

## Tone association and output locality in non-linear structures

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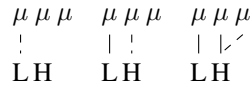
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In the following analyses, we consider logics that assume *either* a function  $p(x)$  indicating the immediate predecessor of  $x$  or  $s(x)$ , indicating the immediate successor of  $x$ . We also assume predicates  $first(x)$ ,  $penult(x)$ , and  $last(x)$ , indicating the first, penultimate, and last member on a tier, respectively. We define  $second(x) \stackrel{d}{=} first(p(x))$ , and  $third(x)$ , etc., similarly.

(1) **Mende** (Leben, 1973, 1978): Melodies associate to TBUs one to one from left to right

a. kó ‘war’	b. pélé ‘house’	c. háwámá ‘waist’
d. kpà ‘debt’	e. bèle ‘pants’	f. kpàkàli ‘three-legged chair’
g. mbû ‘owl’	h. ngflà ‘dog’	i. félàrà ‘junction’
j. mbă ‘rice’	k. nìkà ‘cow’	l. ndāvúlá ‘sling’
m. mbă ‘companion’	n. nyàhâ ‘woman’	o. nìkflì ‘groundnut’

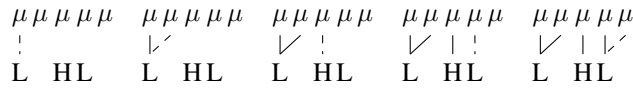


$A(x, y) \stackrel{d}{=} R(x, y)$ , where  $R(x, y)$  is a relation defined:

$$R(x, y) \stackrel{d}{=} \begin{array}{l} first(x) \wedge first(y) \vee \\ R(s(x), s(y)) \vee \\ (first(x) \wedge R(x, s(y))) \end{array} \quad \begin{array}{l} (x \text{ and } y \text{ are the first elements on each tier, or} \\ \text{or } R \text{ relates the elements immediately following } x \text{ and } y, \text{ or} \\ x \text{ is first and the successor of } y \text{ is related to } x) \end{array}$$

(2) **Kikuyu** (Clements and Ford, 1979): The first tone in a melody associates to the first two TBUs, then proceeds one to one from left to right

a. mòtē ‘tree’	b. ìrîá ‘milk’	c. mòdèrékàngéíré ‘way of releasing oneself quickly’
d. ròkǒ! ‘firewood’	e. kàngèrí ‘Kang’eri (name)’	f. kàngèrí ò:níré ‘Kang’eri saw.’
g. ikàrá ‘charcoal’	h. rèìdórí! ‘teardrop’	i. ìrîá né reèyá ‘Milk is good.’

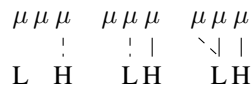


$A(x, y) \stackrel{d}{=} (first(x) \wedge first(y)) \vee R(x, y)$ , where  $R(x, y)$  is a relation defined:

$$R(x, y) \stackrel{d}{=} \begin{array}{l} (first(x) \wedge second(y)) \vee \\ R(p(x), p(y)) \vee \\ last(y) \wedge R(p(x), y) \end{array} \quad \begin{array}{l} x \text{ is the first element and } y \text{ is the second element, or} \\ \text{the elements immediately preceding } x \text{ and } y \text{ are in relation, or} \\ y \text{ is the last element and it is in the relation with } x\text{'s predecessor} \end{array}$$

(3) **Hausa** (Newman, 1986, 2000): Tones associate to TBUs one to one from right to left

a. jáa ‘pull’	b. jíráa ‘wait for’	c. béebíyáa ‘deaf mute’
c. wàa ‘who?’	d. màcè ‘woman’	e. zàmfarà ‘Zamfara’
f. jàakí ‘donkey’	g. jìminúu ‘ostriches’	h. bàbbàbbàkú ‘well roasted’
i. fáadi ‘fall’	j. hántúnàa ‘noses’	k. búhúnhúnàa ‘sacks’
l. màntá ‘forget’	m. kàràntá ‘read’	n. kákkàràntá ‘reread’

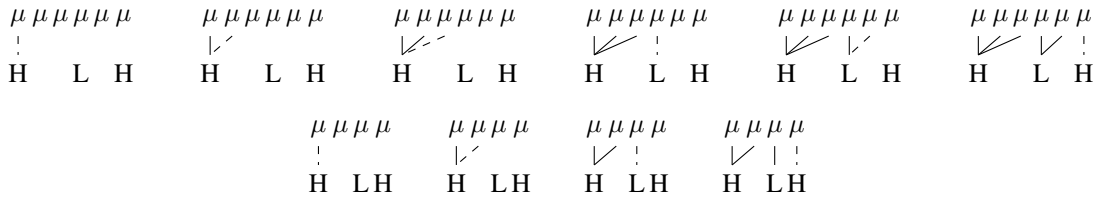


$A(x, y) \stackrel{d}{=} R(x, y)$ , where  $R(x, y)$  is a relation defined:

$$R(x, y) \stackrel{d}{=} \begin{array}{l} last(x) \wedge last(y) \vee \\ R(s(x), s(y)) \vee \\ (first(x) \wedge R(x, s(y))) \end{array} \quad \begin{array}{l} (x \text{ and } y \text{ the last elements on each tier, or} \\ \text{or the elements immediately preceding } x \text{ and } y \text{ are associated, or} \\ x \text{ is first and the predecessor of } y \text{ is associated to } x) \end{array}$$

- (4) **North Karanga Shona** (Non-assertive) (Odden, 1981; Hewitt and Prince, 1989): First and last tones associate to the edges, first tone spreads inward up to 3 syllables

a. ...-p-á	'I didn't give'	H
b. ...-tór-à	'I didn't take'	HL
c. ...-tór-ès-á	'I didn't make take'	HLH
d. ...-tór-és-èr-á	'I didn't make take for'	HHLH
e. ...-tór-és-ér-àn-á	'I didn't make take for e.o.'	HHHLH
f. ...-tór-és-ér-ès-àn-á	'I didn't make take a lot for e.o.'	HHHLLH
g. ...-tór-és-ér-ès-ès-àn-á	(same as f.)	HHHLLLH



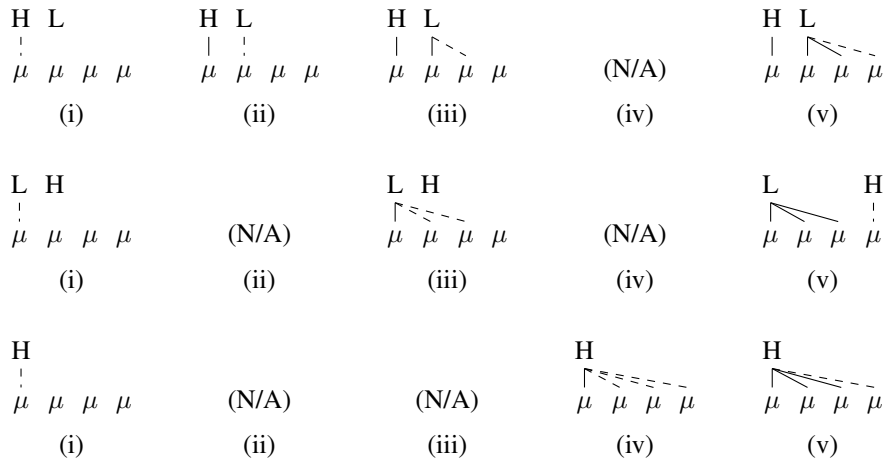
$A(x, y) \stackrel{d}{=} R(x, y)$ , where  $R(x, y)$  is a relation defined (for brevity, we assume  $x$  is tone and  $y$  is TBU):

$$R(x, y) \stackrel{d}{=} \left( \text{first}(x) \wedge \text{first}(y) \right) \vee \left( \text{first}(x) \wedge \neg \text{fourth}(y) \wedge \neg \text{penult}(y) \wedge R(x, p(y)) \right) \vee \left( \text{second}(x) \wedge \text{fourth}(y) \wedge \neg \text{last}(x) \right) \vee \left( \text{second}(x) \wedge \text{third}(y) \wedge \text{penult}(x) \right) \vee \left( \text{second}(x) \wedge \neg \text{last}(y) \wedge R(x, p(y)) \right) \vee \left( \text{last}(x) \wedge \text{last}(y) \right)$$

*(The first tone spreads up to the third position, as long as it's not penultimate, ...  
...the second tone associates to the fourth TBU (if it's not penultimate) or the third (if it is penultimate), ...  
...the second tone spreads up to the penult, ...  
...and the last elements on each tier associate.)*

- (5) **Kukuya** (Hyman, 1987): Melodies associate so that a H tone spreads only if it is the only tone in the melody; otherwise, L tones spread

a. bá	'palms'	b. bágá	'show knives'	c. bálágá	'fence'
d. kâ	'to pick'	e. sàmà	'conversation'	f. kàràgà	'to be entangled'
g. sǎ	'knot'	h. kàrà	'paralytic'	i. m <sup>w</sup> àrègí	'younger brother'
j. bvĩ	'falls'	k. pǎlĩ	'goes out'	l. kàlógì	'turns around'



$A(x, y) \stackrel{d}{=} R(x, y)$ , where  $R(x, y)$  is a relation defined (for brevity, we assume  $x$  is tone and  $y$  is TBU):

$$R(x, y) \stackrel{d}{=} \left( \text{first}(x) \wedge \text{first}(y) \right) \vee \left( \text{second}(x) \wedge P_L(x) \wedge \text{second}(y) \right) \vee \left( P_L(x) \wedge \neg \text{last}(y) \wedge R(x, p(y)) \right) \vee \left( P_H(x) \wedge \text{last}(x) \wedge R(x, p(y)) \right) \vee \left( \text{last}(x) \wedge \text{last}(y) \right)$$

*(i) x and y are the first elements on each tier, or  
(ii) the second TBU and second tone associate if L, or  
(iii) a low tone spreads up to the penult, or  
(iv) a high tone spreads to the end, or  
(v) the last elements on each tier associate*

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