Revisiting tone sandhi domain in Xiamen Chinese

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Introduction Current approaches to the syntax-prosody interface in OT framework have proposed a number of constraints to force the isomorphism between syntactic structures and prosodic structures. Among these, there are two major families of constraints, Match theory and Align/Wrap theory. In this paper, we use the tone sandhi domain in Xiamen Chinese as a case study to demonstrate that Match gives a more elegant explanation than Align/Wrap because it allows for subcategorization. MatchNonMin and MatchMax, when interacting with general MatchSP, are sufficient to predict the tone sandhi domain in Xiamen Chinese. Align/Wrap, on the other hand, needs a prosodic wellformedness constraint such as BINARITY to dominate Align/Wrap. The comparison between Match and Align/Wrap is conducted in the SPOT App. The automatic evaluation of the candidates is done in the OTworkplace (Prince, Tesar, & Merchant, 2015).

Xiamen Chinese Xiamen Chinese is a tonal language that has seven citation tones as in (1). The basic tone sandhi rule in Xiamen Chinese is that base tones are preserved at the right edge of tone group (TG) and undergo sandhi elsewhere (# indicates tone boundary). I follow Truckenbrodt (1999) in interpreting the domain of tone sandhi as φ, and assuming that no phonological recursion is involved in these structures. The general pattern of TG boundaries is represented in (4). The right domain boundary corresponds to the right edge of XP. We analyzed the TG in different constructions, including VP-adjuncts vs. sentential-adjuncts, dative constructions and topicalized sentences using Match constraints and Wrap/Align theories. Examples of each input syntactic structures and their output prosodic structures are given in Table 1 (English translation).

(1) The citation tones (in Chao tone letters (1968))

a) a. 44 b. 24 c.53 d.21 e.22 f.32 g.4.

(4) Tone sandhi domain rules in Xiamen Chinese

a. XP -> [YP XP] # where YP is adjunct to the host structure XP.

b. XP -> [YP # [X_0 ZP]$_{XP}$ #] where X_0 is the lexical head and YP/ZP are its arguments.

c. S - > [XP # YP # (ZP #)] where XP and YP are daughters of a sentence.

Syntactic structures	Examples	Output prosodic structures
Argument vs. Adjunct	{(sesame-seed) $_{NP}$ (big) $_{AP}$} $_{S}$	((sesame-seed) $_{\varphi}$ (big)$_{\varphi}$) $_{\iota}$
	{((sesame-seed)$_{NP}$ (big)$_{AP}$) $_{AP}$} $_{S}$	(sesame-seed big) $_{\varphi}$
VP adjunct vs. Sentential adjunct	{((already)$_{AvP}$ (go) $_{VP}$) $_{VP}$} $_{S}$	(already go) φ
	{(probably)$_{AvP}$ (go) $_{VP}$} $_{S}$	((probably) φ (go) φ) ι
Dative Verbs	((that book) $_{NP}$ (give (schoolmate) $_{NP}$) $_{VP}$) $_{VP}$	(that book) $_{\varphi}$ (give to schoolmate) $_{\varphi}$
	((schoolmate) $_{NP}$ (introduce (a girlfriend)$_{NP}$) $_{VP}$	(to schoolmate) φ (introduce a girlfriend) φ
Topicalization Structures	{((video-game) $_{NP}$ (rent one (watch) $_{VP}$) $_{VP}$} $_{S}$	((video-game) $_{\varphi}$ (rent one to watch) $_{\varphi}$) $_{\iota}$
	{(video-game) $_{NP}$ ((rent one) $_{VP}$ (expansive) $_{AP}$} $_{S}$	((video-game) $_{\varphi}$ (rent one) $_{\varphi}$ (expansive) $_{\varphi}$) $_{\iota}$

Table 1. A summary of the syntactic structures and their output prosodic structures (English translation)

<u>SPOT Setup: Match and Align/Wrap</u> We set the GEN output parameters as NONRECURSIVITY, Root prosodic tree in ι and Strict Layering for both Match and Align/Wrap. The relevant Match constraints are MATCHSP(xp), MATCHNONMINSYNTAX(xp), and MATCHMAXSP-LEXICAL(xp). The factorial typology using Match constraints generates three languages and Language 2 is Xiamen Chinese. The key Winner-Loser pairs are given in Table 2. WRAP-XP and ALIGNRIGHT-XP/ALIGNLEFT-XP generate two languages, and neither is Xiamen Chinese. A conflicting ranking exists between WRAP-XP and ALIGNRIGHT-XP. We thus introduce BINMAX that requires that any φ should not have more than two children to dominate both faithfulness constraints, as in Table 3.

Input	**Winner**	**Loser**	MATCHNONMINSYNTAX(xp)	MATCHSP (xp)	MATCHMAXSP-LEXICAL(xp)
{[[already] [go]]}	{(already go)}	{(already) (go)}	**W**	L	**W**
{[[sesame] [big]]}	{(sesame big)}	{(sesame) (big)}	**W**	L	**W**
{[[book] [gave [schoolmate]]]}	{(book) (gave schoolmate)}	{(book gave schoolmate)}		**W**	L
{[[schoolmate] [introduce [girlfriend]]]}	{(schoolmate) (introduce girlfriend)}	{(schoolmate introduce girlfriend)}		**W**	L
{[[rent [videogame]] [watch]]}	{(rent videogame) (watch)}	{(rent videogame watch)}		**W**	L

Table 2. Xiamen Chinese: Winner-Loser pairs using Match theory.

Input	**Winner**	**Loser**	BINMAX(branches)	WRAP-XP	ALIGNRIGHT-XP	ALIGNLEFT(xp)
{[[already] [go]]}	{(already go)}	{(already) (go)}		**W**	L	L
{[[sesame] [big]]}	{(sesame big)}	{(sesame) (big)}		**W**	L	L
{[[book] [gave [schoolmate]]]}	{(book) (gave schoolmate)}	{(book gave schoolmate)}	**W**	L	**W**	L
{[[schoolmate] [introduce [girlfriend]]]}	{(schoolmate) (introduce girlfriend)}	{(schoolmate introduce girlfriend)}	**W**	L	**W**	L
{[[rent [videogame]] [watch]]}	{(rent videogame) (watch)}	{(rent videogame watch)}	**W**	L	**W**	L

Table 3. Xiamen Chines: Winner-Loser pairs using Wrap/Align theory with BINMAX

<u>Summary</u> We found that Match constraints alone can derive the correct optimal output for the above constructions because it has a richer subcategorization for φ, such as MATCHNONMINSYNTAX(XP), whereas Wrap/Align must combine with a prosodic well-formedness constraint BINMAX. In general, the OT analysis is more elegant and simpler than other non-OT analysis that used c-commanding/m-commanding or even lexical government (Lin, 1994; Zhang, 2020; Chen, 1987, 1992).

Selective references

Chao, Y-R (1968), *A Grammar of Spoken Chinese*, Berkeley, CA: University of California Press

Chen, M. Y. (1987). The syntax of Xiamen tone sandhi. *Phonology yearbook*, *4*, 109-149.

Prince, Alan, and Paul Smolensky. 1993/2004. *Optimality Theory: Constraint interaction in generative grammar*. Blackwell Publishing.

Selkirk, Elisabeth. 2017. Syntactic constituency: Spell-out through Match constraints. Talk presented at SPOT Workshop UC Santa Cruz, Nov. 2017.

Truckenbrodt, H. (1999). On the relation between syntactic phrases and phonological phrases. *Linguistic inquiry*, 30(2), 219-255.