may not be the velar nasal or a stop other than the glottal stop. Assuming that the velar fricative has the feature [+sonorant] and the glottal stop is more sonorous than the other voiceless stops, the second consonant must be lower in sonority than the first. In addition, there are the following more specific constraints:
 - (i) The fricatives /s/ or /v/ may only be followed by /k/.
 - (ii) The nasal /m/ may only be followed by /tʃ/ but the nasal /n/ may be followed by any stop or affricate.
 - (iii) The glottal stop may only be followed by /tʃ/ or /k/.
 - (iv) A liquid may not precede a dental or retroflex stop (but there is one instance of /d/ following /ʀ/ in the data).
 - (v) The continuant /j/ may only be followed by a fricative (/s/ or /v/).

The constraint (iv) on liquids actually allows for many more possible clusters than are actually found in the data. But a more exact specification would be quite cumbersome and hence has been avoided.
- (a) Triconsonantal codas are restricted to the following four clusters: ʀnd, ʀndʒ, ɣsk and rsk. Thus the constraint may be stated as follows. The first consonant is a non-lateral liquid. If preceded by the retroflex flap, the second consonant is the alveolar nasal, which is followed by a voiced stop; otherwise the second consonant is the alveolar grooved fricative followed by the velar voiceless stop.

IV. POSTLEXICAL PHONOLOGICAL RULES

The phonological description presented here would be incomplete without reference to the phonological rules that give the final phonetic shape to the utterances. Following the model of lexical phonology as proposed by Mohanan (1986), the phonological rules are of two types (or two levels): lexical and postlexical. The lexical level consists of one or more strata; at each stratum, particular morphological rules (of affixation) apply, followed by appropriate phonological rules at that stratum. The output is then fed to the next stratum, if there is one. A discussion of the lexical level is avoided here, since such a discussion can only be included in a morphological description of the language. The output of the lexical component is then subject to **postlexical phonological rules**. These rules apply wherever their structural description is met, without exception. They make no reference to the morphology and may even apply across word-boundaries. The postlexical rules of Hill Madia presented below account for all the allophonic variations described in Sec. 2.2. In addition they also account for some other phonological processes (such as insertion and deletion) that take place at the postlexical level.

Generative phonology makes use of **distinctive phonetic features**. Each feature is binary-valued (+ or -). These features are well-known and therefore need not be listed here. A summary however may be found in the appendix.

4.1 Statement of rules

The following rules apply in Hill Madia (Bhamragad dialect).

- (1) **Stress Assignment (SA) Rule:** The first syllable of every word carries stress. It is the vowel that is marked for stress.

$$[+ \text{syll}] ? \left| \begin{array}{l} + \text{syll} \\ + \text{stress} \end{array} \right| / \# ([-\text{syll}]) ______$$

The round brackets enclose an optional word-initial consonant. # denotes a word boundary. It is important to mention that when two words are joined together to form a compound word, the stress is on the first syllable of *each component* of the word. For example, when /kis/ “fire” is joined to /d̪aba/ “box” to form the compound word /kisd̪aba/ “matchbox”, both the first and second syllables are stressed. This can be accounted for if the output of the compounding process is marked as /kis/#/d̪aba/. In this sense, the SA Rule may not be strictly postlexical, but it is the last rule to be applied at the lexical level. It has been included in this discussion as stress is an important conditioning factor for one of the postlexical rules below.

(2) **Stop Insertion (SI) Rule:** If the velar nasal /ŋ/ is followed by a vowel, then the voiced velar stop [g] is inserted between the two. The rule may be formalized as follows

$$\Phi > \begin{array}{|l} - \text{cont} \\ - \text{nas} \\ + \text{back} \\ + \text{voice} \end{array} / \begin{array}{|l} - \text{cont} \\ + \text{nas} \\ + \text{back} \end{array} \text{ — } [+ \text{syll}]$$

The symbol Φ depicts a null segment which becomes the segment [g] (i.e. insertion) in between the velar nasal and a vowel.

Examples: Consider the case of the present tense morpheme {-iʔ} and first person plural morpheme {-nom} being suffixed to the verb stem {ne:ŋ} “enter”.

Output of lexical component: /ne:ŋ/iʔ/nom/ “we enter”

Application of SI Rule: [ne:ŋgiʔnɔm]

Consider also the case of the negation morpheme {-o} followed by the non-masculine null morpheme suffixed to the verb stem {va:ŋ} "leak"

Output of lexical component: /va:ŋ/o/ "it does not leak"

Application of SI Rule: [va:ŋgo]

(3) **Consonant Gemination (CG) or Lengthening Rule:** Any consonant other than the glottal stop, the velar fricative and the retroflex flap is geminated or lengthened between two short vowels when the first vowel is stressed. The rule may be formalized as follows:

$$\Phi > \begin{array}{|l} - \text{syll} \\ - \text{constricted} \\ \alpha F \end{array} / \begin{array}{|l} + \text{syll} \\ + \text{stress} \\ - \text{long} \end{array} \begin{array}{|l} - \text{syll} \\ - \text{constricted} \\ \alpha F \\ \text{except} \\ + \text{son} \\ - \text{nas} \\ - \text{ant} \\ + \text{cons} \end{array} \text{ — } \begin{array}{|l} + \text{syll} \\ - \text{long} \end{array}$$

In the above formalization, the feature [- constricted] excludes the glottal stop only. To symbolize gemination (or copying), the notation “ αF ” has been used to denote the whole set of distinctive features of the consonant being geminated. The features [+ son, - nas, - ant, + cons] are used to define the two exceptions, i.e. /ɣ/ and /ɽ/, the non-anterior liquids. It has been mentioned earlier, in Sec. 3.2.3 and in Sec. 3.3, that the velar fricative behaves like a liquid in Hill Madia. In Hill Madia, the stress always falls on the first vowel (or syllable) of a word. As an example of how the rule applies *within a morpheme*, consider

#/pɪt̪e/ “bird”

Application of SA Rule: /'pɪt̪e/

Application of CG Rule: [pɪt̪t̪e]

As an example of how the rule applies *across a morpheme boundary*, consider the affixation of the imperative singular suffix to the verb stem {ud} “sit”:

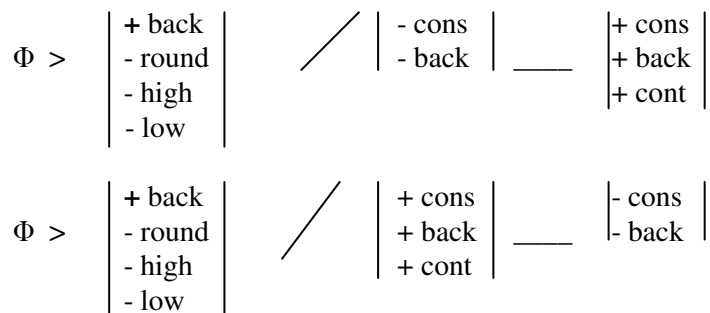
Output of lexical component: #/ud//a/ “sit! (impv. sg.)”

Application of SA Rule: /'uda/

Application of CG Rule: [ˈuɖɖa]

The conditions for the application of the CG rule are frequently met in the generation of *citation forms*. In Hill Madia, every consonant-final noun or demonstrative has a citation form which is used whenever the word is pronounced in isolation or given particular focus in a discourse. The citation form is generated by attaching either /u/ or /i/ at the end of the word; there are two classes of nouns, those that take /u/ and those that take /i/. The CG rule applies to monosyllabic nouns and demonstratives. For example, the citation forms of {kis} "fire", {vad} "net" and {av} "those (non-mas.)" surface [ˈkɪssu], [ˈvəɖɖi] and [ˈɛvvu] respectively after the addition of the appropriate vowel in each case.

- (4) **Vowel Insertion (VI) Rule:** When a front vowel or glide precedes or follows the velar fricative, a transitional schwa [ə] is inserted between the two. The data show that the only front vowel that precedes /ɣ/ is /e/ and the only one that follows it is /i/; the glide /j/ may also follow /ɣ/.



The feature [- cons] includes the glides, unlike the feature [+ syll] which excludes them.

The rule may apply within a morpheme or across a morpheme boundary. Consider the single morpheme word {berɛɣ} "river".

Output of lexical component: /berɛɣ/ "river"

Application of VI Rule: [berɛəɣ]

The VI Rule also applies in citation forms generated by adding the vowel /i/ to nouns ending in /ɣ/. Thus the citation form of {berɛɣ} surfaces as [berɛəɣəi].

As an example of how both parts of the above rule apply across morpheme boundaries, consider the formation of the infinitive form of the verb {teɣ} “open (trans.)”. When the infinitive suffix {-na} is attached to the verb stem, another suffix which Veena (1965) calls the “classificatory suffix” appears between the verb stem and the infinitive suffix (this is a lexical property of some verb stems).

Output of lexical component: /teɣ//ja//na/ “to open (trans.)”

Application of VI Rule: [tɛəɣəjəna]

- (5) **Velar Fricative Devoicing (VFD) Rule:** The velar fricative (which is voiced in the underlying forms) becomes voiceless when it precedes a voiceless consonant other than the glottal stop.

$$\left| \begin{array}{l} + \text{ cons} \\ + \text{ back} \\ + \text{ cont} \end{array} \right| \quad ? \quad [-\text{voice}] \quad / \quad ___ \quad \left| \begin{array}{l} - \text{ voice} \\ - \text{ constricted} \end{array} \right|$$

As examples of application within a morpheme, consider

/oɣpal/ [oxpəl] “iguana”

/peɣke/ [pɛəxke] “behind”

/mays/ [mɛxs] “axe”

As an example of application across a morpheme boundary, consider the attachment of the continuous suffix {-sor} to the verb stem {ka:ɣ} “teach”. A lexical rule changes the form of the continuous suffix to /tʃor/.

Output of lexical component: /ka:ɣ//tʃor/ “teaching”

Application of VFD Rule: [ka:xtʃɔr]

- (6) **Coronal Assimilation (CA) Rule:** The coronal nasal /n/ or the lateral /l/, if preceded or followed by a coronal obstruent, assimilates to the point of articulation of that obstruent. The dental, alveolar, retroflex and palato-alveolar segments share the feature [+ coronal].

$$\left| \begin{array}{l} + \text{ cor} \\ + \text{ nas} \\ \text{OR} \\ + \text{ lat} \end{array} \right| > \quad [\alpha \text{ P of A}] \quad / \quad ___ \quad \left| \begin{array}{l} + \text{ cor} \\ - \text{ son} \\ \alpha \text{ P of A} \end{array} \right|$$

$$/ \quad \left| \begin{array}{l} + \text{ cor} \\ - \text{ son} \\ \alpha \text{ P of A} \end{array} \right| \quad ___$$

The feature [P of A] refers to the point of articulation. As an example of how the rule applies within a morpheme, consider

/ud]a/ [ʊd]a “small”

Several more examples can be found on pages 7-9.

As an example of how the rule applies across a morpheme boundary, consider the attachment of the continuous suffix {-sor} to the verb stem {tin} “eat”. There is a lexical rule that changes the initial /s/ in the suffix to /dʒ/ so that

Output of lexical component: /tin//dʒor/ “eating”

Application of CA Rule: [tɪndʒor]

If the same verb stem is followed by the imperative plural suffix {-tu},

Output of lexical component: /tin//tu/ "eat! (impv. pl.)"

Application of CA Rule: [tɪntu]

(7) **Vowel Tensing (VT) Rule:** Before discussing this rule, it is necessary to clarify some of the phoneme symbols used, especially the vowel symbols. For example, the vowel /e/ has two allophones, [ɛ] and [e], which are in complementary distribution (see Sec. 2.2.2). Of the two, the former is far more common, while the latter is much more restricted. Some would say that it would be more appropriate to symbolize the phoneme as /ɛ/. Nevertheless, for the sake of convenience, and also to highlight the contrast between the short and long vowel phonemes, the symbol /e/ has been chosen. The same is true of the other short vowels. It is clear from Sec. 2.2.2 that each of the five short vowels has two allophones, which were described as “centralized” and “decentralized”. The terms “lax” and “tense” have also been used respectively for these two qualities. The feature [ATR] or “advanced tongue root” is used to make this distinction (see Harms, 1977). The lax vowels [ɪ], [ɛ], [ɐ], [ɔ], [ʊ] carry the feature [-ATR], while their tense counterparts [i], [e], [a], [o], [u] carry the feature [+ATR]. It is important to understand that all the short vowels of Hill Madia are [-ATR] (i.e. lax) by default. Thus, unless the VT Rule applies, /e/ is by default realized as [ɛ]. The VT Rule makes a short vowel tense if it occurs word-finally or immediately preceding the glottal stop.

$$\left| \begin{array}{l} + \text{syll} \\ - \text{long} \end{array} \right| \quad ? \quad [+ \text{ATR}] \quad / \quad ___ \# \\ / \quad ___ \quad [+ \text{constricted}]$$

For example,

/beske/	[beske]	“when”
/poʔpi/	[poʔpi]	“chisel”
/putju/	[putju]	"worm"
/uʔtana/	[uʔtəna]	"to keep for cooking"

4.2 Crucial orderings

Of the above rules, the Stress Assignment Rule must apply before Consonant Gemination. If the former is the last rule to apply lexically, then this is automatically taken care of..

It is also crucial for Stop Insertion to apply before Consonant Gemination. One can see the possible outcome if the rules were to apply in reverse order. Consider the attachment of the third person non-masculine singular suffix {-iʔta} to the verb stem {beŋ} “crawl”

Output of lexical component: /beŋ//iʔta/ “crawls (non-mas.)”

Application of CG Rule: [beŋŋiʔta]

Application of SI Rule: [beŋŋgiʔta]*

The result is an unacceptable form. The correct surface form [beŋgiʔta] is obtained only if the CG Rule is applied after the SI Rule.

Output of lexical component: /beŋ//iʔta/ “crawls (non-mas.)”

Application of SI Rule: [beŋgiʔta]

Since the conditions for the CG Rule are not met ([ŋ] is no longer intervocalic), it does not apply, and the correct surface form is obtained.

Of course, one can avoid this necessity, by specifying the velar nasal as an exception to the CG Rule along with the velar fricative and retroflex flap. But this is an avoidable complication of the rule. On the one hand, the velar fricative and retroflex flap constitute a natural class of non-anterior liquids; on the other hand, the rule clearly applies to the other nasals. So the authors consider it appropriate to maintain the simplicity of the rule and specify the mandatory ordering of Stop Insertion before Consonant Gemination.

There are no other crucial orderings among the postlexical rules.

APPENDIX: DISTINCTIVE FEATURES

The following distinctive features are used for formulating the phonological rules. Each is binary-valued:

- [ATR] an acronym for “Advanced Tongue Root”. The centralized or lax vowels [ɪ], [ɛ], [ɐ], [ɔ], [ʊ] are [-ATR], while their tense or decentralized counterparts [i], [e], [a], [o], [u] are [+ATR].
- [anterior] abbreviated as [ant]. Sounds produced with an obstruction in front of the palato-alveolar region are [+ant]. The retroflex sounds are considered as [-ant].
- [back] Back sounds are produced by retracting the body of the tongue from the neutral position. This includes all velar, uvular and glottal consonants, the central and back vowels.
- [consonantal] abbreviated as [cons]. Sounds that are produced with an obstruction greater than that made for the high vowels are all [+cons]. The vowels, glides, [h] and [ʔ] are all [-cons]. All other consonants are [+cons].
- [constricted] Involves constriction of the vocal cords. The glottal stop and all glottalized sounds are [+constricted].
- [continuant] abbreviated as [cont]. A continuant is produced without blocking entirely the air flow through the mouth – thus excluding stops and nasals which are [-cont].
- [coronal] abbreviated as [cor]. Coronal sounds are produced with the tongue blade raised above its neutral position. All consonants articulated with the tongue tip or tongue blade are [+cor]. All others are [-cor].
- [high] High sounds are produced by raising the body of the tongue above the neutral position. Palato-alveolar and velar consonants and the close vowels are [+high].
- [lateral] Lateral sounds are produced with the sides of the tongue lowered, enabling a lateral airstream.
- [long] Long sounds are produced over an extended duration.
- [low] Low sounds are produced by lowering the body of the tongue below the neutral position. The open vowels and pharyngeal consonants are [+low]. The half-close and half-open vowels are both [-high] and [-low].
- [nasal] abbreviated as [nas]. Nasal sounds are produced with a lowered velum that allows the air to escape through the nose. Includes all nasal consonants and nasalized vowels.

- [sonorant] abbreviated as [son]. Sonorants are produced with a vocal tract configuration that permits spontaneous voicing of the vocal folds. Vowels, glides, liquids and nasals are [+son].
- [stress] Vowels that carry stress have the feature [+stress].
- [syllabic] abbreviated as [syll]. Vowels are [+syll], consonants are [-syll].
- [voice] Voiced sounds are those which involve vibration of the vocal chords.

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