

Chain-Shift, Schmain-Shift: Anti-Identity and Tone Sandhi in Hmong, A-Hmao, and Jingpho

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1 Introduction

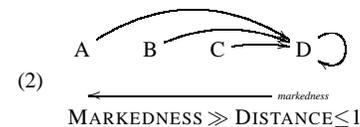
- It is known that there are certain morpho-phonological alternations that cannot be modeled with only markedness and faithfulness constraints (Alderete 2001:207). See, for example, the following data from Luo (Gregersen 1972 and Okoth-Okombo 1982):

(1)	<i>singular</i>	<i>plural</i>	
a.	bat	bed-e	'arm'
	luθ	luð-e	'walking stick'
b.	čogo	čok-e	'bone'
	owadu	owet-e	'brother'

- In order to model such alternations, the use of anti-identity constraints, or some other similar formal mechanism is required.
- This paper will argue that such constraints, or their equivalents in the actual grammar, interact with markedness and faithfulness to produce the chain and chain-like synchronic phonological shifts seen in A-Hmao and Jingpho, two languages of Southern China/Southeast Asia.

2 A Brief Typology of Chain-Shifts (and Their Closest Friends)

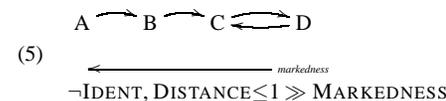
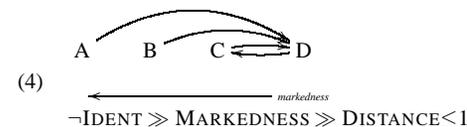
- Simple chain shifts are not trivial to model in OT. To do so, a number of solutions have been offered. The one employed here is an adaption of *distantial faithfulness* (Kirchner 1996). Thus, chain shifts versus neutralizations may be modeled as a competition between $\text{DISTANCE} \leq 1$ and MARKEDNESS .
- Given a set of phonological forms A, B, C, ..., and X such that A incurs the most violations of MARKEDNESS and X incurs the fewest violations of MARKEDNESS , and such that the number of violations of $\text{DISTANCE} \leq 1$ for a given input/output pair are equal to the displacement (in increments) along the series minus one, it is possible to construct a typology of chains and neutralizations.
- If MARKEDNESS out-ranks $\text{DISTANCE} \leq 1$, the result is a neutralization to the final (least-marked) position in the series.



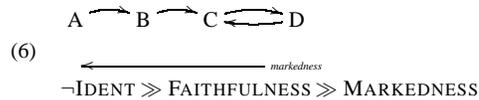
- If $\text{DISTANCE} \leq 1$ out-ranks MARKEDNESS , the result is a chain ending at the least-marked position of the series.



- If $\neg\text{IDENTITY}$ is added to either scenario, such that it out-ranks MARKEDNESS , the “bounce-back” will occur—if the least marked member of the series is the input, the output will be the second least-marked member of the series.



- In the second case given here, the chain effect is not necessarily motivated by distantial faithfulness. If $\text{DISTANCE} \leq 1$ is replaced with ordinary FAITHFULNESS and if $\neg\text{IDENTITY} \gg \text{FAITHFULNESS} \gg \text{MARKEDNESS}$, the result is superficially identical to the situation shown in (5):



- Any chain effect produced by anti-identity must include some type of BOUNCE-BACK effect (as must any neutralization in interaction with anti-identity). Likewise, the presence of these effects is sufficient evidence to establish that anti-identity is highly ranked in the grammar generating such a chain-shift or neutralization, as long as it is clear that the alternations in question are not simply the result of paradigmatic replacement.
- Form-series of these types (both +/-[chain] and +/-[bounce-back]) are attested in the tonal alternations of Dashanjiao Hmong, A-Hmao and Jingpho.

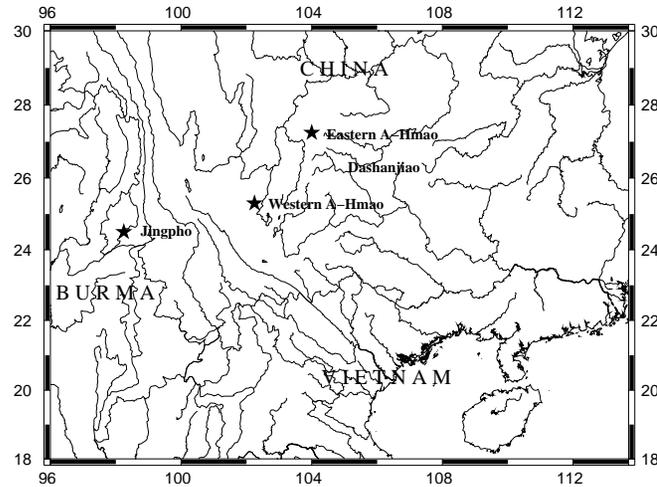


Figure 1: Approximate locations where the languages cited here are spoken.

3 Dashanjiao Hmong

3.1 Background

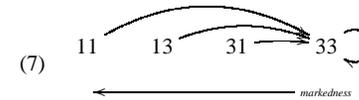
Genetic Affiliation Hmong-Mien, Western Hmongic

Geographic Range Guizhou province, People Republic of China

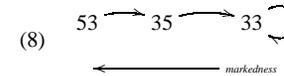
Description of Tone System 8 phonological tones divided between two 4-tone registers: “high” register [55, 53, 35, 33]; “low” register [31, 11, 33, 13].

3.2 Tone Neutralization

- In a particular morphological *and* phonological context, the tones of Dashanjiao syllables neutralize in a rather unexceptional pattern.
- The conditioning environment for these changes are basically the same as those for A-Hmao, below, except that the trigger-tones are [55] and [31].
- Under these conditions, a rather complex series of tone changes take place. The changes for the “low” register are shown in (7).



- The high register changes are shown in (8):¹



- There seems to be a high-ranked markedness constraint *NONMID that penalizes peripheral tones (which is undominated relative to the tones in the “low” register). This motivates the neutralization.
- For the data, see Niederer (1998).

4 A-Hmao (Western)

4.1 Background

Genetic Affiliation Hmong-Mien, Western Hmongic

Geographic Range Guizhou and Yunnan provinces, People Republic of China.

Description of Tone System 8 phonological tones divided between two 4-tone registers: “high” register [52, 45, 33, 22], “low” register [13, 22', 21, 11]. The [22] tones in each register are homophonous, but are phonologically distinct.

- A-Hmao exhibits a system of tone sandhi in which a given syllable can bear one of two tones depending upon the environment.
 - In isolation, the syllable displays what I will call the LEXICAL TONE. This tone is usually a direct reflection of the “underlying” or input tone.
 - In a particular morphological and phonological environment, it bears a tone predictable from the lexical tone, which is usually different than the lexical tone. I will call this tone the SANDHI TONE.

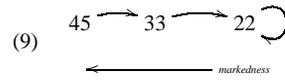
¹The apparent change from [53] to [35], that is falling to rising, seems unusual if this is in fact a markedness chain, but comparative data shown that this is in fact a lowering chain, or at least was diachronically. Phonologically, we should probably view [35] as between [53] and [33] in pitch.

- The inventory of sandhi tones is a subset of the inventory of lexical tones.
- The sandhi tone appears iff the following conditions are met:
 - * The syllable is the non-initial syllable in the set of affected constructions (mostly types of compounds and quantificational constructions).
 - * The preceding syllable in the construction bears either the [52] or [13] tone (i.e. one of the phonological contour tones).

- In Western A-Hmao (WAH), sandhi tones tend to be “less marked” than the corresponding lexical tones. In WAH, this means that they are less peripheral (closer to [22]).
- We may attribute this to a high-ranked *NONMID.
- There are two principle sets of tone shifts: one for the high register and one for the low register²

4.2 High Register: Tone Chain with no Bounce-Back

- The tone changes for the high register are shown in (9):



- Examples include the following (Johnson 1999:241):

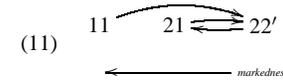
- (10) a. $ka_{(A1)}^{52} + ki_{(B1)}^{45} \rightarrow [ka_{(A1)}^{52} ki_{(C1)}^{33}]$
 line road ‘custom; Christianity’
 b. $dfilo_{(A2)}^{13} + mpa_{(C1)}^{33} \rightarrow [dfilo_{(A2)}^{13} mpa_{(D1)}^{22}]$
 oil pig ‘lard’

- This process seems to be a chain of progressive lowering towards the [22] midpoint. All of the tones given here are phonologically level, but Johnson (1999) labels one of them as [45] despite the fact that it is nearly level phonetically (Johnson 1999:230).
- This type of chain-shift cannot be explained in terms of anti-identity since there is no bounce-back, and the typology given above predicts bounce-back to be an essential part of anti-identity-driven chain shifts.
- Instead, a formal device such as distal faithfulness must be invoked in order to explain this kind of shift while still capturing this lowering as a chain instead of a series of unrelated changes.
- In this case, $DIST \leq 1-TONE \gg *NONMID$.

²The sandhi tone for the low register [13] is actually [52] (high register). This tone shift is interesting for a variety of reasons, but will not be discussed in this paper.

4.3 Low Register: Tone Neutralization with Bounce-Back

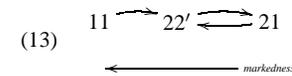
- The tone changes for the low register are shown in (11), where the arrows point from the lexical tone to the corresponding sandhi tone:



- Data illustrating these changes include the following (Johnson 1999:241):

- (12) a. $ndfu_{(A2)}^{13} + dzfie_{(B2)}^{22} \rightarrow [ndfu_{(A2)}^{13} dzfie_{(C2)}^{21}]$
 sky/season cold ‘autumn’
 b. $?au_{(A1)}^{52} + nfa_{(C2)}^{21} \rightarrow [?au_{(A1)}^{52} nfa_{(B2)}^{22}]$
 water rain ‘rain water’
 c. $ndfili_{(A2)}^{13} + ndfilau_{(D2)}^{11} \rightarrow [ndfili_{(A2)}^{13} ndfilau_{(B2)}^{22}]$
 rice glutinous ‘glutinous rice’

- The two lower tones neutralize to the unmarked [22'] tone.
- The [22'] tone, however, shifts to the second least-marked option, the [21] tone (which is phonetically falling, but behaves phonologically as if it is a level tone between [11] and [22']).
- This is exactly the pattern predicted in (4), for cases where $\neg IDENTITY$ dominates MARKEDNESS.
- In this specific instance, we may postulate that $\neg IDENT-TONE \gg *NONMID$.
- However, it is not immediately obvious that this should be treated as a neutralization, rather than a chain with bounce-back, as shown in (13):



- The (rejected) analysis given in (13) does not capture the general tendency in this language for [22] to be “least-marked” and other tones be more or less “marked” based upon their distance from this midpoint.
- There are also historical reasons for believing that the genesis of this set of shifts was a neutralization.

5 Jingpho

5.1 Background

Genetic Affiliation Sino-Tibetan, Tibeto-Burman, Jingpho-Nung.

Geographic Range Yunnan, Peoples Republic of China; Kachin State, Burma; Assam, India (Liu 1984).

Description of Tone System 4 tones (3 principle tones, one marginal tone): *high* [55], *mid* [33], *low* [31], and *falling* [51]. Tone [51] occurs mostly as a sandhi tone, but also is apparently the lexical tone of a few kinship terms (Matisoff 1974:160). Only the *high* and *low* tones can occur in stopped syllables (syllables with a stop or glottal-stop coda).

- The Jingpho data here are taken from a dialect of Jingpho spoken in China and documented by Dai Qingxia (1990).
- In this dialect, there is a set of tonal alternations conditioned by noun-noun and noun-verb compounding constructions (Lai 2002).
- In these constructions, the tone of the first syllable is always different from the tone of the same morpheme in isolation.
- The realization of this tone is influenced by the tone of the following syllable, which—in the construction described here—does not alternate.
- This may be a function of stress, as the stress pattern of Jingpho is iambic, so the first syllable in disyllabic compounds is unstressed.
- I make the following assumptions about the representation of these tones:

Name	Chao Numbers	[upper]	[raised]
HIGH	55	+	+
MID	33	+	–
LOW	31	–	

Here, [upper] and [raised] are treated as nodes in the tonal feature geometry, following a great number of proposals (for an overview of which, see Bao 1999). I am not, however, treating Jingpho contours as intrinsic to the tone as does Bao (1999). The marginal [51] tone is treated as a sequence of HIGH and LOW. As such, the tonal representations used here would also be compatible with the proposals made by Yip (1980; 1989), and even proposals made by some tonologists coming from Africanist traditions.

- [-upper] tones are phonetically *low* regardless of the value of [raised], but lexical L tones are underspecified for [raised].
- [+upper] tones are phonetically *high* unless they are specified as [-raised].

5.2 Tone Exchange

- In stopped syllables, there are only two possible tones: H [55] and L [31]. Since the lexical tone must be different than the sandhi tone, then the alternation for syllables ending in a stop (including glottal stop) is a simple exchange:

$$(14) \quad H \rightleftharpoons L$$

- See, for example, the following data (Dai 1990):³

- (15) a. $ka^{55} + tsi^{33} \rightarrow ka^{31} tsi^{33}$
 ‘tree sp.’
 b. $pʒa^{55} + mut^{31} \rightarrow pʒa^{31} mut^{31}$
 caterpillar gray ‘gray caterpillar’
 c. $lut^{55} + jom^{31} \rightarrow lut^{31} jom^{31}$
 ‘cigarette’
 d. $na^{55} + ʒa^{31} \rightarrow na^{31} ʒa^{31}$
 god hall ‘god’s hall’
- (16) a. $mji^{31} + pʒui^{33} \rightarrow mji^{55} pʒui^{33}$
 eye tear ‘tear’
 b. $na^{31} + tham^{31} \rightarrow na^{55} tham^{31}$
 ‘a type of large tuber’
 c. $wa^{31} + kʒaŋ^{31} \rightarrow wa^{55} kʒaŋ^{31}$
 ‘bamboo washing basin’

- Based upon these data, it is clear that Jingpho tone sandhi exhibits a kind of anti-identity effect, but it is not clear whether the relevant constraints refer to the tone complex as a whole or to one of the two tone features.

5.3 Tone Chain with Bounce-Back (?)

- In open syllables and syllables with sonorant (in Jingpho, only nasal) codas, the situation is more complex.

$$(17) \quad M \rightleftharpoons L \rightleftharpoons H$$

- Syllables that bear the lexical (underlying) tones M [33] and H [55] always bear the L [31] tone in compounds (Dai 1990):

- (18) a. $tum^{55} + khʒak^{55} \rightarrow tum^{31} khʒak^{55}$
 bamboo tube suitable ‘small box’
 b. $phum^{55} + ku^{55} \rightarrow phum^{31} ku^{55}$
 tree branch crooked ‘bent tree branch’

- (19) a. $tum^{55} + ka^{33} \rightarrow tum^{31} ka^{33}$
 bamboo tube picture ‘bamboo tube with patterns’

- (20) a. $khon^{33} + set^{55} \rightarrow khon^{31} set^{55}$
 girl clever ‘clever girl’

³Note that there are gaps in the glosses due to that fact that Dai (1990) did not give morpheme by morpheme glosses. For this, I apologize.

- b. $kh\dot{z}ai^{33} + ku\eta^{55} \rightarrow kh\dot{z}ai^{31} ku\eta^{55}$
 bridge bow 'bridge bow'
- c. $lo\eta^{33} + taʔ^{55} \rightarrow lo\eta^{31} taʔ^{55}$
 cloth hand 'sleeve'
- d. $khon^{33} + \dot{z}am^{55} \rightarrow khon^{31} \dot{z}am^{55}$
 girl young 'young girl'
- e. $khjen^{33} + nep^{55} \rightarrow khjen^{31} nep^{55}$
 board pave 'floor board'

- (21) a. $tsun^{33} + po^{33} \rightarrow tsun^{31} po^{33}$
 fishing end 'fishing bank'
- b. $\eta um^{33} + kh\dot{z}i^{33} \rightarrow \eta um^{31} kh\dot{z}i^{33}$
 peach sour 'sour peach'
- c. $pu\eta^{33} + tsin^{33} \rightarrow pu\eta^{31} tsin^{33}$
 wind cool 'cool wind'
- d. $kh\dot{z}a\eta^{33} + kho^{33} \rightarrow kh\dot{z}a\eta^{31} kho^{33}$
 'cabbage'
- e. $kh\dot{z}a\eta^{33} + tu^{33} \rightarrow kh\dot{z}a\eta^{31} tu^{33}$
 'regenerating mosses'
- f. $si^{33} + ph\dot{z}a^{33} \rightarrow si^{31} ph\dot{z}a^{33}$
 field cotton 'cotton field'

- (22) a. $lo\eta^{33} + ph\dot{z}o^{31} \rightarrow lo\eta^{31} ph\dot{z}o^{31}$
 clothing white 'white clothing'
- b. $ju\eta^{33} + fa^{31} \rightarrow ju\eta^{31} fa^{31}$
 finger small 'little finger'

- Syllables that bear the lexical (underlying) tone L [31] always bear either M [33] or H [55] in compounds. The pitch of the tone will, in these cases, always agree with that of the following tone: M [33] occurs before L [31] tones, and H [55] occurs before H [55] and M [33] tones (Dai 1990).⁴

- (24) a. $thi\eta^{31} + \dot{z}oʔ^{55} \rightarrow thi\eta^{55} \dot{z}oʔ^{55}$
 'small bamboo tube'
- b. $na^{31} + kham^{55} \rightarrow na^{55} kham^{55}$
 field waste 'wasteland'
- c. $thi\eta^{31} + ka^{33} \rightarrow thi\eta^{33} ka^{33}$
 'back basket'

⁴There is one exception to this pattern given by (Dai 1990):

- (23) $khum^{31} + tfa\eta^{33} \rightarrow khum^{55} tfa\eta^{33}$
 'winter melon'

This form appears to be exceptional, and I have no explanation for it at this time.

- d. $u^{31} + kh\dot{z}u^{33} \rightarrow u^{33} kh\dot{z}u^{33}$
 bird dove 'turtledove'
- e. $naʔ^{31} + tham^{31} \rightarrow naʔ^{55} tham^{31}$
 'a type of large tuber'

- In cases where the following tone is high, the set of changes is as shown in (25), and when the following tone is low, the set of changes is as shown in (26):



- Paradigmatic thinkers may prefer to visualize the same whole set as follows:

	H	M	L
H +	L-H	L-M	L-L
M +	L-H	L-M	L-L
L +	H-H	M-M	H-L

- As with the A-Hmao low register, it is not immediately clear whether this set of shifts is to be modeled as a chain shift or a neutralization. After all, in terms of abstract categories (not populated with features) the set of shifts (for each environment) is the same.
- Unlike the A-Hmao, situation, it seems that here, anti-identity refers to the value of a specific feature node: [register].
- So, in fact, there may not be anything scalar about this set of shifts at all. The alternation may simply result from the fact that \neg IDENT-UPPER \gg AGREE-RAISED \gg FAITH-TONE.

6 Discussion

- The data here have demonstrated, quite conclusively, that there are bounce-back phenomena of the sort predicted by the existence of a class of anti-identity constraints.
- There are also tonal chain shifts that seem to “move down” a markedness hierarchy, but which cannot be driven by anti-identity (because they do not feature bounce-back). Thus, there is still a need for distasteful faithfulness, or another similar mechanism.

- What is still unclear is whether individual cases of these anti-identity phenomena affecting less than four points in a phonological space should be treated as chain-shifts with bounce-back, or neutralizations with bounce-back.
 - When divested of content, a three-point neutralization with bounce-back and a three-point chain with bounce-back are formally identical.
 - The cases identified here are tonal, and (given unresolved questions in tonal representation) it is still not clear with what featural content the individual points should be invested.
 - Within unelaborated Optimality Theory, markedness—as a hierarchical notion—is an epiphenomenon of constraint rankings, so relative markedness can vary even between fixed representations.
 - It is doubtful whether a universal markedness hierarchy can be established for tone. For example, even within closely related dialects of A-Hmao, there seems to be variation. In the Western A-Hmao dialect discussed here, the [22] mid tones seem to be least-“marked,” but in the closely related Eastern A-Hmao dialect, the [11] low tones are least-“marked” (see the data in Wang and Wang (1984)).
- Any of the alternations that can be described in terms of anti-identity can also be captured trivially using “direct-mapping”, that is, two-level constraints.
- It seems that there are some cases where the notion of paradigmatic replacement seems necessary (Schuh 1978:248–251). If this is the case, then it then becomes unclear what circular tonal alternations should be analyzed as anti-identity effects, and which are simply the result of a paradigmatic remapping.

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