Tone in Chinese: Preserving tonal melody in strong positions*

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SUMMARY

The difference in tonal domains in Chinese dialects is explained by the difference in syllable structure and the Structure Preservation in strong position without the edge-based constraints. Tone in Chinese provides support for the universality of Structure Preservation in strong positions, which is also found in a number of phenomena cross-linguistically.

RÉSUMÉ

La différence dans les domaines tonal dans les dialectes chinois est expliquée par la différence de structure syllabique et la préservation de la structure en position de force sans les contraintes pointe basée. Tonalité en chinois fournit un support pour l'universalité de la préservation de la structure dans des positions fortes, qui se trouve également dans un certain nombre de phénomènes inter-linguistique.

1 TONAL DOMAIN IN CHINESE DIALECTS

Chinese dialects have been claimed to have different tonal domains based on the data shown in (1) and (2), where a pair of square brackets represent a tonal domain (Chen, 1987; Selkirk & Shen, 1990; Chen, 2007).

(1) Shanghai: [V] [NP], [P] [NP]

a. ‘zaw ‘mo
toward horse
(LH) (LH)

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b. peq ‘mo tshaw
give horses vegetables
(MH) (LH) (MH)

(2) Xiamen: [V NP], [P NP]

a. yi tsiong hit pun ts’q # sang hoo tang-oq
he Obj-marker that Cl book give to schoolmate
‘he gave that book to his schoolmate.’

b. yi kap tang-oq # kai-siao tsit e lu-ping-yu
he to schoolmate introduce one Cl girlfriend
‘he introduced a girlfriend to his schoolmate.’

Here a double cross represents a boundary of tonal domains. The data show that Shanghai has smaller domain than Xiamen. Yip (2002, p. 118) also shows the following data to illustrate the tonal difference between Shanghai and Taiwanese (cf. Chen, 1987, p. 112).

(3) Shanghai: [V] [NP]

taN # ‘niN
hit people

‘hit people’

(4) Taiwanese: [V NP]

pang hong-ts’e
fly kite

‘fly kite’

These data show that Shanghai Chinese has two tonal domains [V][NP] or [P][NP] within the syntactic domain VP or PP, while other dialects such as Xiamen and Taiwanese have a single domain [V NP] or [P NP]. Assuming that all the Chinese dialects have the same syntax, we need to explain the difference of tonal domains in terms of syntax-phonology interface or phonology of these dialects. In the next section, we will briefly review the previous analyses based on phonological edge parameter and the edge alignment constraint. In section 3, we will present an alternative analysis based on the principle of phonological preservation in strong positions.

2 PHONOLOGICAL EDGE PARAMETER AND THE EDGE ALIGNMENT CONSTRAINT

As a way of relating tonal phenomena among Chinese dialects to prosodic and syntactic domains, the literature often refers to parameters/constraints such as the phonological edge parameter (Selkirk & Shen, 1990) and the edge alignment constraint of syntactic and prosodic phrases (Selkirk, 1995; Truckenbrodt, 1999). The differences in tonal behaviour between Shanghai Chinese and other Chinese dialects including Standard Chinese (Beijing dialect) are, for example, typically analysed by

referring to an interaction between prosodic domains and the directionality of the edge parameter/constraint.

(5) *The Edge Parameter* (Selkirk & Shen, 1990)
Domain edge = Left/Right of XP

Shanghai	Left, XP	[V] [NP], [P] [NP]
Other dialects	Right, XP	[V NP], [P NP]

In a framework which employs edge alignment, for example, Shanghai has two tonal domains [V][NP] within the syntactic domain VP where the constraint ALIGN-XP LEFT dominates, while other dialects have a single domain [V NP] where ALIGN-XP RIGHT is dominant.

(6) *Ranking of Alignment constraints* (Selkirk, 1995; Trukenbrodt, 1999)
ALIGN-XP LEFT/RIGHT

Shanghai	'ALIGN-XP LEFT > 'ALIGN-XP RIGHT	[V] [NP], [P] [NP]
Other dialects	'ALIGN-XP RIGHT > 'ALIGN-XP LEFT	[V NP], [P NP]

This type of analysis is interesting and descriptively adequate, but offers no explanation for why Shanghai and other dialects employ the different prosodic domains: the former refers to the immediate constituents of VP and the latter to the VP itself.

3 TONAL MELODY PRESERVATION IN STRONG POSITIONS

3.1 PROSODICALLY STRONG SITE

Without having to refer to the edge selections in Shanghai and Standard Chinese, we provide an alternative approach to the facts in question. We assume that, like Cinque's (1993) argument for stress assignment rules based on syntactic structures rather than separate prosodic ones, the most deeply embedded part (constituent) of a given XP is a prosodically strong site for tonal phenomena.

For a long time the notion of prosodic strength has played a central role in accounting for a variety of phonological phenomena such as segmental distribution and alternation, tone and pitch-accent patterns and historical sound changes (Carvalho, Scheer & Ségéral, 2008; Nasukawa & Backley, 2009). For instance, the immunity and susceptibility of segmental processes are often explained by referring to strength relations between prosodic positions: 'weak' positions are typically subject to processes while 'strong' positions are not. Typical examples are found in languages such as Japanese, Ibibio and English, in which consonant lenition takes place typically in intervocalic position –a context which is regarded as prosodically weak –whereas word/foot-initial positions are prosodically strong and immune to lenition and other processes. In many dialects of Japanese, for example, consonant lenition takes place foot/word-internally but never word-initially: e.g., sa**k**a 'slope' → sa**ɣ**a but **k**asa 'umbrella' → ***ɣ**asa in Southern Tohoku Japanese (Nasukawa, 2005); mi**t**a 'saw' → mi**ɾ**a but **t**aki 'waterfall' → ***ɾ**aki in Koshikijima Japanese (Nasukawa, 2010). In Ibibio, spirantisation takes place intervocalically: e.g., di**p** 'hide' → di**β**e 'hide oneself' and fʌ**k** 'hide' → fʌ**ɣ**ɔ 'hide oneself' (Harris, 1997). In the same context, a number of English systems exhibit t-tapping: e.g., ci[t]y → ci[**ɾ**]y.

The literature provides a number of explanations for why word/foot-initial sites are regarded as prosodically strong and immune to processes. For example, Beckman (1997) and Kager (1999) put forward the phonetic argument that positional faithfulness tends to be preserved in word-initial position because this is perceptually more salient than other positions as well as being more stable in terms of lexical contrast. They do, however, formalise their argument using ranked violable constraints.

Meanwhile, a widely supported phonological explanation is offered by Harris (1994, 1997), who argues that strength relations are prescribed by the prosodic hierarchy and implemented via a network of dependency (licensing) relations holding between prosodic positions. According to this approach, differences in the hierarchical structure of dependency relations are mirrored by differences in the strength of segmental contrasts. In order to intrasegmentally license melodic features, a position inherits licensing potential from its head position (Licensing Inheritance: Harris, 1992, 1994, 1997). A position located relatively distant from the ultimate head of a domain may receive less potential to license melodic features. And as a result, languages such as Japanese and Ibibio suppress some features (e.g. [occlusion] and [noise] in Japanese, [occlusion] in Ibibio) in those positions which receive less feature-licensing potential.

On the face of it, the kind of word/morpheme-internal analysis just described would appear to contradict Cinque's (1993) argument for stress assignment rules based on syntactic structures, which claims that the most deeply embedded constituent in a domain receives the 'strongest' stress. However, we assume here that corresponding relations between dependency and prosodic strength are reversed in syntax: a head constituent is prosodically weak while its dependent is prosodically stronger. In fact, since the time of SPE this kind of difference between phonology and syntax has been widely accepted within linguistic circles. This paper simply adopts the most widespread view that a head-dependent relation in syntax is assumed to be interpreted prosodically as a weak-strong relation. We then assume that in Chinese the most embedded constituent in a given XP is the 'strong' constituent, and as such, exhibits an immunity to tonal change. This will be demonstrated in section 3.2 and 3.3[1]. The preference for preserving the properties of a prosodically strong position at all levels of representation is associated with the principle of Structure Preservation (cf. Harris, 1997; Nasukawa & Oishi, 2001; Takahashi, 2004; Nasukawa, 2005 for detailed discussions). In order to avoid underparsing any properties in the strong constituent, we will assume the following principle (Nasukawa & Oishi, 2001):

(7) *Preserve (strong)*
Parse all lexically active properties in prosodically strong sites.

This principle prescribes that all lexically specified properties must be parsed in prosodically strong sites, and furthermore, that the addition and deletion of properties are banned (cf. Beckman 1997 for a similar constraint called IDENT-IO in the framework of Optimality Theory). Coupled with the notion of strength relations and the principle of Structure Preservation, we analyse the phenomena

[1] Regarding the relation between dependency structure and melodic complexity, a mismatch between two different levels is also found within the phonological component. For example, the syllabic head (nucleus) tends to be melodically less complex than its dependent onset (cf. Harris, 1994; Backley, 2011). A similar situation also arises in the case of the asymmetry between compounding stress assignment and phrase stress assignment (Chomsky & Halle, 1968, et passim).

in question in the remainder of this paper.

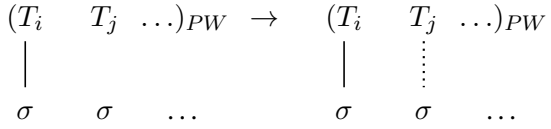
3.2 TONAL MELODY PRESERVATION IN SHANGHAI CHINESE

In the case of Chinese dialects, NP, the most deeply-embedded part of VP, for example, is a prosodically strong site for the phrasal behaviour of tones. In accordance with Structure Preservation, both Shanghai and Standard Chinese retain lexically-given tonal melodies in the strong constituent, NP of VP. According to the present analysis, the difference between these dialects is assumed to lie not in the edge parameter/constraint, but in the different phonological operations, specifically deletion and sandhi. In Shanghai all the tones following the first tone in a domain are deleted. Extending a domain to VP would delete the lexically- given tone in strong position (NP). Thus, Shanghai divides VP into two domains to observe Structure Preservation. First, let us consider tonal phenomena in Shanghai. Selkirk and Shen (1990) show three rules applying in a Prosodic Word: Obligatory Tone Deletion, LR Association and Contour Tone Association. Obligatory Tone Deletion is formulated as in (8).

(8) $(T_i\ T_j\ \ldots\ T_k\ \ldots)_{PW} \rightarrow (T_i\ T_j\ \ldots)_{PW}$

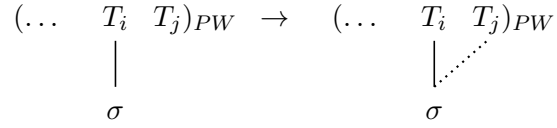
This rule deletes all the tones following the first pair of tones in a prosodic word domain. LR Association associates the second tone with the second syllable in a prosodic word, as shown in (9).

(9) *LR Association*



Contour Tone Association associates the last pair of tones Ti Tj with the last syllable in a prosodic word, as shown in (10).

(10) *Contour Tone Association*



Duanmu (2008) argues that Shanghai, which has CV syllables only, shows tone split, where contour tones break into level tones. Tone split is illustrated as in (11).

(11)

Surface	[H	L]	[L	H]	[L	H]
Citation	[HL	0]	[L-H	0]	[L-H	0]
	fii	lə$^{?}$	see	lə$^{?}$	zee	lə$^{?}$
	fly	PERF	break	PERF	earn	PERF
	‘flew’		‘broke’		‘earned’	

If Shanghai had the same tonal domain as other dialects, the complement noun in PP or VP would lose its citation tone LH and receives the last half of the preceding contour tone LH.

(12)	Surface	*[L	H]	Tone Split
		[LH	~~LH~~]	Tone Deletion
	Citation	[LH]	[LH]	
		$[_{PP}$ $[_{P}$ ‘zaw	$[_{N}$ ‘mo]]	
		toward	horse	

In (12), the second contour tone LH in citation form is deleted by Tone Deletion (8) if the tonal domain is widened to the whole PP, and then the last half of the first contour tone LH, namely H, is split to be realized on the N. However, the surface form in (12) violates Structure Preserving in strong position. Then the only phrasing observing Structure Preservation is [V] [NP] or [P] [NP], which keeps the citation tone of NP, as shown in (13).

(13)	Surface	[LH]	[LH]	
		[LH]	[LH]	
		$[_{PP}$ $[_{P}$ ‘zaw	$[_{N}$ ‘mo]]	
		toward	horse	‘toward a horse’

Thus, Shanghai must have small tonal domain in order to keep the tone of complement.

3.3 TONAL MELODY PRESERVATION IN OTHER CHINESE DIALECTS

On the other hand, tonal sandhi in other Chinese dialects changes all the tones preceding the last tone in a domain; a lexically-given tone in strong position (NP) is opaque to the process when the domain is extended to VP. Let us look at some examples. First, other dialects have stable tone, as shown in (14).

(14) *Standard Chinese*

Surface	[HL	(L)]	[LH	(L)]	[L	H]
Citation	[HL	0]	[LH	0]	[L-H	0]
	mai	lə	lai	lə	mai	lə
	sell	PEF	come	PERF	buy	PERF
	‘sold’		‘came’		‘bought’	

Standard Chinese changes the sequence of third tones immediately preceding the final third tone as shown in (15).

(15)	Surface	[MH	L]	
	Citation	[L	L]	
		mai	ma	
		buy	horse	‘buy a horse/horses’

The tonal sandhi in Standard Chinese does not affect the tone on the complement, which keeps its citation tone. Thus, Standard Chinese observes Strong Preservation in strong position if tonal

domain is expanded to VP or PP.

Xiamen and Taiwanese also have similar tonal sandhi rules to Standard Chinese, which change the sequence of tones immediately preceding the final tone in a tonal domain, as shown in (16) (cf. Chou & Chen, 2010)[2].

(16) *Xiamen/Taiwanese*: [V NP], [P NP]

Surface	HL	M	H	
Citation	L	H	H	
	pang	hong-	ts'e	
	release	wind	zither	'to fly a kite'

Thus, the tone sandhi in Standard Chinese and Xiamen/Taiwanese is formalized as (17), where S shows sandhi tone and C citation tone (cf. Chen, 1987).

(17) $(\mathrm{C\ C\ C} \ldots \mathrm{C})_{\mathrm{prosodic-phrase}} \rightarrow (\mathrm{S\ S\ S} \ldots \mathrm{C})_{\mathrm{prosodic-phrase}}$

This contrasts with Shanghai Tone Deletion formulated here as (18).

(18) $(\mathrm{C\ C\ C} \ldots \mathrm{C})_{\mathrm{prosodic-phrase}} \rightarrow (\mathrm{C\ C\ \cancel{C \ldots C}})_{\mathrm{prosodic-phrase}}$

The difference between Shanghai (18) and other dialects (17) is that the tone on the right edge is kept in tact in (17) but is deleted in (18). Thus, we can explain broad tonal domain in other Chinese dialects than Shanghai. They can preserve the tone of the complement, which locates at the end of tonal domain[3].

In sum, the difference in tonal domain between Shanghai and other Chinese dialects is due to the difference of deletion rules. Duanmu (2008) ascribes the difference of sandhi rules to the difference of syllable structure. If this is possible, the tonal difference between Chinese dialects can be ascribed to the syllable structure. However, we will not discuss Duanmu's argument here.

4 CONCLUSION

The present analysis makes it possible to do away with the edge-based constraints and gives us a principled explanation of why Chinese dialects have different tonal domains in spite of the fact that they have the same morphosyntactic properties, such as word order. Tone in Chinese provides support for the universality of Structure Preservation in strong positions.

[2] The tone sandhi in Xiamen/Taiwanese is usually described with the height of pitch (cf. Chou & Chen, 2010):

Citation tone	55	24	53	21	33	32	4
Sandhi tone	33	33	55	53	21	4/53	21

Following Tsay, Myers and Chen (1999, Table 1), in (16) I use H, M and L instead of pitch height numbers in order to be consistent: 55 (H), 33 (M), 53 (HL), 21 (L).

[3] In (16), the first tone on the complement hong-ts'e is changed from H to M. This shows that Structure Preservation on strong position prohibits deletion of the tone(s) on the complements, and allows sandhi tone(s) for the tone(s) preceding the tone on the right edge.

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