Title: Polar Tone in Kanuri

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1 Abstract

Polar tones are problematic for restrictive accounts of tonal phonology since they seem to require an equivalent off rules using alpha-notation assumed in Chomsky and Halle (1968). In this paper, I argue that the polar tone in Kanuri (Cyffer, 1992) verb inflection can be captured without mechanisms of this type and derives from independently motivated optimality-theoretic constraints. This is in a line with Antilla and Bodomo (1996) who also treat polar tones as an epiphenomenon of other constraints.

2 Introduction

In a number of tone languages specific constructions exhibit high tone in the context of a low tone, and low tone in the context of a high tone. This phenomenon is called "polar tone" in the phonological literature (see Yip, 2002:159; and references cited there). In Kanuri, a Nilo-Saharan language spoken around lake Chad in Northeastern Nigeria, Eastern Niger and parts of Chad (Lukas, 1937; Hutchison, 1981; Cyffer, 1992)[1], a polar tone arises in many verb paradigms, such as the imperfect forms. If the verb root bears a low tone as in (1a), the following tone on the suffixal string is high (or falling, i.e. high-low as in **sawandîn**). If the tone of the root is high, the following suffixes are low (1b):

(1) **Imperfect Paradigms**

a. *kar*, 'carve'

	sg	**pl**
1	karə́kin	karíyen
2	karə́min	karúwin
3	səgarîn	saarîn

b. *kúd*, 'bring'

	sg	**pl**
1	kúdəkin	kúdiyen
2	kúdəmin	kúduwin
3	súwúdin	sówúdin

The default position of the polar tone is the vowel after the root, which I interpret following Cyffer (1992) as an epenthetic vowel, which separates consonant-final roots and consonant-initial agreement suffixes. Only in the 3rd person forms, where the vowel-initial tense/aspect suffix **-in** directly follows the root, the high tone ends up on **-in**.[2] That tone polarity here is due to morphological reasons not due to a phonological restriction (say to a ban on adjacent syllables with the same tone) can be seen from the fact that adjacent low tones are allowed in

[1] All data in this paper are taken from Cyffer (1992)

[2] The same happens with all forms in vowel-final roots.

the suffix string, as in **lóriyen**, but also from the comparison with other paradigms. Thus in the perfect forms, all syllables of the suffix string except the aspect marker **-na** bear high tone, no matter whether the root has low (2a) or high tone (2b):

(2) **Perfect Paradigms**

a. *kar*, 'carve'

	sg	**pl**
1	karə́kə́na	karíyéna
2	karə́mma	karúwa
3	səgarə́na	saarə́na

b. *kúd*, 'bring'

	sg	**pl**
1	kúdə́kə́na	kúdíyéna
2	kúdə́mma	kúdúwa
3	súwúdə́na	sówúdə́na

It seems as if apart from the suffix **-in**, imperfect is expressed by inserting after the root the "opposite tone" to the tone associated with the root. However, attributing the polar tone to a morphological operation is conceptually problematic, since it is unclear whether morphological rules should have the expressive power to execute such polarity operations and a crucial part of the research program in prosodic morphology (and earlier: in autosegmental morphology) is just to eliminate procedural morphological operations and to reduce them to general phonological principles (e.g. reduplication, Semitic root-and-pattern morphology, etc.).

In this paper, I show that an analysis is possible which does not use any notion of polarity at all. The basic intuition is that imperfect **-in** is associated with the floating tone pattern H(igh) L(ow) which is not associated to syllables or segments. This pattern surfaces in both, high-tone and low-tone verbs, but in different positions:

(3)

Floating Tones:		H	L	H	L	
Segments/Syllables:	ka.	rə́	kin	kú	də	kin

These different positions result since the tones of the floating pattern can merge with identical tones which are underlyingly associated with roots and imperfect **-in**, as depicted in (4). The exact position is derived from general optimality-theoretic constraints on tone.

(4)

Floating Tones:		H	L	H	L	
Segments/Syllables:	ka.	rə́	kin	kú	də	kin
Associated Tones:	L		L	H		L

The rest of this paper is organized as follows: In section 3, I introduce the optimality-theoretic approach to tone mapping I assume in this paper. The analysis of polar tone in Kanuri is presented in section 4. In the following two sections, I show that the constraint ranking assumed for tone polarity is compatible with the tonal phonology in perfect paradigms (section 5) and prefixes (section 6). A short summary of the paper is given in section 7.

3 The Theoretical Framework

In the following I will use an optimality-theoretic approach to tone which makes crucial use of correspondence theory (McCarthy and Prince, 1994, 1995). The terminology and semantics of most constraints follows Yip (2002). I assume autosegmental representations where tone-bearing units (TBUs) are linked by association lines to tones, and both tones and TBUs have indices relating input- and output forms:

(5) **Input:**

kar$_5$ mo$_6$
| |
L$_1$ H$_2$ L$_3$ L$_4$

Output:

ka$_5$ rə̂m$_7$
| | \
L$_1$ H$_2$ L$_{3,4}$

As in (5), I will assume that the TBU in Kanuri is the syllable, and that syllables are also present underlyingly. An immediate problem is the correspondence between syllables in input and output which are not identical (such as kar and ka in (5)). I will assume here that syllables correspond if their nuclei (here: their vowels) correspond, but this assumption should obviously be replaced by a theory with specific constraints in a more elaborate account.

As in other phonological domains, there are specific faithfulness constraints which require that the output is maximally similar to the input. I will use her the following faithfulness constraints:

(6) **Faithfulness Constraints on Tone and Tone Association**

MAX-T	For each input tone there should be a corresponding output tone
DEP-T	For each output tone there should be a corresponding input tone
IDENT-T	Corresponding input- and output tones should be identical
NO-FUSION	Output tones should only bear one index
***ASSOCIATE**	For each output association line there should be an input line such that the respective anchors of the lines correspond
***DISSOCIATE**	For each input association line there should be an output line such that the respective anchors of the lines correspond

In addition, there are wellformedness constraints requiring that TBUs and tones are associated and as far as possible in a one-by-one fashion:

(7) **Markedness Constraints on Tone Association**

***FLOAT**	Each tone should be associated with at least one TBU
***SPECIFY**	Each TBU should be associated with at least one tone
***CONTOUR**	Each TBU should be associated with at most one tone
NOLONG-T	Each tone should be associated with at most one TBU

Finally, there are alignment constraints governing the position of tone. The one most crucial in the following was proposed by Zoll (1997) and is cited in the version of Yip (2002) in (8):

(8) **Align-L**: Each tone is assigned a violation for each TBU that intervenes between the one it is associated to and the left edge of the word (Yip, 2002:94)

I will use it here in the slightly modified version in (9):

(9) **Align-L**: Each tone **index** is assigned a violation for each TBU that intervenes between the one **its tone** is associated to and the left edge of the word

The formulations differ only for structures containing tones corresponding to more than one input tone. Thus (10):[a] is violated once by (9) and (8), but (10b) is violated once by (8), and twice by (9):

(10) a. $\begin{array}{cc} \text{ka} & \text{nu} \\ | & | \\ H_1 & L_2 \end{array}$ b. $\begin{array}{cc} \text{ka} & \text{nu} \\ | & | \\ H_1 & L_{2,3} \end{array}$

While the difference is minimal, we will see below that it has important consequences for tone mapping in Kanuri. The second alignment constraint to be used in the following (also proposed by Zoll, 1997) is **ALIGN-R(CONTOUR)**:

(11) **ALIGN-R(CONTOUR)**: Contours are linked to the rightmost TBU

The only additional constraint I will use is **NO-SPREAd**, a subconstraint of ***ASSOCIATE** which I will introduce below.

4 The Basic Analysis of Polar Tone

I will assume that verbal roots and TAM markers in Kanuri have tone specifications, but that agreement markers are underlyingly toneless just as epenthetic vowels. Imperfect **-in** has the tone pattern L H L, where only the last tone is lexically associated to the segments. (12) shows the underlying representations of a high tone (12a) and a low tone (12b) imperfect form (the 1st person forms from example (1)):

(12) a. $\begin{array}{cccc} \text{kúd} & & & \text{kin} \\ | & & & | \\ H_1 & H_2 & L_3 & L_4 \end{array}$ b. $\begin{array}{cccc} \text{kar} & & & \text{kin} \\ | & & & | \\ L_1 & H_2 & L_3 & L_4 \end{array}$

Since the melody encoded here is overtly realized in all forms, the constraints ***FLOAT** which prohibits tones not associated with TBUs, and **MAX-T** requiring that all input tones are represented by a coindexed output tone must be crucially undominated, excluding candidates like the ones in (13), where tones are deleted (H_2 in (13a)) or remain floating (H_2 in (13b)):

(13) **Input:** $\begin{array}{cccc} \text{kar} & & & \text{kin} \\ | & & & | \\ L_1 & H_2 & L_3 & L_4 \end{array}$

	*FLOAT	MAX-T	...
a. $\begin{array}{ccc} \text{ka} & \text{rə} & \text{kin} \\ \vert & \vert & \vert \\ L_1 & L_3 & L_4 \end{array}$		*!	
b. $\begin{array}{cccc} \text{ka} & & \text{rə} & \text{kin} \\ \vert & & \vert & \vert \\ L_1 & H_2 & L_3 & L_4 \end{array}$	*!		

I will also take it for granted that in output forms every syllable is associated to at least one tone enforced by the undominated constraint **SPECIFY** and that for each input tone there is maximally one output tone coindexed with (by undominated **UNIQUENESS**) As already noted, I assume that with high-tone roots the high tone of the imperfect pattern fuses with the high tone of the root. Technically, this means that in the output there is only one high tone H which is coindexed with both underlying tones (H_1 and H_2) as in (14):

(14) **Input:**

$$\begin{array}{cccc} \text{kúd} & & & \text{kin} \\ | & & & | \\ H_1 & H_2 & L_3 & L_4 \end{array}$$

Output:

$$\begin{array}{ccc} \text{kú} & \text{də} & \text{kin} \\ | & | & | \\ H_{1,2} & L_3 & L_4 \end{array}$$

This can be derived if the high-ranked constraint **ALIGN-L** dominates **NO-FUSION**. The floating high tome H_2 fuses with H_1 because it would otherwise be separated from the left word edge by one syllable leading to an additional violation of **ALIGN-L**. Violation of **NO-FUSION** is tolerated since this is ranked lower. No violation of **IDENT-T** occurs since H equals H for this constraint, no matter whether there are additional indices:

(15) **Input:**

$$\begin{array}{cccc} \text{kúd} & & & \text{kin} \\ | & & & | \\ H_1 & H_2 & L_3 & L_4 \end{array}$$

	IDENT-T	ALIGN-L	NO-FUSION
☞ a. $\begin{array}{ccc} \text{kú} & \text{də} & \text{kin} \\ \vert & \vert & \vert \\ H_{1,2} & L_3 & L_4 \end{array}$		$*_3*_4*_4$	*
b. $\begin{array}{ccc} \text{kú} & \text{də́} & \text{kin} \\ \vert & \vert & \vert \\ H_1 & H_2 & L_{3,4} \end{array}$		$*_2*_3*_3*_4!\ *_4$	*

In contrast, with low-tone roots, the first two tones can only fuse at the cost of an **IDENT-T** violation, since there is no tone which is H and L at the same time. Since **IDENT-T** is ranked higher, the additional violation of **ALIGN-L** is tolerated:

(16) **Input:**

$$\begin{array}{cccc} \text{kar} & & & \text{kin} \\ | & & & | \\ L_1 & H_2 & L_3 & L_4 \end{array}$$

	IDENT-T	ALIGN-L	NO-FUSION
a. $\begin{array}{ccc} \text{ka} & \text{rə́} & \text{kin} \\ \vert & \vert & \vert \\ H_{1,2} & L_3 & L_4 \end{array}$	*!	$*_3*_4*_4$	*
☞ b. $\begin{array}{ccc} \text{ka} & \text{rə́} & \text{kin} \\ \vert & \vert & \vert \\ L_1 & H_2 & L_{3,4} \end{array}$		$*_2*_3*_3*_4*_4$	*

A possibility to minimize **ALIGN-L** violations without getting in conflict with **IDENT-T** is to link the root segments with the low root tone and the floating high tone creating a falling tone on the root syllable as in (17):

(17)

```
ka   rə́   kin
| \  |     |
L1   H2   L3,4
```

This can be excluded by the high-ranked constraint ***CONTOUR** penalizing all TBUs associated with more than one tone:

(18) **Input:**

```
kar               kin
 |                 |
L1    H2    L3    L4
```

	*CONTOUR	ALIGN-L	NO-FUSION
☞ a. ka rə́ kin L_1 H_2 $L_{3,4}$		$*_2*_3*_3*_4*_4$	*
b. ka rə́ kin L_1H_2 L_3 L_4	*!	$*_3*_4*_4$	
c. ka rə́ kin L_1 H_2,L_3 L_4	*!	$*_2*_3*_4*_4$	

However, contour tones are possible in Kanuri verbs to preserve underlying tone which would otherwise be deleted. Since in imperfect forms this phenomenon is relatively rare, I will demonstrate this point with noun emphasis past (NEP) paradigms which have the same tone patterns as the imperfect forms, but segmental morphophonology which more systematically triggers falling tones. In NEP forms (19) instead of **-in** the suffix **-o** is used, underlyingly associated with the same tonal melody as **-in**. But, **-o** is actually deleted after vowels, m, and r leading to a falling tone on the final syllable when tone cannot be preserved by one-to-one mapping of syllables and tones or by tone fusion:

(19) **Noun Emphasis Past Paradigms**

a. *kar*, 'carve'

	sg	**pl**
1	karə́ko	karíye
2	karə̂m	karûw
3	səgarô	saarô

b. *kúd*, 'bring'

	sg	**pl**
1	kúdəko	kúdiye
2	kúdəm	kúduw
3	súwúdo	sówúdo

(20) **Input:**

```
kar          mo
 |            |
 L1   H2  L3  L4
```

	*FLOAT	MAX-T	IDENT-T	*CONTOUR	ALIGN-L	NO-FUSION
☞ a. ka rə̂m | | \\ L_1 H_2 $L_{3,4}$				*	$*_2*_3*_3*_4*_4$	*
b. ka rə̂m | | $L_{1,2}$ $L_{3,4}$			*!		$*_3*_4$	*
c. ka rə̂m | | L_1 H_2		*!*			$*_2$	
d. ka rə̂m | | L_1 H_2 $L_{3,4}$	*!				$*_2*_3*_3*_4*_4$	*

That a falling tone on the last syllable (20a) is preferred over a rising tone on the first syllable, i.e. the structure in (21) is due to the constraint **ALIGN-R(CONTOUR)** which requires that contour tones are as right as possible in the phonological word.[3] This constraint must be ranked above **ALIGN-L** since the latter constraint actually favors (21):[4]

(21)

```
ka       rəm
 |  \      |
 L1  H2  L3,4
```

(22) **Input:**

```
kar          mo
 |            |
 L1   H2  L3  L4
```

	ALIGN-R(CONTOUR)	ALIGN-L
☞ a. ka rə̂m | | \\ L_1 H_2 $L_{3,4}$		$*_2*_3*_4$
b. ka rəm | \\ | L_1 H_2 $L_{3,4}$	*!	$*_3*_4$

Note finally that with high-tone roots, structures such as (23) become optimal:

[3] Alternatively, one might invoke the markedness constraint ***RISE** which disallows rising tones. However, rising tones do exist in Kanuri, although rarely (Cyffer, 1992:114).

[4] For all other constraints, both candidates fare equally well.

```
       ku   dǝ̂m
(23)   |     |
      H1,2  L3,4
```

This is parallel to (20)-b but does not violate **IDENT-T** because the underlying root tone is also high. Since the high-root forms corresponding to (20)-a and (20)-b fare equally for all other constraints favoring (20)-b, (23) is the optimal candidate.

5 Tone in Perfect Forms

Recall that with perfect forms all material between the root and the perfect suffix **-na** has high tone. If there is only one syllable for which this is the case and the root has a low tone, the correct form follows straightforwardly from representing **-na** with a L tone associated to the vowel preceded by a floating high tone and the constraint ranking introduced above For the form karuwa we get the input representation in (24):

```
      kar        wna
(24)   |          |
       L1   H2    L3
```

Syllable structure and segmental constraints enforce the syllable structure **ka.ru.wa**. High-ranked **CONTOUR** and **IDENT-T** block formation of contour tones or fusion of tones (since all adjacent tones are different). Insertion of additional tones is excluded by **DEP-T** and all underlying tones must be realized and associated (by high-ranked **MAX-T** and ***FLOAT**). The only representation which satisfies all these constraints is the one-to-one mapping of tones and syllables in (25):

```
      ka   ru   wa
(25)  |    |    |
      L1   H2   L3
```

Since the mentioned constraints dominate all other relevant constraints, this form becomes optimal. Problematic for the constraint ranking so far are forms with two syllables between a low-tone root and **-na**, such as **karǝ́kǝ́na**. Consider the most plausible candidates in the pseudo-tableau in (26), again disregarding tone fussion, contours, floating tones, and unassociated syllables and the relevant constraints excluding these configurations. The correct form (26a) is here harmonically bounded by (26b). (26a) violates all constraint violation (26b) violates plus one additional violation of **ALIGN-L**. Hence (26a) should not become optimal under any ranking:

(26) **Input:**

kar   **kna**
| |
$\mathbf{L_1}$ $\mathbf{H_2}$ $\mathbf{L_3}$

	DEP-T	ALIGN-L	*LONG-T	*ASSOCIATE
☞ a. ka rə kə na |	/ | L_1 H_2 L_3		$*_2*_3*_3*_3$	*	**
b. ka rə kə na |	\ | L_1 H_2 L_3		$*_2*_3*_3$	*	**
c. ka rə kə na | /	| L_1 H_2 L_3		$*_2*_2*_3*_3**_3$	*	**
d. ka rə kə na |		| L_1 H_2 L_4 L_3	*	$*_2*_4*_4*_3*_3*_3$		**
e. ka rə kə na |		| L_1 L_4 H_2 L_3	*	$*_4*_2*_2*_3*_3*_3$		**

What is at stake here is obviously that association of an unassociated syllable with a floating tone is preferred to association with a tone which iks already associated to another syllable. I propose to capture this observation by the constraint **NO-SPREAD** in (27), which requires that for a tone which is already associated underlyingly, no new association lines should be inserted:

(27) **NO-SPREAD:** Count a constraint violation for each output association T_i – TBU_j such that there is an input association T'_i – TBU_k and $j \neq k$

NO-SPREAD is a specialized version of ***ASSOCIATE**. As ***ASSOCIATE** it penalizes insertion of new association lines, but in contrast to this constraint it does so only if the tone involved is already associated in the underlying form.[5] Notice that ***ASSOCIATE** even together with the other involved constraints does not suffice to capture the preference for (276) since all relevant candidates require insertion of an association line.

If **NO-SPREAD** is now undominated, we correctly predict the tone assignment for **karə̀kə́na**:

[5] In religious terms, ***ASSOCIATE** means celibacy, **NO-SPREAD**, fidelity.

(28)

kar kna
| |
L_1 H_2 L_3

	NO-SPREAD	DEP-T	ALIGN-L	*ASSOCIATE	*LONG-T
☞ a. ka rə kə na | | / | L_1 H_2 L_3			$*_2*_3*_3*_3$	**	*
b. ka rə kə na | | \\ | L_1 H_2 L_3	*!		$*_2*_3*_3$	**	*
c. ka rə kə na | / | | L_1 H_2 L_3	*!		$*_2*_2*_3*_3**_3$	**	*
d. ka rə kə na | | | | L_1 H_2 L_4 L_3		*!	$*_2*_4*_4*_3*_3*_3$	**	
e. ka rə kə na | | | | L_1 L_4 H_2 L_3		*!	$*_4*_2*_2*_3*_3*_3$	**	

NO-SPREAD is also crucial for forms with high-tone roots and only one syllable between root ann **-na** such as **díkə́na**. Without **NO-SPREAD**, low tone on the second syllable is predicted (☛ marks the correct output which is not predicted by the given ranking):

(29)

di kna
| |
H_1 H_2 L_3

	DEP-T	ALIGN-L	*ASSOCIATE	*LONG-T
☞ a. di ke na | \\ | $H_{1,2}$ L_3		$*_3$	*	*
b. di ke na | / | $H_{1,2}$ L_3		$*_3*_3!$	*	*
☛ c. di ke na | | | H_1 H_2 L_3		$*_2*_3!*_3$	*	
d. di ke na | | | $H_{1,2}$ H_4 L_3	*!	$*_4*_3*_3$	*	

Again **NO-SPREAD** blocks spreading of an already associated tone and predicts the correct candidate:

(30)

```
di        kna
|          |
H1   H2   L3
```

	NO-SPREAD	DEP-T	ALIGN-L	*ASSOCIATE	*LONG-T
a. di ke na | \ | $H_{1,2}$ L_3	*!		$*_3$	*	*
b. di ke na | / | $H_{1,2}$ L_3	*!		$*_3*_3$	*	*
☞ c. di ke na | | | H_1 H_2 L_3			$*_2*_3*_3$	*	
d. di ke na | | | $H_{1,2}$ H_4 L_3		*!	$*_4*_3*_3$	*	

Finally, (31) shows how this ranking derives the correct tone association for a high-tone root with tow syllables between root an perfect suffix (**kúdəkə́na**):

(31)

```
kud       kna
|          |
H1   H2   L3
```

	NO-SPREAD	DEP-T	ALIGN-L	*ASSOCIATE	*LONG-T
☞ a. ku də kə na | | / | H_1 H_2 L_3			$*_2*_3*_3*_3$	**	*
b. ku də kə na | | \ | H_1 H_2 L_3	*!		$*_2*_3*_3$	**	*
c. ku də kə na | / \ | $H_{1,2}$ L_3	*!		$*_3*_3$	**	**
d. ku də kə na | | | | $H_{1,2}$ L_4 L_5 L_3		*!*	$*_4*_5*_5*_3*_3*_3$	**	
e. ku də kə na | | | | H_1 H_2 L_4 L_3		*!	$*_2*_4*_4*_3*_3*_3$	**	
f. ku də kə na | | | | H_1 L_4 H_2 L_3		*!	$*_4*_2*_2*_3*_3*_3$	**	

6 Tone and Prefixes

Additional evidence for the constraint **NO-SPREAD** comes from the distribution of tone with prefixes. While with low-tone roots prefixes always bear a low tone, in prefixed high-tone roots, the high tone does not generally spread to the prefix, but only with specific roots. For example, there is spreading with **nót**, 'send', but not with **lór**, 'collect'

(32)

Spreading High-tone root	**Non-spreading High-tone root**
sú-nót-in	su-lór-in
cí-nót-in	ci-lór-in

A plausible assumption is that spreading roots have an additional floating high tone. Hence the lexical representations are as in (33):

```
                nót                  lór
(33)   a.        |            b.      |
             H   H                    H
```

Without **NO-SPREAD** we would predict that H in non-spreading roots, the high tone of the root together with the floating H of the imperfect either shifts (34a) or spreads to the prefix (☛ marks the candidate which is empirically correct, but not predicted by the given constraint ranking):

```
                 su  lór          in
(34)   Input:         |            |
                     H1   H2  L3   L4
```

	DEP-T	ALIGN-L	*LONG-T
☞ a. sú lo rin (sú–$H_{1,2}$, lo–L_3, rin–L_4)		$*_3*_4*_4$	
b. su ló rin (su, ló–$H_{1,2}$, rin–$L_{3,4}$)		$*_3*_3*_4*_4$!	*
☛ c. su lo rin (su–L_5, lo–$H_{1,2}$, rin–$L_{3,4}$)	*!	$*_1*_2*_3*_3*_4*_4*_4$	

(34a) can be excluded straightforwardly by the high-ranked constraint ***DISSOCIATE** which requires that for each link in the underlying form there must be a link in the surface form between items corresponding to the underlying linked items. This is violated in (34a) since there is no link between H_1 and **ló(r)**. However ***DISSOCIATE** is not violated in (34b). Here we need again **NO-SPREAD** to block association of the underlyingly linked tone to a new syllable:

(35) **Input:** su lór in
$\quad$ | $\quad$ |
H_1 H_2 L_3 L_4

	*DISSOC	NO-SPREAD	DEP-T	ALIGN-L	*LONG-T
a. sú lo rin | | | $H_{1,2}$ L_3 L_4	*!			$*_3*_4*_4$	
b. su ló rin \ | | $H_{1,2}$ $L_{3,4}$		*!		$*_3*_3*_4*_4$	*
☞ c. su lo rin | | | L_5 $H_{1,2}$ $L_{3,4}$			*	$*_1*_2*_3*_3*_4*_4*_4$	

Note that ranking ***LONG-T** above **DEP-T** and **ALIGN-L** is not an option since with perfect forms a floating tone linked to multiple syllables is preferred over tone insertion. Hence ***LONG-T** must be ranked below these constraints as in (35). That the tone inserted on the prefix is **L** and not **T** can be derived by ranking the general markedness constraint ***H** penalizing all high tones over the corresponding constraint for low tones ***L**. Since these constraints only emerge in tone insertion, but do not have the effect that underlying tone is suppressed, I assume that they are ranked below aall other relevant constraints (abbreviated by "..." in (36)):

(36) **Input:** su lór in
$\quad$ | $\quad$ |
H_1 H_2 L_3 L_4

	...	*H	*L
☞ a. su lo rin | | | L_5 $H_{1,2}$ $L_{3,4}$		*	**
b. su lo rin | | | H_5 $H_{1,2}$ $L_{3,4}$		**!	**

As expected, the constraint ranking so far also predicts high-tone prefixes for the roots with a floating high tone:

(37) **Input:**

su nót in
| |
H_1 H_2 H_3 L_4 L_5

	*DISSOC	NO-SPREAD	DEP-T	ALIGN-L	*LONG-T	
a. su no tin | | | $H_{1,2,3}$ L_4 L_5	*!			$*_4*_5*_5$		
b. su no tin \ | | $H_{1,2,3}$ $L_{4,5}$		*!		$*_4*_4*_5*_5$	*	
c. su no tin | | | L_6 $H_{1,2,3}$ $L_{4,5}$			*!	$*_1*_2*_3*_4*_4*_5*_5$		
☞ d. su no tin | | | H_1 $H_{2,3}$ $L_{4,5}$				$*_2*_3*_4*_4*_5*_5$		

7 Summary

In this paper, I have demonstrated that polar tone in Kanuri imperfect forms can be derived without any formal equivalent of tone polarity, by the interaction of a floating tone melody with independently motivated alignment- and faithfulness-constraints. I have shown that this analysis is compatible with a more general account of tonal phonology in Kanuri, and have argued for a new faithfulness constraint **NO-SPREAD**, which penalizes insertion of association lines for tones which are already underlying associated.

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