Elision and tone sandhi in the Tianjin dialect♠

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In the Tianjin dialect, casual utterance of familiar trisyllabic sequences often induces deletion of phonological segments. Depending on the positions of the deleted segments, syllable weight is affected. This paper argues that in the Tianjin dialect, the mora is the tone-bearing unit to which tonal features are preassociated. Thus reduction of mora count modifies tonal specifications, which in turn affect the kinds of tone sandhi found in casual Tianjin utterances.

1. Introduction

This paper presents an account of the interaction between the rich tone sandhi system of Tianjin and segmental elision that happens in fast and casual utterances of familiar trisyllabic sequences, henceforth Elision~Sandhi Interaction (ESI). It argues that (i) tonal features must be preassociated to morae in the Tianjin dialect; (ii) tonal features are deleted when mora-bearing segments are deleted; (iii) tonal features combine to form contour tones; (iv) tone sandhi applies after elision.

The phenomenon of ESI can be easily illustrated with the following examples:

(1)	a.		/ɕiauR ɕiL kuanL/	小西关 “little west fort”
		→	[ɕiɔiR kuanL]	
	b.		/ tiɛnF ʂʅF tɕiL /	电视机 “television set”
		→	[tiɛrR tɕiL]	

In (1), slash brackets represent the input syllables and the uppercase letters indicate tone contours: R = rising; F = falling; H = high flat and L = low flat. The question raised by data such as those in (1) is:

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(2) Given the inputs, how does elision of the phonological segments interact with the tones to yield the output tone?

2. Tone Sandhi

Since ESI involves tone sandhi as well as segmental elision, it is necessary for us to have a grasp of these two processes in isolation. This section gives an overview of Tianjin tone sandhi (for details, see Chen 2000 and Wee et al, in press) while section 3 outlines the processes involved in elision. Below, (3) presents the inventory of tones.

(3) Tones in Tianjin dialect

	Pitch value		Description (Chen 2000 and Wang 2002)
	Li and Liu (1985)	Shi (1990)	
First tone	[21]	[11]	L (Low)
Second tone	[45]	[55]	H (High)
Third tone	[213]	[24]	R (Rising)
Fourth tone	[53]	[53]	F (Falling)

Tones are not always stable in Tianjin; certain collocations trigger alternation known as tone sandhi. There are six such sandhi-triggering collocations. The tone sandhi rules (from Wee et al, in press) are provided below (with an example to each rule):

(4) Tone Sandhi rules in Tianjin

a. OCP type:

LL	→	RL	e.g.	[fei.tɕi]	"air plane"
RR	→	HR	e.g.	[mai.mi]	"buy rice"
FF	→	LF	e.g.	[pau.kau]	"report"

b. Partial OCP type

RH	→	LH	e.g.	[tʂu.rən]	"master/owner"
RF	→	LF	e.g.	[xau.ɕiau]	"funny/laughable"
FL	→	HL	e.g.	[tɕiau.ʂɻ]	"teacher"

In (4), the 6 tone sandhi rules are classified into two categories. (4a) is fairly straightforward. All offending input sequences are identical in contour, clearly exhibiting obedience to the OCP. Why (4b) is described as Partial OCP would become clear if we assume that contour tones are really made up of simple tone features such as high (H) and low (L). Hence, LH would describe a falling contour F while L would describe a rising contour R.

(5) Compositionality of contour tones

With (5), it should be clear that rules such as (4b) are cases of partial OCP. For example, RF is really LH.HL, where two Hs are adjacent. Likewise, FL is really HL.L with adjacent Ls.

Tone sandhi in Tianjin exhibits certain ordering and directionality effects in longer sequences. These effects are summarized below:

(6) Tone sandhi of trisyllabic sequences in Tianjin (Chen 2000)

a. Default direction is rightwards
/RRR/ → HRR → [HHR] e.g. 母老虎 "tigress"

b. OCP applies before partial OCP
/RFF/ → [RLF] (bleeds RF → LF) e.g. 五四四 "5-4-4"

c. Directionality flip
/LLL/ → RLL → *RRL → (flip)
/LLL/ → [LRL] e.g. 拖拉机 "tractor"
If default direction yields OCP violation, flip direction of derivation.

As far as Chen (2000) and Wee et al (in press) have been able to establish, the generalizations in (6) hold true for longer sequences as well.[1]

3. Elision

Having presented the tone sandhi system of Tianjin, this section moves on to describe the elision processes first studied in Wee et al (2005). A crucial characteristic of Tianjin elision is that in trisyllabic sequences, the window for elision is located between the initial and medial syllables. The final syllable is always stable.

(7) Window of elision

1stσ 2ndσ 3rdσ

elision happens here

[1] The generalizations in (6) pose a number of interesting theoretical questions which Wee (2004) explores in detail. For the purposes of this paper, (6) will suffice.

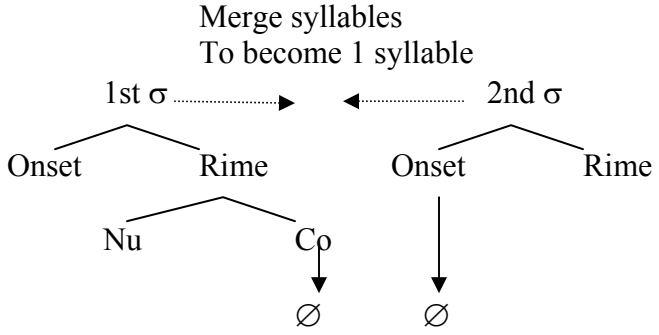
Elision in Tianjin comes in two flavors, namely: (i) deletion of the medial syllable in a trisyllabic sequence; and (ii) merging into a single syllable the initial and medial syllables in a trisyllabic sequence. In what follows, (8) illustrates (i).

(8) Elision by deletion of medial syllable

	1stσ	2ndσ	3rdσ	
		↓		
		∅		
e.g.		/tɕhyɛnF jeF tʂhaŋR/		"劝业场" name of a mall
	→	[tɕhyɛnF tʂhaŋR]		

(8) describes the case where elision is done via the deletion of the medial syllable, which is quite straightforward. Elision by merging is slightly more complicated, as shown in (9).

(9) Elision by merging of initial and medial syllables



e.g.		/ tɕiŋR kaŋL ʂanL/	"井冈山" Mt Jinggang
	→	[tɕiaŋR ʂanL]	

As illustrated in (9), this flavor of elision happens by the deletion of the coda of the initial syllable and the onset of the medial syllable. The leftover material from the two syllables then join to form a new syllable, as exemplified by the [tɕiaŋ], which is the result of combining [tɕi] and [aŋ] after the deletion of the [ŋ] coda and [k] onset.

It is unclear when deletion of medial syllables occur and when merging occurs. However, Wee et al (2005) notes that [k, kh, x, ts, tsh, s, tʂ, tʂh, r, ɕ, tɕ, tɕh, ɕ, f] are most easily deleted. Also, in merging, vowels may coalesce, e.g. au → ɔ; iu → y (Archangeli & Pulleyblank 1994).

4. Syllable deletion and tone sandhi

Armed now with an understanding of the elision and tone sandhi patterns, we are now ready to study their interaction, i.e. ESI. The section begins with the interaction between medial syllable deletion and tone sandhi. Logically, either tone sandhi applies prior to deletion or tone sandhi applies after deletion. It turns out that attested forms can only be arrived at if deletion of the medial syllable precedes tone sandhi. Consider again (8), repeated below as (10).

(10) Deletion of medial syllable before tone sandhi (bleeding)

/tɕhyɛnF jeF tʂhaŋR/ "劝业场" name of a mall

→ [tɕhyɛnF tʂhaŋR]

Derivations:

a. Deletion first:

	/tɕhyɛnF jeF tʂhaŋR/
Deletion	tɕhyɛnF tʂhaŋR

No sandhi rules left to apply

b. Tone sandhi first:

	/tɕhyɛnF jeF tʂhaŋR/
FF→LF rule	tɕhyɛnL jeF tʂhaŋR
Elision	*tɕhyɛnL tʂhaŋR

In (10), two orderings of the processes are considered. (10a) shows the effects of medial syllable deletion prior to tone sandhi. In this case, deleting the medial syllable (and with it the tone F) bleeds the FF→LF rule. (10b) is the reverse: the tone sandhi rule applies before the triggering environment is deleted. As it turns out, (10a) is attested, not (10b).

Deletion, besides bleeding tone sandhi, is also able to feed it, as in (11).

(11) Deletion of medial syllable before tone sandhi (feeding)

/ tɕhiɛL tsaiF tauL / "切菜刀" cleaver

→ [tɕhiɛR tauL]

Derivation:

	/ tɕhiɛL tsaiF	tauL /
Deletion	tɕhiɛL	tauL
LL → RL	tɕhiɛR	tauL

Thus, it can be established that the elision process of deleting the medial syllable precedes tone sandhi. A stronger statement would be to say (12): the question is whether it holds true for the "merging" type of elision as well.

(12) Deletion precedes tone sandhi

5. Syllable merging and tone sandhi

As explained in section 3, merging of the initial and medial syllables is a rather complicated process involving the deletion of coda and onset consonants. It turns out that even here, elision precedes tone sandhi, as exemplified by (13).

(13) /xuH tɕiaL tʂuŋL/ "胡家忠" Hu Jiazhong
→ [xuaH tʂuŋL]

In (13), it should be clear that tone sandhi could not have applied prior to elision. This is because early application of tone sandhi would cause the medial L to become an R tone, after which there would be no recourse for explaining the tone of the output [xuaH]. In the case of (13), merging happens after the onset of /tɕiaL/ is removed. For now, I will treat the medial glide [i] is part of the onset, so in (13) [tɕi] would be the onset of /tɕiaL/.[2] In any case, the syllable [xua] is the result of merging the initial and the medial syllable. One way one can arrive at the attested output is as presented in (14).

(14) Deriving (13)

	input	/xuH tɕiaL tʂuŋL/	Notes:
Step 1	deletion of segments	aL	
Step 2	merging of syllables	xuHaL	(=xuaF)
Step 3	tone sandhi (FL→HL)	xuaH	
	output	[xuaH tʂuŋL]	

An objection one might raise to (14) is that the output could very well be the result of totally obliteration of the medial tone. There are a few objections to this. Firstly, to make the input tone of /tɕiaL/ disappear when the mora-bearing nucleus [a] is realized requires a highly stipulative rule. Secondly, the example in (15) is empirically inconsistent with any assumption that medial tones are systematically deleted. Rather, it has to be that the deletion of tonal information and deletion of the corresponding mora-bearing segment occur together. But (15) presents challenges of a very different kind.

[2] This will become clearer in section 6. For treatment of medial glides as onset constituents, see Duanmu (2000).

(15) / tiɛnF ʂɻF tɕiL / "电视机" television set
→ [tiɛrR tɕiL]

Derivation:

	input	/ tiɛnF ʂɻF tɕiL /	Notes:
Step 1	deletion of segments	tiɛF[3] ɻF	
Step 2	tone sandhi (FF→LF) (FL→HL)	tiɛL ɻF ɻH tɕiL	OCP prior to partial OCP
Step 3	merging of syllables	tiɛLrH	(=tiɛrR)
	output	[tiɛrR tɕiL]	

Notice that in (15), the medial tone does play a role in determining the output. Without it, one would have no account for the rising tone in [tiɛrR]. However, while (15) vindicates the decision in (14) to not systematically obliterate medial tones, (15) and (14) are at loggerheads with each other in the ordering of "merging" and tone sandhi. In (15), merging and deletion are separate processes, sandwiching the tone sandhi process. In (14), deletion and merging precedes tone sandhi. It is noteworthy that deletion of segments and merging of syllables are both part of the elision process. Separating them as in (15) would not be as desirable as keeping them together in (14). How then can one obtain the correct results without appealing to the kinds of derivation in (15)?

The key to resolving the conflict between (14) and (15) lies in the observation that in (15), after deletion, there are 2 contour tones F between [tiɛF] and [ɻF]. F is in fact a sequence of HL, so FF would be HL.HL.[4] When viewed this way, merging these two contour tones would require the second H to crossover the L to its left before they can get from HL.HL to HHLL (i.e. which is effectively F. Otherwise one would get a syllable made up to two consecutive falling tones). Such an operation violates linearity of the original tonal sequence Obedience to input linearity must therefore be the solution to this conundrum.

(16) LINEARITY[5] Preserve the linear order of input tonal features.

With (16), one has an answer as to why merging in (15) occurs after tone sandhi. To merge prior to tone sandhi would involve violation of (16). To put things simply then, merging is a step that happens whenever it is allowed to, which is why in (14) it happens prior to tone sandhi but in (15), it happens after.

[3] Deletion of [n] coda does not affect syllable weight because there are still 2 vowels, hence the tone F remains intact. More on this in section 6.
[4] Note that at this point, tone sandhi (in this case FF → LF) has not set in. Tone sandhi applies after elision.
[5] LINEARITY is a universal constraint necessary in accounting for why metathesis happens so rarely. For exact formulation and details, see McCarthy and Prince (1995).

Thus far, analysis of ESI seem straightforward enough as long as one keeps in mind the requirements of LINEARITY. However, the next section will show that clarity in some deeper assumptions about syllable structures and tone-bearing units are crucial as well.

6. Moraicity of glide vowels

It was mentioned in passing earlier that the syllable structure of Tianjin is such that medial glides are part of the onset (cf. (13)). This implies that the [tiɛnF] in (15) has [ɛn] as its rime and [ti] as its onset. Deletion of the coda [n] would then render [tiɛ] mono-moraic. The sandhi patterns here indicate that the tone of [tiɛ] is nonetheless F. Consequently, one has to concede that a single mora can house both the tonal features required to describe the contour tone F. However, this cannot be right because (17) presents evidence to the contrary.

(17) /ɕiauR ɕiL kuanL/ "小西关" little west fort
→ [ɕiɔiR kuanL]

Derivation:

	input	/ɕiauR ɕiL kuanL/	Notes:
Step 1	deletion of segments	iL	
	vowel coalescence	ɔL	au→ɔ, losing one mora, the contour reduces from LH to L.
Step 2	merging of syllables	ɕiɔiL	merge here does not violate LINEARITY
Step 3	tone sandhi (LL→RL)	ɕiɔiR	
	output	[ɕiɔiR kuanL]	

The interesting thing about (17) is that vowel coalescence (au→ɔ) reduces moraic count, thereby causing the contour R tone to lose its H element and become L. This appears to be the most sensible account of (17). If there was no reduction of the R tone, tone sandhi operations would yield empirically unattested outputs (tritonal sandhi of RLL yields HRL. RLL→ R<u>RL</u> → <u>HR</u>L, where the tones undergoing sandhi are underlined). There is a conflict between (15) and (17) that needs resolution, which is to be found in the syllable structure of Tianjin. Consider first the following syllables.

(18) a. i. ta ii. *ɕa
b. i. tu ii. *ɕu
c. i. ti ii ɕi

The curious thing about (18) is that the palatal consonant [ɕ] is always followed by some front vowel (in this case [i] but it can also be [y]). The situation in (18) is also true for the palatal affricates [tɕ] and [tɕh]. In these cases, there is clear evidence that the medial glide is part of the palatal consonant onset. Such evidence is lacking for the other consonants. As such, the situation in (15) is quite different from that in (17). In (15), the onset is [t], which not palatal, the [i] is arguably part of the rime. [i] is thus mora-bearing in (15) but not (17).

(19) a. t i ɛ b. ɕiɔ
| | |
μ μ μ

Given (19a), (15) need no longer be interpreted as a mono-moraic syllable hosting a composite tonal contour. The conflict is thus resolved.

Implicit in the analysis provided so far is that morae are tone-bearing units in the Tianjin dialect. This position is independently argued for in Wang's (2002) study of neutral tones in Tianjin. It must also be assumed that tonal features are preassociated to the host mora. This is because it is the loss of moraic count that reduces the tonal contour in (17).

7. Conclusion and implications

This paper studies the interaction between elision in casual speech with the tone sandhi system of the Tianjin dialect. The Elision~Sandhi Interaction (ESI) though complex at first blush, is easily described if one orders elision processes such as deletion of syllables and segments before tone sandhi. A crucial point to bear in mind is that the merging of two syllables to form a single syllable is constrained by requirements of LINEARITY. Merging does not occur at the expense of LINEARITY preservation of input tonal elements. Once LINEARITY is obeyed, merging is free to take place; it is thus that merging of syllables happens before and after tone sandhi.

Another interesting aspect of this paper is the bearing ESI has on assumptions of Tianjin syllable structure. Supported by evidence from minimal pairs (or the lack thereof), it can be established that not all medial glides (such as [i]) are constituents of the onset. This issue has not been explored sufficiently here, but will have to wait research more dedicated to a deeper understanding the Tianjin syllable structure.

Finally, perhaps the most interesting aspect of this paper is the observation that elision precedes tone sandhi. Elision here is a result of casual speech, something one would think is highly phonetic in nature. Tone sandhi, however, is deeply embedded in the

phonological patterns of the language and part of the abstract grammatical system. It is curious that ESI should pattern in the way seen in Tianjin.

In sum, this paper raises the following questions: (i) What mechanisms would explain the LINEARITY constraint on the merging of syllables such that merging can happen before or after tone sandhi; (ii) How can one determine the status of vowel glides in the Tianjin syllable; and (iii) What kinds of framework would adequately describe ESI where phonetic processes like elision could influence grammatical processes like tone sandhi?

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