Feature Correspondence amongst Dholuo Coronals

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Abstract

This paper discusses the nature of correspondence amongst Dholuo coronals. This can be approached in two ways, either as feature spreading or feature agreement which seem to be controversial in literature. Dholuo coronal harmony involves action at a distance; it spans over vowels and/or consonants. Data reveals that features affected are non contiguous and therefore only the targeted elements are affected. The fact that coronal harmony affects non-local segments rules out feature spreading. The alveolar nasal blocks the propagation of harmony phenomena as it remains unaffected hence co occurs with dentals. The existence of transparent elements within the spreading domain weakens the hypothesis of feature spreading amongst Dholuo coronals. Coronal harmony takes place when segments agree in the specification for the feature distributed [±dist].

Key words: coronal, harmony, correspondence, spreading, agreement and optimality

1.0 Introduction

1.1 Dholuo Coronal Harmony

Coronal harmony in Dholuo refers to the co- occurrence restriction on dental and alveolar obstruents and nasals. Alveolar and dental consonants are not allowed to co-occur within roots in Dholuo. Alveolars like /l,r,n,s/ which do not have a dental counterpart in Dholuo phonemic inventory, co-occur with dentals and alveolars.

1) Dental and alveolar restrictions

a) /θô:θ/	thûth	'weevil'
b) /ðɔ́:ðɔ̀/	dhodh	'suckle'
c) θe:ðo/	thedho	'forge iron'
d) /té:tnì/	tet-ni	'shivering'
e) /te:do/	tedo	'to cook'
f) /dódó/	dodo	'kind of music'

2) A summary of co-occurrence patterns between alveolars and dentals

i.	d-t	t-t	t-d	d-d
ii.	ð-θ	θ-θ	θ-ð	ð-ð
iii.	*d-θ	*t-θ	*t-θ	*d-ð
iv.	*ð-t	*θ-t	*θ-d	*ð-d

The coocurrence restriction of dentals and alveolars is a western Nilotic phenomenon as seen Päri (Andersen, 1988), Shilluk (Gilley, 1992) and Mayak (Andersen, 1999). Päri has dental nasal [n̪] counterpart for the alveolar nasal [n]. Anywa creates an alveolar nasal allophone (Mackenzie, 2005). This therefore means that

the alveolar nasal participates in the co-occurrence restriction unlike Dholuo where the alveolar nasal is blocked from participating since there is no dental nasal counterpart. There being no dental nasal counterpart for the alveolar, the alveolar nasal blocks the propagation of harmony property, /n/ is consistently alveolar and is neutral to coronal harmony since it co-occurs with dentals.

3) Co- occurrence of alveolar nasal with dentals

a)	θǿ:nɔ̀	thuno	'breast'
b)	ðá:nɔ̀	dhano	'human being'

2.0 Literature Review

Consonant harmony is a phonological phenomenon that requires that sounds within particular words match in terms of their phonetic or phonological properties. It also refers to a kind of assimilation, in which a segment affects another distant segment with similar features (Lee, 2009). Based on the definition it would be important to establish if consonant harmony in Dholuo involves targeted consonants only or the intervening vowels are affected even if inaudibly. Issues of locality also arise, as to whether the assimilation is local or non-local; and whether the correspondence is as a result of feature matching or feature spreading (Hansson, 2001).

There are two approaches to consonant harmony: feature spreading (Goldsmith, 1975; Halle & Vernaugd, 1981; Shaw, 1991 and Gafos, 1996) and feature spreading (Rose & Walker, 2004).

Feature spreading based analyses of harmony consider locality of segments as an extremely important issue (Hansson, 2001). The class of target elements must be appropriately defined. In addition; any and all the intervening segments that are transparent to harmony must be unspecified on the tier which contains the spreading feature (F) otherwise harmony is blocked (Hansson, 2001). Shaw (1991) analyzes Tahltan coronal harmony as autosegmental feature spreading. She argues that when harmony is analyzed as feature spreading then it is bound by strict locality requirement and all segments within a spreading domain are participants that are targeted by the spreading feature. There is no skipping of segments. In reality, however; there are systems which display segmental opacity whereby a set of non-participating segment blocks the propagation of the harmonizing property. This approach to consonant harmony has been criticized by a series of works that investigate a wider typology of consonant agreement (Walker 2000, Rose and Walker, 2001 and Hansson, 2001).

Rose and Walker (2001) assert that the mechanism that underlies non-local agreement between consonants is not spreading but rather an identity effect that arises between the segments that are recognized to be similar. They further present a typology of long distance consonant agreement and demonstrate the importance of similarity between the interacting segments. This paper is interested in determining whether Dholuo consonant harmony is feature spreading where only local segments falling within the spreading domain are affected and those that cannot undergo feature spreading are blocked; or is it feature agreement which involves action at a distance where non-contiguous segments exhibit harmony phenomena and the intervening segments that do not correspond with those showing harmony are non participants. These two approaches to consonant

harmony create a problem of theoretical significance. The researcher would therefore seek to determine the nature of correspondence of consonants in Dholuo consonant harmony as either feature agreement or feature spreading or possibly both.

Hansson (2001) and Polgardi (2006) further enrich the claim that consonant harmony is about feature agreement which leads to correspondence and not feature spreading as earlier studies claimed.

Rose and Walker (2001) debate the idea of action at distance, a characteristic of consonant harmony. Their focus is to establish if feature agreement is as a result of spreading or correspondence. In non-linear phonology, the featural agreement phenomena have been analyzed as product of spreading. Shaw (1991) in the study of Chumash coronal harmony analyzes agreement for coronal subsidiary features among sibilants in Chumash as the product of the spreading feature [anterior], a daughter of the coronal node. The example in (4) below shows a spreading of the anterior feature from right to left.

(4) **cor** s – api –tso- us ‘he has good luck’

• • •

| |

□---------- [+ ant]

(Adapted from Rose and Walker, 2001, p.2)

The representation above is a gapped configuration which refers specifically to structures where feature linkage gaps across an intervening segment of which it is not an associated property.

Rose and Walker (2001) analyse Chumash sibilant harmony in terms of feature agreement and this differs from Shaw (1991) as illustrated in (10). Rose and Walker (2001) observe that the character of coronal fricatives and affricates is determined by the right most coronal sibilant. In example (5) a) agreement alters /s/ to /ʃ/ when preceding a root or suffix palato-alveolar and b) conversely /ʃ/ is realized as /s/ when preceding [s]. c) the rightmost sibilant can occur in a root or affix.

(5) a) ʃ-api-tʃo-it ‘I have good luck’ s-api-tso-us ‘he has good luck’

b) s-ixut ‘it burns’ ʃ-ilakʃ ‘it is soft’

c) uʃla ‘with the hand’ usla-siq ‘to press firmly by hand’

(From Shaw 1991, quoted in Rose & Walker 2001)

Rose and Walker (2001) approach consonant harmony as ‘Long-Distance Agreement through Correspondence (LDAC)’. Their chief assertion is that agreement is determined by identity constraints which check feature

matching in corresponding consonants, thereby obviating representations in which feature linkage skips over spans of neutral segments. Another key claim is that similarity plays a decisive role in identifying segments which stand in correspondence (Rose and Walker 2001, p.2). The configuration for LDAC as proposed by Rose and Walker (2001) is as represented in (6).

(6) LDAC Configuration

C_x V C_x V

| |

[αF] [αF]

↗ ↖ (Adapted from Rose and Walker, 2001, p.2).

In this structure a certain relation has been established between two consonants as indicated by coindexing. The featural agreement comes about through the activity of constraints that enforce identity between corresponding segments.

This paper is interested in establishing how harmony manifests, that is, whether harmony in Dholuo is as a result of feature spreading or correspondence is as a result of feature agreement. From the literature, featural agreement is better able to explain the skipping of intervening segments which remain unaffected by harmony since here the target is matching consonants. Those which do not match are overlooked (Rose & Walker, 2001). Consonant correspondence due to featural agreement can therefore explain harmony affecting non-contiguous segments.

Rose & Walker (2001) proposed the following types of agreement based on LDAC. These include nasal agreement, liquid agreement, laryngeal agreement and coronal agreement. Nasal agreement over intervening vowels and consonants is found in Kikongo. The key property of nasal agreement that distinguishes it from nasal harmony is that the intervening vowels and other consonants are not nasalized.

(7) Nasal agreement in Kikongo perfective affix (adapted from Rose & Walker, 2001,p.4)

a) m-bud-idi	'I hit'	n-suk-idi	'I washed'
b) tu-kin-ini	'we planted'	tu-nik-ini	'we ground'

In Kikongo suffix consonant phoneme is realized as [d] or [l] when oral. The consonants that participate in nasal agreement are approximant consonants and nasals which share the property of being sonorants, and voiced stops and nasals which share the property of being voiced non-continuants.

Rose and Walker (2001) further observe that the typology of LDAC includes nasal agreement found over intervening vowels and consonants in Kikongo (cited in Odden, 1994), liquid agreement operates over intervening vowels and other non-liquids in Kipare (Odden, 1994), laryngeal agreement where the laryngeal features are [voice], [spread glottis] and [constricted glottis] (Lombardi, 1991), and coronal agreement which include sibilant agreement in Chumash and Navaho (Hayward,1990), dental agreement which is particularly

prevalent in Nilotic languages such as Mayak (Andersen, 1999), Shilluk (Gilley, 1992), Anywa (Reh, 1996) and Luo (Tucker, 1994).

3.0 Theoretical Framework

The study is modeled on Optimality theory as developed by Prince and Smolensky (1993) and McCarthy and Prince (1993). In this framework the underlying and surface forms are related formally. An optimal form is selected from a wide set of candidates based on the constraints. These constraints are universal though languages differ on the rankings. 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. CON is the same in every language but languages differ in 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. OT proposes 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. The optimal member of a set is the output.

4.0 Methodology

The study adopted the analytic research design. 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 domain of coronal harmony in Dholuo is the word; therefore the unit of analysis consists of words that display coronal harmony. 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.

4.0 Data presentation analysis and discussion

4.1 Coronal harmony

Dholuo coronal harmony data reveals that features affected are non contiguous. It involves action at a distance; spans over vowels and/or consonants. Action at a distance involves assimilation processes in which the trigger segment and affected segment are adjacent (Ni Chiosain and Padgett, 1997).

(8) Data for coronal harmony in Dholuo

a) /ðɔ́:ðɔ́/	dhodho	'suckle'
b) /dé:dé/	dede	'grasshopper'
c) /tá:dò/	tado	'roof'
d) /θû:ðnò/	thudhno	'numbness'

From the data of coronal harmony, only the targeted elements are assimilated. The targets are (a) dentals (b-c) alveolars (d) a disharmonic form where the alveolar nasal violates the co occurrence restriction with dentals. Data in (a), (b) and (c) display the co occurrence restriction between dentals and alveolars. The alveolar nasal as exemplified in d) is transparent to harmony and therefore not a participant to the co occurrence. It patterns in the schema in (9)

(9) Action at a distance i) $C_xV_yC_z > C_zV_yC_z$ consonant harmony

ii) $C_xV_yC_zC_x > C_z V_yC_zC_x$ transparent element

(Adapted from Rose and Walker, 2011 p. 240)

In (i) Here only the consonants are targeted by the harmonizing feature which explains the data in(8) a-c, the vowels in-between remain audibly unaffected. Schema 9 (ii) shows that some consonants are assimilated by the harmonizing feature yet other consonants remain unaffected like in 8(d) the nasal remains redundantly alveolar. The fact that the assimilation targets other elements and leaves others out raises the debate on nature of correspondence as either feature matching or spreading. If it is feature matching then only the targeted elements are affected; if feature spreading then all the elements within the spreading domain are affected such that those that remain unassimilated are considered to be blocked.

(10) Continuous harmony $C_xV_yC_z > C_zV_zC_z$ vowel consonant harmony

(Rose & Walker, 2011)

In continuous harmony (10), all the elements assimilate to the harmonizing feature including the vowels. Harmony where contiguous elements are affected is referred to vowel-consonant harmony (Hansson, 2001). This process is only possible in feature spreading.

4.2 Feature Spreading

Feature spreading affects all segments except those transparent to harmony. When harmony is analysed as spreading it involves the autosegmental feature spreading (Goldsmith, 1990). Each harmonizing feature occurs on its own tier. A feature connection with a segment is represented using an association line which links the feature to the rootnode.

(11) feature spreading Vs feature agreement

[tedo] 'to cook'

(a) t e d o Feature Agreement

[+cor,-cont] [+cor,-cont]

(b)

t e d o Feature spreading

[+cor] [-cor]

In feature agreement in (a) the segments with similar phonetic features are matched. The association lines are straight. The segments that are not in correspondence with those showing harmony are non-participants. They are unaffected since they lack the harmonizing feature. In (b) the coronal node spreads its feature skipping the intervening segment which is a vowel. Feature spreading predicts the possibility that harmony may be blocked by intervening segments that cannot undergo spreading. Coronal harmony only targets coronal consonants. If the intervening segments are specified for another feature it may lead crossing of lines as illustrated based on the feature coronal. The association lines must not be crossed based on the No Crossing Constraint (NCC), (Goldsmith, 1976; Coleman & Local, 1989 and Odden, 1994). The NCC prohibits the spreading over of a feature specified on the same tier. This will result to blocking of harmony because spreading over that would cause line crossing. The intervening vowels and consonants are subject to blocking. The blocker (opaque segments) prevents harmony since it is not affected. In coronal harmony in Dholuo, there is a co occurrence restriction between dentals and alveolars. However, the alveolar nasal does not get affected by the harmonizing property. It blocks the propagation of harmony even when it co-occurs with a dental. Cases of alveolar nasal co occurring with the dentals have been attested. This can be illustrated as follows:

(12) Co occurrence of alveolar nasal with dentals

a)	θó:nɔ̀	thuno	'breast'
b)	ðá:nɔ̀	dhano	'human being'
c)	θû:ðnō	thudhno	'numbness'

No dental nasal allophone is created to harmonize with the dentals. The harmonizing feature is not spread across the words in the illustration above. Autosegmental spreading is inadequate as a general model of consonant harmony (Hansson, 2001 & Rose and Walker, 2004). It does not adequately address the transparency of vowels and other consonants. The alveolar nasal is transparent to harmony.

An Optimality theoretic analysis of feature spreading is modeled under strict locality requirement on the segments. Feature spreading occurs between the root adjacent segments. Any and all segments falling within the harmony domain are participants (Hansson, 2001). Spreading basically involves the extension of one articulatory gesture and skipping of segments is therefore impossible. Ni Chiosain & Padgett (1997) posit that harmony is driven by alignment constraints such as [ALIGN-L] and [ALIGN-R].This constraint requires the feature in question to be extended as far as possible toward a particular edge of some morphological or phonological domain. The domain of harmony is within a word. Any segment incompatible with the spreading feature [±F] will block the propagation of harmony.

Gafos (1996,[1997]) suggests the constraint ALIGN (TTCA, Word, L); this constraint is intended to spread an underlying Tongue-Tip Constriction Alignment (TTCA) specification to the left towards the beginning of the word, this is in relation to the discussion on Tahtlan Coronal harmony. If adapted to Dholuo coronal harmony, the researcher suggests the constraint ALIGN (TTCA, Word, R). The alignment is to the right toward the end of the word since directionality is left to right, whereby the root initial consonants affect the following consonants.

(13) Align R [TTCA]

Align to the right the property responsible for harmony.

(14) FAITH [TTCA] faithfulness TTCA [nas] [obs]

Input- Output correspondence to the place of articulation of the obstruent and nasal

(15) Input /θû:ðnò/ ‘numbness’

ALIGN R[TTCA]>> FAITH[OBS]>> FAITH[NAS]

[θû:ðnò]	ALIGN R [TTCA]	FAITH[OBS]	FAITH[NAS]
a. θû:dnò	*!	*	
b. tû:ðnò	*!	*	
c. θû:ðnò ☞	*		
d. θû:ðn̪ò	*!		*

From the tableau a, b, c violate the constraint that spreads the harmonizing feature ALIGN [TTCA, R]. The tongue tip gesture is not extended to the entire word, it is blocked by the nasal therefore the harmonizing feature is not fully propagated. Candidate d, wins based on this constraint, this however may not be realized in Dholuo. A dental nasal has been created with the right alignment. The nasal remains redundantly alveolar it is

not assimilated. The nasal is a blocker segment. Feature spreading creates a marked form. In this case a conflict arises between (c) and (d), since (c) has less violations than (d) , d) loses out having created an unfaithful candidate to the nasal specifications.

4.3 Feature agreement as motivation for consonant harmony

Feature agreement involves feature matching of segments that have similar phonetic features. Similarity determines which segments will participate in consonant harmony processes (Hansson, 2001; Rose and Walker, 2004 and Mackenzie, 2005).

In OT, agreement is determined by identity constraints which check feature matching in the corresponding consonant (Rose and Walker, 2001). In Dholuo, coronal harmony involves the dental/ alveolar cooccurrence restrictions. Dentals are prohibited from co-occurring with alveolar and vice versa. The property distributed [dist] is the defining factor. The alveolar are [- dist] while dentals [+dist]. Consonant harmony results when the sounds agree in the property distributed. This can be exemplified using the following constraint set.

(16) a) AGREE

Consonants agree in the place of articulation.

b) ID-CC [dis] adapted from Mackenzie (2005)

A faithfulness constraint that requires that surface segments are in correspondence with one another agree in the specification of the feature [distributed].

c) ID-IO [+dis]

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

d) ID-IO [-dis]

Alveolar segments in the input are realized as alveolar segments in the output.

(17) Input [te:do]

AGREE>> ID-CC [dis]>> ID-IO [+dis]>> ID-IO [-dis]

te:do	AGREE	ID-CC [dis]	ID-IO [+dis]	ID-IO [-dis]
a. te:do ☞			*	
b. θe:do	*!	*!	*	*
c. te:ðo	*!	*!	*	*
d. θe:ðo			*	*

From the table (a) is the winner since it does not violate the co-occurrence restriction between dentals and alveolars, both initial and second consonant are specified for the feature [- dist] which is a highly ranked constraint in the language. Both b) & c) incur a violation having a dental and an alveolar in the possible output form which leads to a fatal violation therefore cannot win; d) satisfies the highly ranked constraint AGREE and ID-CC but fails in the ID-IO [-dis], a faithfulness constraint which demands for input-output correspondence in the feature [-dis] which accounts for alveolar in the input therefore loses out to (a). The winning candidate is the one with least violations or no violations in this case. Harmony is motivated by constraints which require surface segments to be in a correspondence relation with one another (Hansson, 2001 & Rose and Walker, 2004). This correspondence is between input and output segments. For this correspondence to prevail between the input and output there has to be faithfulness constraints which demand the identity between the corresponding segments. Highly ranked faithfulness constraints will result to consonant harmony (Hansson, 2001; Rose & Walker, 2004 and Mackenzie, 2005). The faithfulness constraint AGREE is not satisfied when dentals co-occur with alveolars. Consequently, consonant harmony cannot take place as its effects are blocked. There are words in Dholuo which violate this constraint AGREE, for example alveolar nasal [n] is transparent to harmony. It does not participate in harmony since it is not affected by the co-occurrence restriction between dentals and alveolars.

5.0 Conclusion

Dholuo consonant harmony can be analysed as feature agreement rather than feature spreading. Feature spreading only works when the segments are local. The purpose of this paper was to further the continuing debate on nature of harmony which is not yet conclusive. Data from Dholuo, a Western Nilotic language reveals that coronal harmony is achieved when segments are agree on the feature distributed which is the distinctive feature between dentals and alveolars. However, agree constraints are violated when alveolar nasal co occurs with dentals creating disharmonic forms. Feature agreement achieves better descriptive adequacy since it is better able to explain the intervening segments which are not affected by the harmonizing property.

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