

Aspects of Dholuo Coronal Harmony

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Abstract

Coronal harmony in Dholuo refers to the co- occurrence restriction on dental and alveolar obstruents and nasals. The purpose of this paper is to describe and explain coronal harmony as it manifests in Dholuo. This involves an examination of the phonetic and phonological properties that define coronal harmony in Dholuo. In an Optimality Theory account of coronal harmony in Dholuo, the paper adapts Rose and Walker (2004) surface correspondence constraints CORR- $T \leftrightarrow T$ which demands identity in all respects between segments and CORR- $T \leftrightarrow D$ where voicing may be different but manner and place of articulation must be identical if at all harmony is to be achieved. The phonological feature distributed [dist] is the distinctive feature amongst the coronals. The paper also proposes that some of the morphophonemic alternations attested in Dholuo grammar are motivated by consonant harmony phenomenon.

Key words: *consonant, harmony, coronal, constraint, optimal candidate, agreement*

1.0 Introduction

This paper seeks to document and analyse coronal harmony in Dholuo in terms of the phonetic and phonological properties that define it. Coronal harmony is more common than any other harmony involving place of articulation (Shaw 1991 and Hansson 2001). Coronal harmony refers to the patterns of agreement for features only relevant to coronals (Rose and Walker 2001). This type of harmony affects the coronal fricatives, such as /s/ and /ʃ/ in a word, requiring all the coronal fricatives in the word to belong to either [+ anterior] class (s-like sounds) or [- anterior] class (sh-like sounds). Such patterns are found in the Dene (Athabaskan) languages such as Navajo (Young and Morgan, 1987, McDonough, 2003) and Tahltan (Shaw 1991). Various Austronesian languages exhibit consonant harmony among liquid consonants with [r] assimilating at a distance to [l] or vice versa. Western Nilotic languages like Anywa and Pari have root internal coronal harmony (Hansson 2001). This is a co- occurrence restriction on dental vs. alveolar obstruents and nasals. The paper is interested in documenting and analysing the manifestation of this phenomenon in Dholuo.

1.1 Background to the language of study

Dholuo is the ‘language of the Luo’. Dholuo belongs to the Western Nilotic group. According to Bender (1989), Western Nilotic languages closely related to Dholuo are Jur Colo, Anuak (Anywa), Shilluk and Luo (Southern Sudan); Acholi, Lang’o (Northern Uganda); Padhola (Western Uganda) and Alur (Northern Eastern Congo and West Nile Province, Uganda). Oduol (1990) confirms the existence of the two dialects of Dholuo and establishes the geographical spread of both dialects. There is Kisumu-South Nyanza hereafter KSN, spoken in a wider geographical area which include Yala, Maseno, Kisumu, Winam, Muhoroni, Mbita, Ndhiwa, Migori, Macalder, Oyugis, Kendu and Bondo divisions (excluding Yimbo locations). The second dialect Boro-Ukwala (B-U) is spoken in Yimbo location of Bondo, Boro and Ukwala divisions.

Dholuo has a total of twenty-six consonants and out of these five are prenasalized compounds which may be regarded as cluster, especially in the underlying representations as they always function as unit phonemes. Table 1 shows consonants classified according to the place of articulation, state of glottis and place of articulation. In each cell where a contrast exists the voiced sound is placed on the right, whereas its voiceless counterpart is on the left.

Table 1: Consonantal phonemes of Dholuo (Adapted from Okombo, 1982 and Tucker,1994)

Place	bilabials	Labio Dentals	Dentals	Alveolars	palatals	labio- velars	Velars	Glottal
Manner								
Stops	p b			t d	c ɟ		k ɡ	ʔ
Fricatives		f	θ ð	s				h
Nasals	m			n	ɲ		ŋ	
Laterals				l				
Trill				r				
Glides					j	w		
Prenasalised Stop	^m b		ⁿ ð	ⁿ d	ⁿ ɟ		^ŋ ɡ	

The manner of articulation of dental sounds represented by the symbols [θ] and [ð] in table 1 is controversial in literature. They are referred to as interdental spirants (Odaga,1997), alveolar fricatives (Okombo, 1982), dental affricates (Maddieson, 1984), dental explosives (Tucker, 1994), dental stops (Hansson, 2001) represented with the phonetic symbols [t̪] and [d̪], interdental affricates by Degenshein (2004) who explains the manner of articulation as domain initial strengthening with a difference in articulation in prosodically stronger versus weaker positions, Cable (2009) refers to them as affricate stops. The researcher adopts the symbols [θ,ð] and refers to them as dental fricatives, since the sounds are articulated with the tip of the tongue moving to the upper teeth causing partial obstruction of air flow.

Tucker (1994) notes that there is a cooccurrence restriction between the dentals and alveolar series. It would be interesting to determine the reason behind the non-occurrence. Are there particular phonological and phonetic properties that motivate the occurrence of dentals with dentals while alveolars occur with alveolars yet bar their co occurrence within a word; yet both dentals and alveolar share the property coronal? Some studies show that these restrictions may be as a result of the shape of the consonantal inventory. Mackenzie (2005) studies Bumo Izon and reveals there is a co occurrence restriction barring implosive and plosive stops from occurring in morphemes and this is attributed to the phonemic inventory. Participating phonemes must contrast in their phonological property. The idea of contrast is then important in the investigation of phonemes. This may mean that the non-contrasting sounds are barred from participating. However, according to Rose and Walker (2004), contrast cannot be the determining factor in selecting participating segment rather all the segments that participate should be highly similar as a factor for their participation. This paper was interested in establishing the phonological property that allows this co occurrence and how contrast applies amongst Dholuo coronals.

Okombo (1982) in the study of morphophonemic alternations prevalent in Dholuo argues that some of the alternations, for instance, change of a final consonant from /l/ to /nd/ in nominal forms cannot be explained by the morphophonemic rules and that there is no phonetically plausible evidence for this change.

(1) Morphophonemic alternations from /l/ to /nd/ (Okombo, 1982)

Nom.sg	Nom pl.	Gen. sg	
(a) tíèlól	tie ⁿ de	tie ⁿ d	‘foot’
(b) tól:l	tó: ⁿ de	tó: ⁿ d	‘rope’
(c) dwô:l	dwô: ⁿ dé	dwô: ⁿ d	‘voice’

The alveolar lateral changes to prenasalized alveolar stop. He overtly calls for further investigation into this type of alternation. Maybe a different rule or phonological process could explain this occurrence. He uses Natural Generative Phonology (Hooper, 1979) which he says cannot satisfactorily account for this alternation. An analysis of the similar and contrastive features would enable us get a phonetically plausible explanation in the two forms. This change is not accidental since it has been attested in more than one word in Dholuo therefore morphologically speaking it would be termed as a regular, unmarked form since its occurrence is predictable. On a basic examination the sound [l] and the alternant [ⁿd] are both coronals.

This paper seeks to argue that some of these morphophonemic changes are motivated by consonant harmony. This paper also examines the phonetic and phonological properties that define coronal harmony in Dholuo and the motivating factors behind the non-occurrence amongst the coronals. An examination would help establish if the co-occurrence restriction is motivated by place of articulation rather than manner of articulation feature.

3.0. Theoretical Framework

This investigation was based on the Optimality Theory (hereafter OT), originally developed by Prince and Smolensky (1993). Different scholars have adapted OT and further elaborated the original work (McCarthy & Prince, 1993; Rose & Walker, 2001 & 2004 and McCarthy, 2002). OT is a linguistic model proposing that observed forms of a language arise from the interaction between conflicting constraints. OT models grammars as systems that provide mappings from inputs to outputs. The inputs are conceived as the underlying representations and the outputs as the surface realizations. OT is theory of phonology in which the rewrite rules as formulated in Transformational Generative Grammar (TGG) and NGP are replaced by constraints based on the output. The idea of constraint based model emanates from Universal Grammar. There are three basic components of OT namely, GEN, CON and EVAL (cf. McCarthy & Prince 1993). GEN the generator supplies or generates an infinite number of candidates, or possible realizations of an input. The candidates include ones identical to the input, slightly different from it, or seemingly unrelated ones. The candidates are possible output forms that are placed for evaluation or assessment using a system of constraints to select the optimal form (the one that best satisfies constraint set). OT supposes that there are no language-specific restrictions on the input. This is called the richness of the base. Every grammar can handle every possible


input. The grammar of a language (the ranking of constraints) determines which of the infinite candidates will be assessed as optimal by EVAL (McCarthy & Prince 1993)

CON is the same in every language but languages differ in the ranking of the CON. OT predicts that there cannot be more grammars than there are permutations of the ranking of the CON. The number of possible rankings is equal to the factorial of the total number of constraints. Two languages could generate the same range of input-output mappings but differ in the relative ranking of two constraints which do not conflict with each other (Prince & Smolensky 1993). There are two types of constraints: faithfulness and markedness constraints. Faithfulness constraints demand that the input and output structures are maximally similar. The observed surface form (the output) match the underlying or lexical form (input) in some particular way, that is, these constraints require identity between input and output forms. This constraint is conservative since it requires the input structure to be preserved in the output. Markedness constraints impose requirements on the structural well-formedness of the output. Each constraint plays a crucial role in this theory. Faithfulness constraints prevent every input from being realized as some unmarked form, and markedness constraints motivate changes from the underlying form.

EVAL the evaluator selects the candidate that best satisfies the constraint system as the actual output. The main proposal of OT is that constraints are violable and they are ranked such that a lower ranked constraint can be violated in the optimal output in order to satisfy some higher ranked constraint. Universal Grammar specifies the set of constraints, but ranking is on a language- specific operation. Whenever there is a constraint conflict, the candidate which violates the lowest ranked constraint is the best. While in a gradient constraint, the candidate which ranks the least is the best. In case of a tie, all the surviving candidates are tested recursively against the rest of the hierarchy. The optimal member of a set is the output.

Once the winner is found, the lower-ranked constraints are irrelevant. This can be illustrated by the following schema where the basic conventions of constraint tableau are listed as well.

Table 2: Basic conventions of a constraint tableau

Candidates	A	B	C	D
Cand 1	*!			*
Cand 2		*!		
Cand 3			**!	
Cand 4 			*	***

Adapted from McCarthy and Prince (1993, p.6-7)

Candidates 1, 2, 3 and 4 refer to the various inputs generated by GEN. A, B, C and D refer to constraints. While left-to-right order mirrors the dominance order of the constraints. A dotted line signals that the constraints in question are not ranked with respect to each other. Violation of a constraint is indicated by an asterisk *. Satisfaction is indicated by a blank cell. The symbol [!] indicates fatal violation, the one that is

responsible for a candidate’s non-optimality. It highlights the point where the candidate in question loses to other more successful candidates. The pointing finger [☞] indicates the optimal candidate. Shading indicates the irrelevance of the constraint to the fate of the candidate. A loser’s cells are shaded after the fatal confrontation and the winner’s when there are no more competitors.

4.0 Methodology

The study adopted the analytic research design. The researcher not only described the data as it is, but also attempted to analyse and explain the consonant harmony phenomena as it occurs. The study population included all Dholuo words. The sampled population included spoken texts consisting of transcripts of digital audio material in Dholuo which was recorded from radio programs aired in a local station, Radio Lake Victoria. The data collected consisted of words which were selected, transcribed phonemically, and organized thematically according to the articulatory features. Library research was used in collating information on theoretical literature.

5.0 Presentation and analysis of Coronal Harmony Data

Coronal sounds are produced by the blade of the tongue raised towards the front teeth, the alveolar ridge or the hard palate (Katamba, 1989). Coronal sounds in Dholuo are alveolars and the dentals. The other coronals like palato- alveolar and retroflex are not found in Dholuo phonemic inventory. In Dholuo, there is a co-occurrence restriction between the alveolars and the dentals, i.e alveolars cannot co-occur with dentals in one word. The alveolar sounds in Dholuo are / t, d, s, l, r, n, ⁿd/ while the dental sounds include /θ, ð, ⁿð/. The dentals /θ, ð, ⁿð/ cannot co-occur with these particular alveolar sounds / t, d, ⁿd/ in a single word. The other alveolar sounds /s, l, r, n / co- occur with the dentals.

5.1 Dental vs dental contrasts

A dental consonant is articulated with the tongue against the upper teeth. The upper teeth acts as the passive articulator while the tip of the tongue as the active articulator. In interdental, the airflow is restricted (impeded) when the tongue-tip is caught between the teeth. These dental sounds may be either voiced or voiceless. Dental sounds in Dholuo usually co-occur with each other. This can be illustrated as follows:

Data set 1: [θ-θ] voiceless vs. voiceless dental fricative

Word	orthography	gloss		gloss
a) /θôθ/	thoth	‘many/much’	b) /θieθ/	thieth ‘treatment’
c) /ɔθî:θ/	othith	‘reed’	d) /θô:θ/	thûth ‘weevil’

Data set 1 above illustrates the voiceless dental fricative contrasting with a similar sound / θ-θ/. The consonantal phonemes in the data correspond in terms of place of articulation and voice specification. Rose and Walker (2004) posit that in order to have consonant harmony then a language must have both highly

ranked surface correspondence constraints and highly ranked IDENT-CC constraints that require surface segments in correspondence with one another to share identical specifications for some feature. The IDENT-CC constraint works together with these other constraints:

(2) ID-CC [dist] adapted from Mackenzie (2005)

Surface segments in correspondence with one another agree for the feature distributed (dentals are [+dist] while alveolars [-dist]).

(3) CORR [$\theta \leftrightarrow \theta$]

Surface segments be identical in all aspects (ensures that the dental-dental contrast is established).

(4) ID-CC [voi]

Maintain identity of voice specification. One violation is incurred for each segment that differs in voicing between the input and output.

(5) ID-IO [+dist]

Input and Output correspond for feature [+ dist]. This demands that dental segments in the input are realized as dental segments in the output.

(6) Input [$\theta \hat{\sigma} : \theta$] ‘many/much’

$\theta \hat{\sigma} : \theta$	ID-CC[dist]	CORR $\theta \leftrightarrow \theta$	ID-CC[VOI]	ID-IO[+dist]
a. $\theta \hat{\sigma} : t$	*!	*		*!
b. $\theta \hat{\sigma} : \delta$		*	*	
c. $\theta \hat{\sigma} : \theta$				
d. $\delta \hat{\sigma} : \delta$		*		

In the analysis, (a) fails because it violates ID-CC [dist] which constrains dentals from occurring with alveolars in the output. Dholuo restricts this occurrence especially where there are contrastive dental or alveolars. This is a fatal violation. (b) is a faithful candidate to the dental feature [+ dist], however, fails to satisfy surface correspondence constraints between the input and the output in terms of voicing (CORR $\theta \leftrightarrow \theta$ and ID-CC [VOI]’, (c) is the optimal candidate as it incurs no violations, harmony results when highly ranked faithfulness constraints are satisfied especially those that demand surface segments to be in correspondence in each other. (d) incurs violations in terms of input-output correspondence in terms of voicing so it is outranked by (c) in that front.

Data set 2 : [ð-ð] voiced vs. voiced dental fricative

word	orthography	gloss
a) /ðó:ðò/	dhodho	‘suckle’
b) /ðé:ðé/	dhedhe	‘kind of a bird’
c) /ðé:ðó/	dhedho mach	‘ to make a bonfire’

The data set 2 illustrates the co-occurrence of voiced dental fricatives /ð-ð/. The surface correspondence CORR-T↔T (Rose and Walker, 2004), applies here too, however, it is adapted to constrain output to only the voiced dental segments thus [CORR-ð↔ð], surface segments surface segments in correspondence relations must be voiced dentals. In a tableau analysis, ID-CC constraints are applied as in (6) which are faithfulness constraints.

(7) Input [ðó:ðò] ‘to suckle’

/ðó:ðò/	ID-CC[dist]	CORR-ð↔ð	ID-CC[voi]	ID-IO[+dist]
a. ðó:dò	*!	*!		*!
☞ b. ðó:ðò				
c. ðó:θò		*	*	
d. θó:θò		*!	*	

In the tableau, candidate (a) incurs many violations the worst of them being ID-CC [dist] that requires segments to agree with one another for the feature distributed and in this case both must be [+dist] but /d/ is [-dist] creating a disharmonic form. (b) is the winner as it satisfies ID-CC and surface correspondence constraints. (c) and (d) though faithful to the feature distributed lose out due to failure to correspond to the input-output voice specification and even the surface voice specification demands.

According to Rose and Walker (2004) surface correspondence constraints CORR-T↔T that demands surface structures to be identical must be the highly ranked faithfulness constraint if harmony is to be achieved. These constraints ensure that all consonants are in total correspondence in terms of place, manner and voicing creating total or complete harmony. According to MacEachern (1997) consonants should be identical in all respects. This concurs with the proposition by Rose and Walker (2004) about surface correspondence. MacEachern (1997) proposes a constraint referred to as BEIDENTICAL that explicitly demands total identity between consonants. Dholuo data sets 1 and 2 attest to this fact. He posits that Complete Identity Effects (CIEs) arise when multiple different IDENT-CC constraints work together so that disagreement on any feature leads to dissimilation. Dholuo data reveals that dentals can interact but may not necessarily be identical in every sense. This can be exemplified in Data set 3.

Data set 3: Co occurrence of voiced vs. voiceless dental fricative

word	orthography	gloss
a) /θe:ðo/	thedho	‘forge iron’
b) / θÍêð̃/	thiedho	‘to treat’
c) /ð̃:θ/	dhoth	‘suckling’
d) /ð̃:θ/	dhuth	‘causing conjunctivitis’

Data set 3 illustrates the co-occurrence of the voiced and voiceless dental fricatives in both initial and final positions in a word. These two sounds are contrastive in that /θ/ is voiceless while /ð/ is voiced. The phonology of the language permits this occurrence. Therefore the surface correspondence of segments need not be in all features and but at least some. Coronal harmony is as a result of identity in some respects and not necessarily complete identity.

Rose and Walker (2004) propose another surface correspondence constraint:

(8) CORR-T↔D

This constraint demands correspondence between segments that have same manner and place but differ in voicing (adapted from Rose and Walker, 2004).

(9) Input [θe:ðo] ‘to forge iron’

θe:ðo]	ID-CC[Dist]	ID-IO[+dist]	ID-CC[voi]	CORR-[θ/ð]	CORR-C↔C
a. θe:do	*!	*!		*!	*
b. ðe:ðo			*	*	
c. θe:ðo					*
d. θe:θo			*	*	

Candidate (a) violates most constraints, therefore a fatal candidate, violates co occurrence restrictions between dentals and alveolars. (b) is unfaithful to input-output correspondence in voice specification and surface correspondence demands on contrast on voice specification c) the demand on complete identity is not highly ranked since surface forms from Dholuo data reveal that voice contrasts between dentals within a word have been attested. (c) the winner, faithful to ID-CC constraints.(d) loses out on input-output correspondence in

voice specification . As long as they demand of place of articulation constraints are met; the phonology of the language permits disagreement in voice specification between the surface forms.

An interesting observation amongst the Luo who speak the B-U dialect is in the word ‘thieth’ /θiêθ/ which means treatment. It is pronounced which as chieth /ciêθ/ as illustrated in (9).

(10) Onyango nodhi e chieth (BU dialect version of thieth “treatment)

‘Onyango went for treatment (in hospital)’

The words /ciêθ/ vs. /θiêθ/ both mean ‘treatment’. This gives a contrast of [c- θ] rather than [θ-θ]. This dialectal variant causes dissimilation because a palatal contrasts with a dental. Dissimilation is a phonological process whereby sounds which are similar and therefore difficult to articulate are made more auditorily distinct or perceptible. This dissimilation causes disharmony as the two consonants no longer match in the phonological properties. The phonemes /c/ a palatal stop and /θ/ dental fricative have both been used in the same context (word-initial) to bring the same meaning. If [θiêθ] is hypothesized to be the Proto-Luo word then analysed in OT terms:

(11) input [θiêθ]

θiêθ	ID-CC[dist]	CORR-θ↔θ	ID-IO[dist]	ID-CC[voi]
a. θiêθ				
b. ciêθ	*	*!	*!	

i) /c.. θ/ disharmonic output- palatal...dental

ii) /θ.. θ/ harmonic output dental... dental

The phonemes /c/ and /θ/ are in free variation in this context since the use of either of the does not result into a change in meaning. This free variation is attested only in B-U dialect. In a different context, /c/ and /θ/ are distinct phonemes (resulting into a difference in meaning), as can be seen in the minimal pairs /cô:θ/ ‘completely’ and /θô:θ/ ‘weevils’

5.2 Alveolar contrasts

Data set 4 : Alveolar vs alveolar contrasts

Word	orthography	gloss
(a) /tú:tó/	tutu	‘pus’
(b) /té:tnì/	tet-ni	‘shivering’
(c) /te:do/	tedo	‘to cook’
(d) /dódó/	dodo	‘kind of music’
(e) /dó:dó/	dudu	‘name of a person’
(f) / dé:dé/	dede	‘insect’
(g) /dûtō/	duto	‘all’

From the data above (a) and b) illustrate /t-t/ co-occurrence, while (c) illustrates /t-d/, then (d),

(e) , (f) illustrate /d-d/ and (g) illustrates /d-t/. This can be summed up as: / d-t/, /t-t/, /t-d/, and /d-d/ contrasts are all allowed in the language in both initial and final positions.

The data sets 1,2 and 3 reveal that dentals contrast with dentals while data set 4 shows alveolars contrast with alveolars. For instance, /t-d/ and /θ-ð/ contrast but not */t- ð/ or */θ-d/ in words like, /tedo/ and /θeðo/ but not */θe:do/ or */teðo/ respectively.

(12) A summary of co-occurrences patterns between alveolars and dentals

- a. d-t t-t t-d d-d
- b. ð-θ θ-θ θ-ð ð-ð
- c. *d-θ *t-θ *t-θ *d-ð
- d. *ð-t *θ-t *θ-d *ð-d

From the summary (a) and (b) are allowed combinations while (c) and (d) are disallowed. However, there are some compound words in the language which permit certain disallowed combinations.

Data set 5: Alveolar and dental combinations

(13)	Word	Orthography	Gloss
	(a) /ðɔ:t/	dhoot	‘door’
	(b) /ðɔ:údl̩/	dhouði	‘doors’

Data from Dholuo reveal combinations */ð-t/ and */ð-d/ which are ordinarily disallowed in the language since they violate the dental /alveolar contrast. This could be explained by the fact that the words are formed from two different words in (a) dhoot which is derived from dhog ot ‘house’s mouth’ literally which means ‘a door’ as a compound noun while (b) is the plural form dhog udi ‘houses’ mouths’ which means ‘doors’. In the compound word, when /g /which is the final consonant in the first compound is elided the vowel /ɔ/ is lengthened to compensate for the loss of the consonant /g/ and vowel /ɔ/, /ðɔ:g ɔt/ becomes /ðɔ:t/. This is a disharmonic output since a dental occurs with an alveolar.

5.3. Contrastive patterns of alveolars and dentals

As already mentioned dentals co-occur with dentals while alveolars with alveolars, however, in the nasals and liquids series there are alveolars /l,r,n/ and yet no dentals */l,r,n/ to contrast with .

Table 2: Contrastive patterns of alveolar and dentals in Dholuo

	Dentals	Alveolar
Voiceless	θ	t
Voiced	ð	d
Prenasal stop	ⁿ ð	ⁿ d
Nasal		ⁿ
Liquids		r,l

From the table it can be observed that in Dholuo there is alveolar nasal [n] and no dental nasal; alveolar liquids [r,l] and no dentals liquid to contrast with. The contrastive alveolar consonants [t,d] will trigger harmony unlike the redundantly alveolar sonorants like [n], [l] and [r]. Cases of alveolar nasal and alveolar liquids co occurring with the dentals were attested in this study.

Data Set 6 :

	word	orthography	gloss
a)	θó:nò	thuno	‘breast’
b)	ðá:nò	dhano	‘human being’
c)	θû:ð-nō	thudhno	‘numbness’
d)	ló:θ-nì	lothni	‘to be loose’
e)	ló:ð-nì	ludhni	‘to be in want’

The data reveals that the nasals and liquids are blocked from participating in the co-occurrence restriction. The nasal [n] freely co-occurs with both dentals and alveolars without incurring any violation of the co occurrence restrictions. Dental nasals are not realised in Dholuo even where an alveolar nasal appears close to a dental sound as in examples (d) and (e). This could be due to the fact that the dental and the alveolar do not fall within the same syllable. However, in Anywa, a Western Nilotic language, [n] may not occur with a dental stop, rather a dental nasal [ɲ] appears allophonically in roots that contain the dental stops (Reh,1996).

(14) Dental vs. alveolar contrasts from Anywa (Reh, 1996)

a) ɲuɖo	‘to lick’	c) nuudo	‘to press something down’
b) tuɖ	‘ropes’	d) tuud	‘pus’
		e) oɖooɲ	‘mud’

(15) Dental / alveolar contrast in Pãri (Andersen, 1988)

a. tuɔɲ	‘male’
b. ɲɔɖ	‘sucking’
c. ɖa:ɲ-ε	‘person,ergative’

The data from Anywa and Pãri show that the nasal is not barred from participating in the dental /alveolar harmony nor is neutralized like in the case of Dholuo, instead an allophone which is a dental nasal [ɲ] is realized. The dental nasal therefore contrasts with the alveolar nasal [n]. Contrast is therefore not the only factor to be considered in selecting participant in harmony. The notion of contrasts obtains in Anywa and Pãri

but not in Dholuo. Dholuo lacks a dental nasal counterpart to contrast with the alveolar, however, it does not create an allophone therefore allowing ‘disharmonic’ forms when the alveolar nasal becomes neutral thereby blocking the propagation of harmony property. The lack of a dental nasal in Anywa is an accidental gap, that means it is not required by the system of contrasts in the language while the lack of a dental nasal in Dholuo is a systematic gap and structure preservation will rule out the creation of a [+ distributed] dental nasal (Mackenzie, 2005).

The lack of a dental nasal in Dholuo is debatable. In a prenasalised dental stop [ʰḏ] there is possibility of articulating the nasal at the dental region thereby creating a dental nasal in that environment. This is a marked cluster. This can be illustrated as follows:

Data set 6

a) ʰḏi:wa	ndhiwa	‘place’
b) ʰḏa:ḏu	ndhandhu	‘taste’
c) ʰḏi:ḏo	ndhindho	‘to feel pins and needles’
d) ʰḏo:ḏo	ondhundho	‘bone marrow’

In the articulation of the prenasalized dental stop the tongue-tip makes contact with the upper teeth air is blocked as a result. The impeded air is then released through the nasal cavity. There may be no dental nasal in the system of contrasts but it occurs as an allophonic variant in a prenasalized compound, [ḏ] rather than [n]. The initial nasal sound is not articulated at the alveolar ridge; rather the tongue tip touches the dental region. This creates a dental nasal allophone due to assimilation at the place of articulation which is the dental region. This kind of assimilation is referred to homorganic nasal assimilation; where a nasal preceding a consonant becomes more like it (Katamba, 1994).

In conclusion, Dholuo data reveals that the notion of contrast applies only if there is a contrastive sound in the inventory. Lack of a dental nasal in Dholuo inventory blocks the propagation of co occurrence restriction. Alveolar nasal therefore cooccurs with dentals . Literature on Bumo Izon an Ijoid language reveals that the voiced velar and labio velar stops do not participate because they lack a partner at the same place of articulation that differs in terms of pulmonic /implosive distinction (Mackenzie, 2005). Consonant harmony therefore depends on the phonemic inventory of a language. Anywa may be a Western Nilotic language just like Dholuo but its system of contrasts differs in that a dental nasal allophone is created to contrast with alveolar nasal. In Anywa, contrast is a factor in coronal harmony. Phonological processes such as assimilation are language specific since a phenomenon may obtain in one language but may be unattested in another. The two languages are related in a diachronic perspective but their phonemes pattern differently.

5.4 Root internal coronal harmony

(16) Root final alternations that lead to coronal harmony in Dholuo

Nom.sg	Nom pl.	Gen. sg		
(a) tíɛ́lɔ́	tiende	tiend	[t..nd]	‘foot’
(b) tɔ̀:l	tɔ̀:nde	tɔ̀:nd	[t..nd]	‘rope’
(c) dwô:l	dwô:ndé	dwô :nd	[d...nd]	‘voice’

In (16) root final consonant /l/ changes to /nd/. The alveolar lateral /l/ changes to a prenasalised alveolar stop to match with initial alveolar stops /t/ and /d/. The shared feature is [-continuant, -distributed] while /l/ is [+continuant, +distributed]. This results to coronal harmony. The root final stops are a result of morphophonemic alternations in the grammar of Dholuo (Okombo, 1982). Most Western Nilotic languages make use of the root-final alternations in their inflectional and derivational morphology (Andersen 1988, 1999; Tucker 1994; Reh 1996; Okombo, 1982). The root final stops are a product of final mutation combined with affixation match the dental or alveolar property of the initial stop. Some of these morphophonemic alternations are an attempt by the phonology of Dholuo to harmonize consonants within a word. The consonants become more similar in their phonological properties and in this case both initial and final.

6.0 Conclusion

Coronal harmony in Dholuo occurs amongst the dental and alveolar consonants. There is a co occurrence restriction barring alveolars from occurring with dentals. The defining phonological property here is the feature distributed [dist]. Alveolar consonant are distinguished by the feature [-dist] while the dentals are distinguished by the feature [+dist]. There are exceptional cases where dentals co occur with alveolars and this could be attributed to the contrasts in the system. The co occurrence restrictions apply only in cases where the dentals contrast with alveolars. However, in the cases of alveolar nasal there is no dental nasal to contrast with. It therefore co occurs with dentals.

7.0 References

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