

A PHONOLOGY OF THE ORYA LANGUAGE

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Fonologi bahasa Orya

Bahasa Orya digunakan oleh sekitar 1600 penutur yang berada di Kecamatan Urunum-Guay, Kabupaten Jayapura, Propinsi Irian Jaya, Indonesia. Bahasa Orya merupakan salah satu tipe khusus dari bahasa-bahasa Non-Austronesia karena bahasa ini mempunyai banyak akhiran yang ditambahkan pada kata kerja dan akar kata-kata benda. Satu ciri yang menarik dari bahasa ini, yaitu terdapat banyaknya perubahan suara yang terjadi baik pada akar kata maupun pada imbuhan apabila ditempatkan dalam lingkungan yang berbeda. Contohnya:

- Huruf /l/ berubah menjadi huruf [r] apabila ada huruf vokal frontal (*i, a, æ*) atau konsonan frontal (*t, d, s, z, j, n, l, y*) yang mendahuluinya. Jadi, kata *il* diucapkan [ir], dan kata *tlanak* diucapkan [tranak].
- Huruf konsonan /g/ hilang lenyap apabila mengikuti satu akar suku kata tunggal, kalau suku kata itu tidak berakhir dengan huruf konsonan. Jadi, huruf konsonan /g/ pada kata *wě-gun* hilang ketika diucapkan.
- Keharmonisan huruf vokal menambah banyak perubahan yang kompleks. Dalam kata *wě-gun* di atas, keharmonisan huruf vokal merubah pengucapan huruf vokal pertama untuk lebih dekat menyesuaikan dengan tingginya huruf vokal kedua. Kata itu diucapkan [weⁱun].

Oleh sebab itu perubahan-perubahan seperti ini dapat bersatu, kata-kata yang sebenarnya beraturan menurut jadinya dapat berbunyi seperti tidak beraturan.

/hla-gul-n/	see her	/hla-ta-n/	see him
→ /hlauln/			
→ /hla ^u ln/			
→ /hla ^u n/			
→ [hlā ^u n]		[hlátān]	

1. INTRODUCTION

The Orya language is spoken by approximately 1600 people in the Indonesian province of Irian Jaya. Most of these people live in the Unurum-Guay district (Kecamatan), 44 nautical miles west of

the major provincial airport, Sentani. There are four larger population groupings within this district: Guryad (which includes the village of Guay), Garusa, Beneik and Santosa, and seven smaller settlements. Orya speakers also live in two villages in the neighbouring Lereh district, and one in the Bonggo district.

Government records and Voorhoeve (1971:51, 1975:40) list the name of this language as Uria. Local speakers, however, call their language Orya, after the village of the same name in the Lereh district where legends say they originated. They also sometimes call themselves Yap Zi 'interior people' and refer to their language as Yap Zi Ol, 'the language of the interior people'. The dialect of Orya described in this paper is that of Guay, where linguistic analysis began in June 1984.

Orya is a Non-Austronesian language within the Tor-Lake Plain Stock (Wurm & Hattori 1981).² This group also includes Sause, Mander and Berik. Of these, Berik (described by Peter and Sue Westrum 1975) appears historically to be the closest, with a cognate count, calculated on basic vocabulary, of 45%.³ The cognate similarity between Orya and Sause is only 10%, and between Orya and Mander, 26%.⁴ Oesterwal (1961) claims that the Berik people migrated from what is now the Orya speaking area, and the Orya and Berik legends would support the idea.⁵ Commercial and geographical contact now, however, is with the Sause and Mander groups, and some Orya are bilingual in Sause.

This analysis will start with broad characteristics of Orya phonology (sentence intonation, stress, syllable structure) and proceed to particular allophonic and morphophonemic rules. Preceding the allophonic rules is a chart of Orya phonemes (section 7). An understanding of the Orya phoneme feature chart is crucial for understanding the rules that follow. This chart gives the key distinguishing features of Orya phonemes, and the allophonic and morphophonemic rules that follow it are based on *those features only*.⁶ Some readers may wish to examine the appendix showing contrast among phonemes before reading the last two sections. In this paper, a prose summary of the phonological rules (in italic print) precedes the fully specified symbolisation of the rule.⁷

2. SENTENCE INTONATION

The pitch of most sentences in Orya starts higher and gradually descends to the end. There is often a rise on the stressed syllable (which is usually penultimate) and a greater degree of fall between the last two syllables of a sentence.



/á.sa man balk.gúl.la.da Bú.ji/⁸
I was just caught by Buji!

Orya questions and statements are both spoken with falling intonation. The question status of a sentence is obvious without special intonation because of the interrogative morphemes /san/ and /we/ which occur early in a question.



/em san í.ni hom/
Don't you have ears? (Can't you hear?)



/ém we wé.a sal.sál.sa ot.de.ʔán.ka/

Would you like to drink tea?

Question words like 'who', 'what' and 'why' are highlighted by raised intonation.



/an bá.hap za.u é.no wé.nya ni.kí.ʔan/

this why there your wife sitting

Why is your wife sitting there?

The one-syllable question below has rising intonation.



/wa/

What (did you say)?

This same pattern of sentence penultimate stress and rise and fall is also found at the end of any pause group, but to a lesser degree. It can be seen in lists, in clause chaining, and especially after the head of head-tail linkage:



/twé.lan nin kó.la wá.leŋ wá.ŋil dan lan.blan.dá.ka/

edible meat sugar cane areca nuts betel pepper picked-for-him

They picked out meat, sugar cane, areca nuts and betel pepper to give him.



/nu.hú.lek...hu.lé.na tab.ʔul.so.ne.ká.ye...éil.zi yá.wal



Kwa.bák.ne Bo.næ.ne ki zeb æ.gwa.hál.zak he.tya.tyaŋ.gwé.zak



kĩ.tak a.há.ʔen mae hom zæ.we gwæ.ka/

They tied her (TAIL)...Having tied her, (HEAD)...the two big brothers, Kwabak and Bonæ, they then went off, fled, all of them, not even one stayed there.

3. WORD LENGTH

It is hard to say how many syllables may occur in an Orya word. The following are examples of six to ten syllable words. Words of up to eight syllables are not unusual and it is expected that other words can be made even longer than ten syllables. Verb and noun roots usually consist of no more than three syllables.

/dwam.gwe.bil.la.da.ʔan/ I want them	(6 syllables)
/he.tyan.gwi.ne.hal.za.ka/ he fled coming down this direction	(7 syllables)
/ta.ken.si.bil.la.da.ʔan.la/ he is asking them	(8 syllables)
/en.bwan.gwe.bil.la.da.gwe.ʔan.la/ he repeatedly intensely pities them	(9 syllables)
/ta.hal.ha.gwe.bil.la.da.gwe.ʔan.la/ he lacks anything to give them	(10 syllables)

4. STRESS

Stress in Orya is non-phonemic and has the function of highlighting word roots and endings in the stream of speech. Stress may be accompanied by a little length as well, especially on word roots.

4.1

Primary stress occurs on the penultimate syllable of a word root. When the root is followed by a one-syllable suffix, the original stress does not change. When two or more syllables are suffixed to a root, the penultimate syllable receives primary stress and the root retains secondary stress.⁹

$$S \text{ -----} \rightarrow [+str] / \left\{ \begin{array}{l} \text{ROOT} \\ \text{PRIMARY} \end{array} \text{ (S) + (S) \#} \right. \\ \left. \begin{array}{l} \text{ROOT} \\ \text{Secondary} \end{array} \text{ (S) + (S}_{\phi}\text{) } \underline{\text{PRIMARY}} \text{ S \#} \right\}$$

(To make the examples in this paper clearer, syllable boundaries are marked (.) and roots are separated from affixes by hyphens. Other morpheme boundaries are marked (+), where this clarifies the operation of a rule. Primary stress is underlined in examples in this section, but in the rest of the paper is marked by an acute accent on the stressed vowel.)

/bó.ton/	false
/bó.ton-.gwek/	she lied
/bó.ton-.gwé.ka/	he lied
/en.lá.la/	thought (NOUN)
/en.lá.la-.gwek/	I thought

/o/	[o]	rain
/u/	[u]	faeces
/i/	[i]	vulva
VC (16)		
/in/	[ĩn]	that
/em/	[ẽm]	you
/æk/	[æk]	teeth
/on/	[õn]	sago grub
VCC (2)		
/alb/	[aľp]	edge
/olk/	[oľk]	under
CV (19)		
/de/	[de]	to, of
/hi/	[hi]	salt
/ho/	[ho]	water
/ku/	[ku]	palm rib
CVC (94)		
/bot/	[bot]	sago pudding
/dob/	[dop]	large rattan
/hen/	[hẽn]	too
/zeb/	[zẽp]	then
CCV (3)		
/bli/	[bli]	frog
/ŋli/	[ŋli]	sky
CCVC (17) ¹⁰		
/hlal/	[hlaľ]	axe
/slak/	[srak]	type of thin leaf used for rolling cigars
CVCC (4)		
/kals/	[kals]	fireplace
/gul̥k/	[guľk]	above

6. CONSONANT CLUSTERS

There are two types of consonant clusters in Orya, those which contain a sonorant, and those in which a semivowel is the second member.¹¹ Semivowel clusters are the most frequent.

6.1 SONORANT CLUSTERS

Liquid sonorants always fill the second slot of onset or internal sonorant clusters. A nasal sonorant may also occur first in onset sonorant clusters.

Onset Sonorant Clusters:

/bli/	[bli]	frog
/dlason/	[drásõn]	to strike (match)
/glætasibiln/	[glætasíbfĩn]	to wash
/hlal/	[hlal]	axe
/hlagun/	[hlāũn]	to see
/mlin/	[mlĩn]	loop
/ŋli/	[ŋli]	sky
/klakatna/	[klakátñə]	narrow
/slæn/	[sræn]	different
/tligulk/	[tríkuk]	I dug
/tlugwen/	[trúwēn]	to sleep (PLUR)

Internal Sonorant Clusters:

/blæble/	[blæble]	wet
/blostablan/	[blóstablān]	to bother him
/basglam/	[básglām]	ant
/boklena/	[bóklēnə]	knee
/goltlæblan/	[góltræblān]	to show him

The sonorant always occurs first in coda position clusters.

/olk/	[oĩk]	below
/golzimk/	[gólzĩmk]	she gave it to them
/bwasomk/	[bwásõmk]	at Bwasom
/kals/	[kals]	fireplace
/alb/	[aĩp]	edge

6.2 SEMIVOWEL CLUSTERS

Semivowel clusters occur very frequently in Orya words. These could be interpreted as labialisation or palatalisation, but since there are other unambiguous consonant clusters, and since /w/ and /y/ occur by themselves as consonants, they are also analysed as consonants here. (See Appendix, Contrast Among Phonemes.)

All consonants may be followed by /w/ or /y/ except /j/, /ŋ/, /z/, /ʃ/, /w/ and /y/, therefore

tw, kw, bw, dw, gw, mw, nw, hw, sw, lw

ty, ky, by, dy, --¹², my, ny, hy, sy, ly occur.

The following examples illustrate:

w-clusters:

/twenblan/	[twēnblān]	to eat (meat)
/kwaki/	[kwáki]	tree kangaroo
/bwi/	[bwi]	cooking banana
/dwenzim/	[dwĩnzĩm]	they eat them (dl OBJ)
/gwægwen/	[gwægwēn]	to live
/mwanak/	[mwānak]	inside
/nwe/	[nwe]	eye

/hwæna/	[hwǣnə]	but
/swe/	[swe]	deceased
/lwa/	[lwa]	dog

y-clusters:

/aptyo/	[áptyo]	arrow shaft
/kyǎnguln/	[kyǎngŭn]	to tighten
/dæbya/	[dǣbyə]	part of arrow shaft
/hæbdyak/	[hǣbdyak]	they cursed him
/myækmyæksɔn/	[myǣkmyæksɔn]	to jiggle it
/anyan/	[ǣnyǎn]	mother
/hyagwesika/	[hyagwesǣkɪ]	he finished
/syok/	[syok]	fire
/walyak/	[wǣlyak]	young

7. ORYA PHONEME FEATURE CHART

Labial		Lingual			Glottal		
(-fr)	+fr	-fr	+bk	-bk	(-bk)		
	<i>t</i>		<i>k</i>		-vd	-cont	-syll
<i>b</i>	<i>d</i>		<i>g</i>		+vd		
	<i>j</i>				+dl rel		
<i>m</i>	<i>n</i>		<i>ŋ</i>		+nas, +son		
				ʔ ¹³	-vd, -son		
				<i>h</i>		+cont	-cons
	<i>s</i>						+cons
	<i>z</i>				-son, +vd		
	<i>l</i>				+son		
	<i>y</i>		<i>w</i>				+syll
	<i>i</i>	<i>ɨ</i>	<i>u</i>		+hi		
	<i>e</i>		<i>o</i>		-hi, -lo		
	<i>æ</i>	<i>a</i>			+lo		

Stress, height and fronting are of prime importance to Orya phonology, as these three features often work together to cause complex changes such as vowel harmony. The changing shape of the /l/ phoneme is also a salient characteristic of the Orya language. Complete definitions for the phonemes are given in the appendix.

8. ALLOPHONIC RULES

8.1 RULES INVOLVING /l/

According to Foley (1986:10) it is common for Non-Austronesian languages to have a single liquid consonant. Orya is typical in this regard in that [l̥] and [r] are allophones of /l/.

8.1.1

/l/ in Orya is dark in pronunciation and is almost 'flapped' like an [r]. The 'flapping' of the /l/ causes a slight echo of the preceding vowel to be heard following it. More precisely,

/l/ is released before [-continuant] consonants and at the end of single-syllable words.

$$l \quad \text{-----} \rightarrow \quad \check{l} \quad / \quad \left\{ \begin{array}{c} \text{---} \quad C \\ \# \quad C_{\emptyset} \quad V \quad \text{---} \quad \# \end{array} \right\}$$

[-cont]

In the phonetic transcription below, an echo vowel is shown as a raised vowel.

/gol-bwa+l/ ----->	[gól ^o bwal]	I gave it to him
/t̥l-k+a/ ----->	[t̥l̥ ⁱ k̥i]	he died
/bul/ ----->	[búl ^u]	boat

8.1.2

/l/ changes to [r] between two vowels, except where one of the vowels is separated from the /l/ by a morpheme boundary.

$l \quad \text{-----} \rightarrow \quad r \quad / \quad + \quad S_{\emptyset} \quad C_{\emptyset} \quad V \quad \text{---} \quad V \quad C_{\emptyset} \quad S_{\emptyset} \quad +$		
/kala-gwe/ ----->	[káragwe]	gaze (IMP)
/ola/ ----->	[órə]	road

Note that change is prevented in examples like the following because of the presence of morpheme boundaries:

/kal-na/	[kálə]	blood FOC
/ol-na/	[ólə]	language FOC
/bul-nak/	[búluk]	boat LOC
/take-n+si+bil+lada+l+a/	[takēnsibiridálə]	he asked them

8.1.3

In sonorant clusters with /l/, the /l/ occurs as [r] when it follows a consonant with the same point of articulation (namely, alveolar). [dl], for instance, is hard to say without an intervening vowel, so becomes [dr]. This process, however, is even more pervasive, because it extends to /l/ following front vowels as well.

/l/ changes to [r] after front vowels, (/i/, /e/ and /æ/), and after front consonants.

l -----> r / [+fr] _____

Unlike the previous rule, this rule is not sensitive to morpheme boundaries.

Examples of /l/ after front consonants:

/dla-son/ ----->	[drásōn]	strike (match)
/slæn/ ----->	[sræ̃n]	different
/tli-gulk/ ----->	[tríuk]	she dug
/tlu-gwen/ ----->	[trúwēn]	they sleep

The /n/ which motivates the change in the next forms is subsequently deleted by front sonorant deletion (9.7.2).

/gu-ʔan+l+a/ --->	[guʔúrə]	he is saying
/gwile-n+si+ʔan+l+a/ --->	[gwírēnsiʔrə]	he is holding it
/take-n+si+bi+l+ada+ʔan+l+a/ --->	[takēnsibiridaʔárə]	he is asking them

This rule works iteratively, and so will have varied output in instances of /ll/, depending on whether the /ll/ is preceded by a front vowel.

/ton-bil+lada+k+a/ ----->	/tonbirladaka/ /tonbirradaka/ [tōnbiridáka] (9.7.2)	he spoke to them
/gol-l+a/ ----->	/golra/ [góla] (9.7.2)	he took her

(/l/ has not been found following the other front consonants, /j/ and /z/.)

Examples of /l/ after front vowels:

/il/ ----->	[ir]	yesterday
/soŋ-gwel/ ----->	[sōŋgwēr]	she went
/take-nsonela/ ----->	[takēnsōnéra]	he called out
/gwæ-l/ ----->	[gwær]	she will live
/gwæ-la/ ----->	[gwærə]	he will live

Compare the preceding forms with those with [-front] vowels:

/ol/	[oĩ]	language
/gu-la/	[gúlu]	he said
/gwile-nsil/	[gwírēnsil]	she held it
/take-nsibilladala/	[takēnsibiridálə]	he asked them

8.2 NASALISATION

Vowels become [+nasal] before nasal consonants.

V	---->	[+nas]	/	_____	C	
					[+nas]	
/em/	---->				[ẽm]	you
/nen/	---->				[nẽn]	we
/in/	---->				[ĩn]	that
/nin/	---->				[nĩn]	meat
/ŋan-gulsun/	---->				[ŋãŋgúlsũn]	to wash
/bla-gulnsin/	---->				[blá ^u nsũn] ¹⁴	to cut it

8.3 VOWEL LAXING

8.3.1

Final /a/ becomes [-low] ([ə]) when word final in an unstressed syllable.

a	---->	[-low]	/	_____	#	
				[-str]		
/mam-na/	---->				[mámna]	big FOC
/bokle-na/	---->				[bóklẽnə]	knee FOC
/bose-sa/	---->				[bósesə]	name OBJ
/ba-sa/	---->				[básə]	what OBJ

One syllable words are stressed, so do not change:

/ba/		[ba]		what
/ta/		[ta]		centipede

8.3.2

In a process that is similar to the above,

/e/ is lowered to [ɛ] before voiced consonants within closed syllables. The change also takes place if /e/ is followed by final [rə], the result of rules 8.1.2 and 8.2.

e	---->	ɛ /	$\left\{ \begin{array}{ccc} \text{---} & \text{C} & . \\ & [+vd] & \# \\ \text{---} & r & ə \quad \# \end{array} \right\}$	
/em/	---->			[ẽm]
/soŋ-gwen/	---->		[sõŋgwẽn]	go (INF)
/soŋ-gwen.na/	---->		[sõŋgwẽn:ə]	the going (GER)
/soŋ-gwel/	---->		[sõŋgwər]	she will go
/soŋ-gwe.la/	---->		[sõŋgwérə]	he will go
/bel/	---->		[bɛr]	platform
/leŋ-leŋ-na/	---->		[lẽŋlẽŋnə]	yellow

This rule is ordered before the devoicing rule, 8.4.

/zeb/ ----->	[zép]	then, therefore
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In the next forms, /e/ is not followed by a word or syllable final voiced consonant, so no change occurs:

/soŋ-gwe/	[sóŋgwe]	go (IMPER)
/soŋ-gwe.ʔan/	[sóŋgwéʔǎn]	she is going
/soŋ-gwek/	[sóŋgwek]	she went
/soŋ-gwe.ka/	[sóŋgwékə]	he went

Although all sonorants operate in similar ways in other areas of the language (see 9.7.1, 9.7.3), it is not the case here. Other sonorants followed by final /a/ do not cause a change similar to that caused by final [rə].

/bokle-na/	[bókľēnə]	knee FOC
/e.ma/	[émə]	(2sg PRES AUX)

8.4 DEVOICING

This rule is both an allophonic and a morphophonemic rule. It accounts for the presence of [p] as an allophone of /b/. As a morphophonemic rule, it gives the reason why there are no final /d/, /g/ or /j/ in Orya, as these would also be devoiced by the rule to become /t/ and /k/.¹⁵ The discontinuing rule (9.1) below is similar to this rule.

Word-final non-sonorant consonants (those other than nasals, /l/, /w/ or /y/) lose their voicing. Syllable-final non-sonorant consonants lose their voicing when followed by another consonant. Orya syllable-final non-sonorant consonants maintain their voicing only in a word-medial intervocalic position.

C	----->	[-vd]	/	_____	{ #
[-son]					{ . c }

This rule explains all the occurrences of /p/ in Orya (except for some borrowed words):

/hæb-tan/ ----->	[hǣptyǎn]	curse him to die
/ab-denak/ ----->	[ápďēnak]	together
/abe-hab/ ----->	[ábehap]	for me
/ab/ ----->	[ap]	for me (contracted)

Compare:

[hæb-osókə]	two men cursed each other to die
[ondoápi]	chief (exception: borrowed from Sentani language family)
[ábla-l]	two women crossed

(/b/ does not change because /bl/ is a cluster beginning the next syllable.)

9. MORPHOPHONEMIC RULES

9.1 DISCONTINUING

In a process similar to the above:

/l/ is realised as [t] when it occurs before a word or morpheme boundary and a /d/. /s/ is realised as [t] only when it occurs before a morpheme boundary and another /s/.¹⁶

$l \quad \text{---->}$	$t / \quad \text{---}$	$\begin{Bmatrix} \# \\ + \end{Bmatrix}$	d	
$s \quad \text{---->}$	$t / \quad \text{---}$	$+$	s	
<i>/æs-sɪblaka/ ----></i>			[eʔsɪblɪkə]	he waited for him until he came
<i>/ol dawem/ ----></i>			[ot dāwēm]	good news
<i>/doal-doal/ ----></i>			[doatdóal]	demons REDUP
<i>/waɲil dan/ ----></i>			[wāɲit dān]	betel pepper

9.2 VOWEL HARMONY

Orya vowel harmony reflects the tendency of the language to keep the tongue high. While there is some interplay between high vowels, most of the assimilation occurs when mid and low vowels are raised to agree with adjacent high vowels. This change can be caused by both preceding and following vowels, i.e. right to left or left to right. The position of stressed syllables is an important controlling factor in most of these situations.

LEFT TO RIGHT HARMONY:

9.2.1

/u/ and /ɪ/ will assimilate when one is preceded by the other.

$u \quad \text{---->}$	$\dot{u}$	$/$	$\dot{u}$	$C_1^?$	---
$\dot{u} \quad \text{---->}$	u	$/$	u	$C_1^?$	---

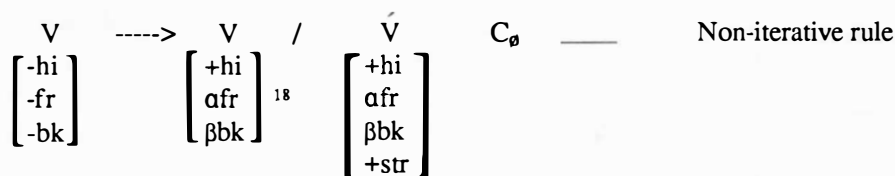
Diagrammed another way:

$V \quad \text{---->}$	V	$/$	V	$C_1^?$	---
$\begin{bmatrix} +hi \\ -fr \\ -abk \end{bmatrix}$	[abk]		$\begin{bmatrix} +hi \\ -fr \\ abk \end{bmatrix}$		

<i>/oto-gulsɪn/ ----></i>	[otogúlsūn] ⁽¹⁾¹⁷	to fix it
<i>/ɪk-gulk/ ----></i>	[ɪkgík] ⁽¹⁾	she planted it
<i>/zɪnɪ-gulk/ ----></i>	[zɪnīgík] ⁽¹⁾	she visited her

9.2.2

/a/ (or [ə], the result of 8.3.1) will assimilate in position to a preceding high stressed vowel. This rule does not re-apply to its own output.



(The stressed vowel may have either primary or secondary stress, and may be in a single-syllable root or in the affixes (rule 4.1).)

Following are examples of primary stress triggering vowel harmony:

/gu-ka/ ----->	[gú ⁽²⁾ ku]	he said
/ik-lal/ ----->	[í ⁽²⁾ klál]	two women planted it
/nein-nak/ ----->	[neí ⁽²⁾ n:ík]	in front
/lop-ta.bil.ka/ ----->	[loptabí ⁽²⁾ rki]	he took them
/hili-gul.ka/ ----->	[hi ⁽²⁾ rigúlku]	he threw it
/híl-gul.ka/ ----->	[hí ^(1,2) lgʷlki]	he untied it
/ík-gul.ka/ ----->	[í ^(1,2) kgʷlki]	he planted it
/ílik-gul.ka/ ----->	[í ^(1,2) ikgʷlki]	he held it, ruled it

Roots retain secondary stress, and this also triggers vowel harmony when the root is only one syllable. It can be seen that the rule does not work on its own output, so [gublúkə] is not changed to *[gublúku].

/gú-blaka/ ----->	[gublú ⁽²⁾ kə]	he told him
/gú-blahaeka/ ----->	[gubluhá ⁽²⁾ kə]	he came and called him away
/hít-taka/ ----->	[hit:í ⁽²⁾ kə]	he stabbed him
/ík-taka/ ----->	[íktí ⁽²⁾ kə]	he planted it

Roots of more than one syllable have stress on their penultimate syllable. This prevents them from influencing the syllable following the root:

/zini-tala/	[zini ⁽²⁾ tálə]	he visited him
/æ-iti-tak/	[eí ⁽²⁾ títak]	they cowered
(/iti/ is the root)		

RIGHT TO LEFT HARMONY:

9.2.3

In a rule similar to 9.2.1 in L-R harmony,

/ɨ/ changes to /i/ before stressed /i/.¹⁹

$$\begin{array}{c} \text{ɨ} \end{array} \text{ ----> } \begin{array}{c} i \end{array} / \text{ --- } \begin{array}{c} C_{\emptyset} \\ [+str] \end{array} \begin{array}{c} i \end{array}$$

/oto-gwesɨbilnan/ ---->	[otogwesibírɨn]	I am satisfied with it
/lake-nsɨzimda/ ---->	[lakɛnsizĩmdi]	they asked them (dl OBJ)

9.2.4

A mid vowel (/e/ or /o/) will raise to a high vowel when preceding a stressed high vowel. A stressed mid vowel will be raised to a high vowel when preceding a high vowel in the final syllable. In both cases the position (fronting and backing) stays the same as the mid vowel.

$$\begin{array}{c} V \\ \left[\begin{array}{c} -hi \\ -lo \\ afr \\ -abk \end{array} \right] \end{array} \text{ ----> } \begin{array}{c} [+hi \\ afr \\ -abk] \end{array} / \left\{ \begin{array}{c} \text{--- } C_{\emptyset} \begin{array}{c} V \\ \left[\begin{array}{c} +hi \\ +str \end{array} \right] \end{array} \\ \text{--- } C_{\emptyset} \begin{array}{c} V \\ [+hi] \end{array} C_{\emptyset} \# \end{array} \right\} \text{ Non-iterative rule}$$

Following are examples of vowel change before a stressed syllable:

/ka.e-gwe.bin.hap/ ---->	[kagwibínhip]	in order to share it
/zon-gul.la/ ---->	[zũngúlu]	he escorted her
/ɲop-gul.ka/ ---->	[ɲupgúku]	he hung it

Compare:

/zon-ta.la/	[zõntálə]	he escorted him
/ɲop-tan.da.ka/	[ɲoptãndákə]	he hung them

This rule also feeds 9.2.1, (which feeds 9.2.2):

/bal.k-o.so.sɨ.ka/ ---->	[bałkosu]sɨka/	two men caught and
	[bałkosusú]ka/	released two men
	[bałkosusúku]	

Below are examples that show raising of mid vowels on stressed penultimate syllables:

/ho.le-gwe.bik/ ----->	[holeg ⁽⁴⁾ wíbik]	she desired it
/gol-hlun/ ----->	[gúlhlūn ⁽⁴⁾]	shut it (door)
/oto-to.no.so.sik/ ----->	[ototonosú ^(4,1) suk]	they fixed it (chair, DUAL OBJ)
/hit-no.so.sik/ ----->	[hitnosú ^(4,1) suk]	they finished stabbing the two (men)

9.2.5

/æ/ will raise to an [eⁱ] glide to harmonise with any high vowel in the next syllable.

æ -----> eⁱ / _____ C_ø V
[+hi]

/tahal-hanæbilladak/ ----->	[tahalhāne ⁽⁵⁾ bíridak]	they were in need of them
/wæ-guln/ ----->	[wé ⁽⁵⁾ ūn]	carry her
/tæ-bilʔan/ ----->	[te ⁽⁵⁾ bíʔɪn]	look for her
/glæ-sosika/ ----->	[gle ⁽⁵⁾ susú ^(4,1,2) ku]	he finished washing it (DUAL: shirt or pants)

9.3 /y/ EPENTHESIS

The importance of high vowels and stress in vowel harmony has already been seen above. The Orya language prefers that the tongue stay high and front, so that when the tongue encounters the low vowel /a/ after several stressed front sounds, it takes some time to make the transition down. This slow transition results in /y/ being added before the low vowel. This is the first of three rules that deal with single-syllable roots, which always retain at least secondary stress.

If a single syllable root contains a front vowel, and if an adjacent consonant is also [+front], /y/ will be added in transition from a front consonant to /a/ in the suffix following. The high vowel and front consonant of the root may be flanked by any consonant.

$$\begin{array}{c} \text{#} \quad \begin{array}{c} 1 \\ (C) \end{array} \left(\begin{array}{cc} \begin{array}{c} 2 \\ C \end{array} & \begin{array}{c} 3 \\ V \end{array} \\ \left[\begin{array}{c} -bk \\ -cons \end{array} \right] & [+fr] \\ \begin{array}{c} V \\ [+fr] \end{array} & \begin{array}{c} C \\ \left[\begin{array}{c} -bk \\ -cons \end{array} \right] \end{array} \end{array} \right) \quad \begin{array}{c} 4 \\ (C) \end{array} + \begin{array}{cc} 5 & 6 \\ C & a \end{array} \begin{array}{c} [+fr] \end{array} \quad \text{=====>} \quad \text{#} \quad 1 \quad 2 \quad 3 \quad 4 + 5 \quad y \quad 6 \end{array}$$

/gwe-sa/ ----->	[gwésyə]	pig OBJ
/we-na/ ----->	[wěnyə]	woman FOC
/te-na/ ----->	[těnyə]	tree FOC
/deŋ-tan/ ----->	[děŋtyān]	cut them (weeds)
/wet-tasika/ ----->	[wet:yasĩki]	change it
/lek-taka/ ----->	[lektyákə]	he hit him
/hæb-dak/ ----->	[hæpdyak]	they cursed him

The following forms are not changed by this rule:

/lek-lek-taka/	[lekлектákə]	he hit him repeatedly (The root stress is on the first syllable of the reduplicated root.)
/keŋ-tan/	[kěŋtān]	submerge him (Both /k/ and /ŋ/ are [+back].)

9.4 /l/ TO SEMIVOWEL SHIFT

Indirect objects are marked on verbs with /-bil/ (FEMALE) and /-bla/ (MALE).

When /-bla/ is preceded by the front vowels /e/ or /æ/ and a front consonant in a one-syllable root, the /-bla/ changes to /-bya/. When /-bla/ is preceded by /o/ and a front consonant in a one-syllable root, the /-bla/ changes to /-bwa/.

$$\begin{array}{c} \text{#} \quad \begin{array}{c} 1 \\ C^2_{\emptyset} \end{array} \quad \begin{array}{c} 2 \\ \check{V} \end{array} \quad \begin{array}{c} 3 \\ C \end{array} + \begin{array}{cc} 4 & 5 & 6 \\ b & l & a \end{array} \quad \text{=====>} \quad \text{#} \quad 1 \quad 2 \quad 3 + 4 \quad \begin{array}{c} C \end{array} \quad \begin{array}{c} 6 \end{array} \\ \left[\begin{array}{c} -hi \\ afr \\ -abk \\ +str \end{array} \right] \quad [+fr] \quad \left[\begin{array}{c} -syl \\ +cont \\ -cons \\ afr \\ -abk \end{array} \right] \end{array}$$

This change is triggered by the occurrence of three consecutive front consonants, the last consonant of the root and the /-bl/. The results are similar to /y/ epenthesis above.

/gol-blal/ ----->	[gólbwal]	I gave it to him
/hwæn-blal/ ----->	[hwæ̃nbyal]	I missed seeing him
/zel-blaka/ ----->	[zeɾbyákə]	he gave him to him
/æs-blaʔanla/ ----->	[æsbyaʔárə]	he is waiting for him

(/zel/ and /æs/ receive secondary root stress)

The following three forms do not undergo this rule because they do not meet the structural requirements.

/gwæ-blaka/	he did it to him (This word does not have rule element number 3.)
/soŋ-gweblala/	he went to him (The change must occur after a stressed syllable.)
/blal-blal-a/	very tall (The first syllable vowel cannot be /a/, [-fr,-bk].)

9.5 /g/ DELETION RULE

When an affix beginning with /gw/ or /gu/ is suffixed to an open ($C^2_\emptyset V$) single-syllable verb stem, the /g/ is dropped.

VERB					
#	1	2	3	4	
	$C^2_\emptyset$	$\check{V}$	+	g	u
		[+str]		w	
					=====> # 1 2 + $\emptyset$ 4

The two affixes involved are the Female/Inanimate Direct Object marker /-gul/, and the activity/achievement verb marker /-gwe/.

/e-gweʔan/ ----->	[ewéʔān]	she has a fever
/hli-guln/ ----->	[hlíūn]	to leave her
/hla-guln/ ----->	[hlāūn]	to see her
/tli-gulka/ ----->	[triúľku]	he dug
/wæ-gulk/ ----->	[wéiuk]	she carried her
/do-gwehanak/ ----->	[dowehānak]	she was sad
/du-gweblala/ ----->	[duweblálə]	he went to see him

Multi-syllable roots, nouns and verbs derived from nouns do not participate in this rule.

/hili-guln/	[hírigūn]	to throw it
/bae-gwela/	[baégwérə]	he doesn't want to
/dugwa/	[dúgwə]	cassowary
/so-gwek/	[sógwək]	it has become weedy
weeds ACHIEVEMENT (PAST2)		
/u-gwek/	[úgwək]	she became pregnant
stomach ACHIEVEMENT		

Compare the following with /e-gweʔan/ ([ewéʔān]) above:

/e.i-gweʔan/	[e'igwéʔān]	it is bearing fruit
fruit ACTIVITY (PRES)		

9.6 VOWEL GLIDES

Vowel clusters in Orya have been analysed as nuclei of separate syllables, rather than as complex nuclei such as a vowel plus a glide. Complex syllable nuclei do in fact occur phonetically in Orya.

As seen above, /hla-guln/ becomes [hlã^un] because of the /g/ deletion rule. The /a.u/ also loses its two-syllable timing to become the [a^u] glide. In Orya, there are three other vowel glides, but unfortunately, the /au/ combination is the only one where morphological evidence has been found that the vowel glide started as two separate syllables.

The /au/, /ae/, /ai/ and /ei/ combinations coalesce to become complex syllable nuclei, vowel glides.

a u	=====>	a ^u
a e	=====>	a ^e
a i	=====>	a ⁱ
e i	=====>	e ⁱ

/bla-gulnsila/ ----->	[blã ^u nsúlu]	he cut it off
-----------------------	--------------------------	---------------

There is an additional line of evidence supporting the status of these vowel glides as being different from vowel phonemes. They do not participate in the /g/ deletion rule above, but rather follow the pattern of two-syllable roots.

/ba.e-gwela/	[ba ^e gwérə]	he doesn't want to
/e.i-gwe [?] an/	[e ⁱ gwé [?] ān]	it is bearing fruit

Other vowels may occur together without intervening consonants, but they retain two-syllable timing. The /ai/ combination has a similar low-high pattern as /au/ and /ai/, but retains its two-syllable timing.

/tak-ta+i+lin/	[tak.ta.ír.ĩn]	to throw out and down
/teha-bla+ine+k+a/	[te.ha.bla.ĩ.né.kə]	he placed (hands) down on him
/wea/	[wé.ə]	water
/bian/	[bí.ān]	father
/boa/	[bó.ə]	lime
/hli-guln/	[hlí.ũn]	to leave
/tlu-gwen/	[trú.wēn]	to sleep (PLUR)
/wæ-guln/	[wéi.ũn]	to carry her

9.7 FRONT SONORANT DELETION

9.7.1

A morpheme final /l/ or /n/ will delete before /r/ or word-final /k/.

C	----->	∅ /	{	— + k #	}
[+fr				(+) ?	
+son					
+cons					

/gol-k/ ----->	[gok]	she took it
/nol-k/ ----->	[nok]	they took it
/hĩl-gul+k/ ----->	[hĩl̥gĩk]	she untied it
/hĩl-gul+k+a/	[hĩl̥gĩl̥kĩ]	he untied it
/hĩl-gul+ [?] an/ ----->	[hĩl̥gĩ [?] ĩn]	she is untying it

/zel-bil+k/ ----->	[zírɓik]	she gave him to her
/zel-bil+k+a/	[zirbírkɪ]	he gave it to him
/zel-bil+ʔan+k/ ----->	[zirbíʔik]	when she gave it to her
/zel-bil+ʔan+k+a/ ----->	[zərɓiʔɪnkə]	when he gave it to her

There are two location words where /lk/ is not reduced to [k]. These words lack the morpheme break in the rule above:

/gulk/	[gułk]	above
/olk/	[ołk]	underneath

9.7.2

/ln/ and [lr] simplify to [l] word medially. [rr] and [nr] simplify to [r] word medially. (The [r] is the result of rule 8.1.3.)

ln	=====>	l
lr	=====>	l
rr	=====>	r
nr	=====>	r

/ol-na/ ----->	[ólə]	language, voice
/gol-na/ ----->	[gólə]	house FOC
/sal-sal-na/ ----->	[salsálə]	hot ADJ
/gol-la/ ----->	/golra/ (8.1.3)	
	[gólə]	he took it
/ton-bil+lada+k+a/ ----->	/tonbirradaka/ (8.1.3)	
	[tõnbiridákə]	he spoke to them
/gwile-n+si+ʔan+l+a/ ----->	/gwiɾensiʔanra/ (8.1.3)	
	[gwiɾɛnsiʔɪrə]	he is holding it

/nn/ is not affected by this rule.

/san-na/	[sǎn:ə]	mosquito FOC
/tolan-na/	[torǎn:ə]	speech

9.7.3

When /ln/ or /ll/ occur word finally, the first of the two is deleted.

1	2				
C	C	#	=====>	Ø	2 #
$\begin{bmatrix} +fr \\ +son \\ +cons \end{bmatrix}$	$\begin{bmatrix} +fr \\ +son \\ +cons \end{bmatrix}$				
/gol-n/ ----->	[gõn]				take INF
/gol-l/ ----->	[goł]				she took it
/hɪl-gul+n/ ----->	[hɪłgɪn]				untie it INF

10. ORDERING RELATIONS BETWEEN RULES

[	8.1.3	/l/ ----->	[r]	/zel-bilk/	----->	/zerbilk/
	9.7.1	Front Sonorant Delete				/zerbik/
	8.1.1	/l/ ----->	[ĩ]			-Ø-Ø-
					----->	[zírbik]
		(+Stress, Front Sonorant Delete, 9.2.4 /e,o/ -----> [i,u],) Rules 8.1.3 and 9.7.1 bleed /l/ -----> [ĩ].				
[	9.7.2	Front Sonorant Delete	/kal-na/	----->		[kálə]
	8.2	Nasalisation (+Stress) Rule 9.7.2 bleeds Nasalisation.				-Ø-
[	9.1	Discontinuing	/waŋil dan/	----->		[wǎŋit dǎn]
	8.1.3	/l/ ----->	[r]			-Ø-
		Rule 9.1 bleeds /l/ -----> [r].				

No ordering constraints have been found for the following rules:

8.1.2	/l/ ----->	[r] (morpheme internal)			
		/ola/	----->		[orə]
8.3.1	/a/ ----->	[ə]	/asa/	----->	[asə]
9.2.3	/i/ ----->	[i]	/take-nsibilki/	----->	[takēnsibírki]

APPENDIX

CONTRAST AMONG PHONEMES

CONSONANT CONTRASTS:

/t/ and /d/, voiced and voiceless alveolar stops:

/ta-n/	[tǎn]	SING SUBJ kill him IMPER
/da-n/	[dǎn]	PLUR SUBJ kill him IMPER
/ab-tanda/	[aptǎndə]	they came
/ab-denak/	[ápdēnak]	together

There is no contrast between /t/ and /d/ word finally.

(See devoicing rule, 8.4.)

/d/, voiced alveolar stop, and /l/, voiced alveolar lateral:

/dan-dan/	[dǎndǎn]	two
/la-n/	[lǎn]	shave IMPER
/da-k/	[dak]	they (PLUR SUBJ) killed him
/la-ka/	[lákə]	they (DUAL SUBJ) killed him

/k/, voiceless velar stop, and /ʔ/, glottal stop:

/ake-n/	[ákēn]	to see them (DUAL OBJ)
/aha-ʔen/	[aháʔēn]	one

/akan-gwebiln/	[akāngwíbīn]	to try it
/a-ʔan/	[áʔān]	this one (close)
/karek-na/	[kárekɲə]	bad
/soŋ-æk/	[sóŋæk]	they (DUAL fem SUBJ) walked

/ʔ/ is not found in word initial or final positions.

/h/, voiceless glottal fricative, and /ʔ/, glottal stop:

/hen/	[hɛ̃n]	also
/ahan/	[áhān]	by itself
/a-ʔan/	[áʔān]	this one (close)
/ohol/	[óhol]	it cooled
/aho-ʔanla/	[ahoʔárə]	he is acting treacherously to her

/h/ and /ʔ/ are not found word finally, and /ʔ/ does not occur word initially.

/k/ and /g/, voiced and voiceless velar stops:

/kol-na/	[kólə]	sugar cane FOC
/gol-na/	[gólə]	house FOC
/boge/	[bóge]	snake
/bokæ/	[bókæ]	close relative; brother
/æk/	[æk]	teeth

/g/ is not found word finally (see rule 8.4.).

/s/ and /z/, voiceless and voiced grooved fricatives.

/san/	[sān]	mosquito
/za-n/	[zān]	to fall INF
/asa/	[ásə]	AUX 1sg. FUT
/aza/	[ázə]	grandfather
/as/	[as]	snake

/z/ is not found word finally.

/j/, voiced alveopalatal grooved affricate, and /z/, voiced alveolar grooved fricative:

/ja-gulk/	[ja ^u k]	she deflected it
/za-gulk/	[za ^u k]	she stood
/eijan/	[éijyān]	war
/aza/	[ázə]	paternal grandfather

/j/ and /z/ are not found word finally.

/j/ and /z/ are in free variation in a few words:

/zi walas/, /ji walas/ (boy).

/j/, voiced alveopalatal grooved affricate, and /y/, voiced palatal semivowel:

/ja-gulk/	[já ^u k]	she deflected it
/ya-gulk/	[yá ^u k]	we (DUAL SUBJ) stood

/bæjen/	[bæjēn]	never
/iye/	[íye]	relative

/j/ and /y/ are not found word finally.

/m/ and /n/ voiced bilabial and alveolar nasals:

/men/	[mēn]	which
/nen/	[nēn]	us
/tama-l/	[tāmāl]	I dug up (PLUR OBJ, potatoes)
/tana/	[tānə]	foot
/kam/	[kām]	night
/ta-n/	[tān]	to kill him INF

/n/ and /ŋ/, voiced alveolar and velar nasals:

/nizi-k/	[nĩzik]	they killed them (DUAL OBJ)
/ŋi/	[ŋi]	thorn
/hanan-gwek/	[hānāngwek]	it became swollen
/haŋ-gwek/	[hāŋgwek]	it broke
/boton/	[bótōn]	false
/beten/	[bétēŋ]	small

/b/, voiced bilabial stop is not considered suspect with any other.

/babbab/	[bápbap]	bird name
/blæble/	[blæble]	damp
/ŋæb-na/	[næpnə]	waves FOC

Word-final and syllable-final /b/ occur as [p] by the devoicing rule, (8.4).

VOWEL CONTRASTS:

/u/ and /o/, high close and mid close back rounded vocoids:

/u/	[u]	faeces
/o/	[o]	rain
/gol-ka/	[gólkə]	he married her
/gulk/	[gułk]	above

/i/, /ĩ/ and /u/, voiced high close front, central, and back unrounded vocoids:

/i-na/	[ĩni]	ear FOC
/ĩ-na/	[ĩni]	vulva FOC
/u-na/	[únu]	faeces FOC
/sin-gwen/	[síngwēn]	to become weak
/siŋi-gweʔanla/	[siŋigweʔárə]	it is spitting rain
/sul-sin/	[súlsūn]	pour out

/e/, voiced mid close front unrounded vocoid, /æ/, voiced low close front unrounded vocoid, and /a/, voiced low open central unrounded vocoid:

/e-ʔen/	[éʔɛ̃n]	you alone
/æ-ʔen/	[æʔɛ̃n]	me alone
/a-ʔan/	[áʔã̃n]	this one
/e/	[e]	I
/æ/	[æ]	village
/a/	[a]	this

SEMIVOWELS:

As /y/ and /w/ appear regularly at the onset of syllables, they are in contrast with /i/ and /u/, which occur only as the nucleus of syllables.

/y/, voiced palatal nonsyllabic vocoid:

/yaye/	[yáyɛ]	male name
/aya/	[áyə]	father
/yu-n/	[yũn]	sew INF
/auyan/	[áʷyã̃n]	great grandfather

/w/, voiced labiovelar nonsyllabic vocoid:

/wawe/	[wáwɛ]	crocodile
/awa-ʔan/	[awáʔã̃n]	I am bathing
/wewal/	[wéwal]	wife
/hwa-næk/	[hwã̃næk]	it exploded

NOTES

1. Program Kerja Sama UnCen-SIL (UnCen-SIL Cooperative Program), September 1988.
2. Anceaux (1965) and Voorhoeve (1971, 1975) include 'Uria' in the Nimboran Group. Orya, however, bears little similarity in cognates or structure to Kemtuk-Gresi or Nimboran.
3. Forty-five percent of 200 words were found to be cognates, and these cognates were 84% similar. The following lists some of the shifts in sounds between Orya and Berik in order of frequency:

Orya	Berik	Orya	Berik
<i>h</i>	<i>f</i>	<i>a/i</i> alternation	
<i>e</i>	<i>i</i>	<i>z</i>	<i>j</i>
<i>n</i>	<i>r</i>	<i>b</i>	<i>bl</i>
<i>ng</i>	deleted	<i>eⁱ</i>	<i>i</i>
<i>a/o</i> alternation		<i>æ</i>	<i>a</i>
<i>a</i>	<i>i</i>	<i>z</i>	<i>g</i>

4. These percentages were also based on a list of 200 common words.

5. The Orya legend of Kwa and Bonæ is the story of two brothers who run to the Berik area to escape an evil spirit and become two mountains. The Berik people say they originate from two brothers who came from those two mountains.

6. Phonological features used in this paper:

Major Class Features:

cons	consonantal
son	sonorant
syll	syllabic

Features relating to position of:

Tongue:

bk	back
fr	front
hi	high
lo	low

Lips:

lab	labial (labial is also [-front])
-----	----------------------------------

Other features:

cont	continuant
dl rel	delayed release
nas	nasal
str	stress
vd	voiced

7. List of symbols and abbreviations used in phonological rules and examples:

1sg	first singular subject
ACHIEVEMENT	Achievement verb form
ACTIVITY	Activity verb form
AUX	auxiliary
C	consonant
C ₂ [∅]	upper limit of 2 consonants, no lower limit
C _∅ , S _∅	∅ or more consonants, syllables
DUAL SUBJ/OBJ	dual subject/object
fem	feminine
FOC	focus
FUT	future
GER	gerund
IMPER	imperative
INF	infinitive
LOC	locative
MALE SUBJ/OBJ	male subject/object
PAST	past
PLUR SUBJ/OBJ	plural subject/object
PRES	present
RECENT	recent past
S	syllable

SING SUBJ/OBJ	singular subject/object
SUBJ	subject
REDUP	reduplicated
V	vowel
#	word boundary
+	morpheme boundary
.	syllable boundary
----->	'changes to'
/	'in the environment of'
_____	position of change, (____ C means 'before a consonant')
()	optional element
{ }	choice of elements enclosed
[]	enclose phonological features in rules or phonetics in text (phonological rules are all in phonetics)
//	enclose phonemics

8. Stress (') is shown here even though it is not phonemic in Orya.
9. Almost all Orya roots are of one or two syllables. Those that are longer show signs of compounding or reduplication. An example is the root for 'think' (/en-lala/), which can be analysed as 'liver-pure'. Such frequently used compounds have gained the status of roots as far as stress is concerned.
10. The four words below do not fit the syllable pattern of virtually all other Orya words. They contain [swɾ], [dwɾ] and [kwɾ], which may have been borrowed from another language or from an earlier form of Orya. The [kwɾ] word is an onomatopoeic word. These could be analysed as labialisation or as CCCV syllables, but because they are so rare, they are simply regarded as anomalous. Since /w/ is clearly a consonant in Orya, we are analysing all of the other consonant-w combinations as two consonants. (The /l/ to [ɾ] shift is discussed in 8.1.)

/swla/	[s ^w ra]	vacant lot
/swlæ-taka/	[s ^w ɾætaka]	he laughed at him
/dwlik/	[d ^w ɾik]	female demon
/kwlet-ʔnan/	[k ^w ɾétʔnān]	evening (frog sound time)

(The Orya word for the sound made by a frog is [k^wɾét].)

11. The consonant clusters being analysed here are those which occur within a single syllable. When looking across syllable boundaries, many more combinations exist. One deserving mention is /n/ + /g/. As there is no nasal assimilation in Orya, this combination does not change to /ŋ/ or /ŋg/.

Words containing alveolar nasals followed by [g]:

/en.en.gwen/	to make a commotion
/ta.ken.gwe.ka/	he shouted
/ŋan.gul.sun/	wash

12. Even though a thorough search has been made, no examples of /gy/ have been found.
13. Following Schane (1973:26), '[consonantal]' refers to a *narrowed constriction* in the oral cavity – either total occlusion or frication' (emphasis Schane's). Therefore, the glottal stop is [-consonantal].

14. Nasalised glides are noted with the nasalisation on the syllabic vowel only. The nasalisation extends through the glide as well.
15. There is no [č] in Orya.
16. It is predicted that this would be true before /z/ as well, but no examples have been found.
17. Numbers above examples in section 9.2 refer to the number of the rule within this section that has caused the change. That is, (1) refers to rule 9.2.1, (2) to rule 9.2.2 etc.
18. The two alpha values must be the same (- and -, or + and +), as must the two beta values. [a] and [β] have no required relation to each other. Opposite relations are shown by [a] and [-a] in other rules.
19. No examples have been found where this rule could apply iteratively.

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