Incomplete Tone Merger as Evidence for Lexical Diffusion in Dalian[1]

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The presence of near mergers has long been a puzzle for linguists due to the notions such as contrast, categorization as well as the postulated symmetry between production and perception (Labov 1994). The present research aims to provide a case study of tonal near merger in Dalian, a less well-known Mandarin dialect spoken in Northeast China. Using a case study of tonal near merger as a jumping off point, this paper draws on insights from the hypothesis of lexical diffusion (Wang 1969) to illustrate that sound change could indeed take a long period of time to complete its course.

1.   Introduction

The present research aims to provide a case study of tonal near merger in Dalian. According to Song (1963), four lexical tones are observed in citation form, i.e. 312, 34, 213 and 53 (henceforth Old Dalian)[2]. Our first-hand data obtained from a young female speaker of Dalian (henceforth Modern Dalian) suggests an inventory of three lexical tones, i.e. 51, 35 and 213. The lexical tone 312 in Old Dalian, derived from Ia (*Yinping*), is merging with 51, derived from III (*Qu*), in the modern system.

However, the tone merger in Modern Dalian is incomplete. A slight phonetic difference can be observed between these two falling contours: both of them have similar F0 values, but the falling contour derived from Ia (*Yinping*) has a longer duration compared with the falling contour derived from III (*Qu*). Nevertheless,

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[2] Tones are marked with Chao tone numbers (Chao 1948) here. "5" indicates the highest pitch used in lexical tones while "1" indicates the lowest pitch. Contour tones are marked with two juxtaposed numbers. For example, 51 indicates a falling tone from the highest pitch to the lowest pitch.

the speaker judges the contours to be the same.

A question arises as a consequence of the tone merger in progress in tone sandhi. How will the merged tone behave during phonological processes? The tone patterns in disyllabic sequences in Modern Dalian suggest that the falling contour, derived from Ia and merging into III, should be analyzed as underlyingly /312/, i.e. the lexical tone in the sixties. However, the current citation form of Ia, /51/, competes with /312/, such that an exception can be found in tone sandhi. The above facts attest that sound change is not *lexically* abrupt, and could take a long period of time to complete its course (Wang 1969).

2.   The thesis of tone merger (Wang 1982)

Wang (1982) first proposes a thesis of tone merger to account for the mechanism of tonal impoverishment in northern Chinese dialects, taking the 8-tone system, obtained after bipartition from four tone categories, as the starting point:

(1)

MC tone categories	MC initials	Tone split	Tone merger
I (*Ping*) ↗ p	⋯⋯	p^a	
↘ b	⋯⋯	p^b	
II (*Shang*) ↗ p	⋯⋯	p^a	
↘ b	⋯⋯	p^b	
III (*Qu*) ↗ p	⋯⋯	p^a	
↘ b	⋯⋯	p^b	
IV (*Ru*) ↗ p	⋯⋯	p^a	
↘ b	⋯⋯	p^b	
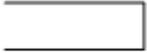
We shall follow one convention in the Chinese linguistics tradition in using I, II, III, and IV to stand for the four Middle Chinese tone categories, and a and b for the *Yin* (upper) and *Yang* (lower) registers respectively.

Conducting a survey of 480 northern Chinese dialects, Lien (1986) observes that Tone III is a merging category while Tones I, II and IV are merged categories. With respect to tone values of Tone III, his quantitative analysis reveals that high falling contour tone is by far the greatest in number in terms of tone tokens for Tone III, followed by high level tone. Lien attributes that underlying force that pulls the rest of the tones into III to perceptual reasons, high falling contour tone being the most favored tone feature in speech perception. Moreover, from a production point of view, falling contour is also favored in languages: there is a universal intonation tendency to begin a declarative sentence with a high tone and finish it by a low

tone. Liberman & Pierrehumbert (1984) observe as well a final lowering in declarative sentences in English. Pierrehumbert & Beckman (1988) underline that this phenomenon occurs, in Japanese, in declarative sentences but not in interrogative sentences. Likewise, a final lowering is observed in Lomongo (Hulstaert 1961) and Vietnamese (Nguyên & Boulakia 1999).

Lien's survey, written in 1986, mostly cites data reported in the 1960s and 1970s. As suggested in his paper, northern Chinese dialects of that time still keep the distinction between Ia and Ib. However, in a recent report on the dialects spoken in east Shandong province, a merger of Ib into III is observed (Qian *et al.* 2001). The same tendency is found in our data, where a reduced tonal inventory of three tones is observed, as we shall see in the next section.

3.   Dalian - tone merger in progress
3.1   Tone system of Modern Dalian

Dalian is a city located at the south of Liaodong Peninsula, in Liaoning Province in Northeast China (see Figure 1). As a city located along the coast and facing Shandong Peninsula, most speakers of Dalian and other cities of Liaodong Peninsula were originally from Shandong. Dialects spoken in these two peninsulas are generally called Jiao-Liao Mandarin.

Figure 1: the location of Dalian city

On a basis of an elicitation list of 204 words, three lexical tones are classified in citation form, i.e. 51, 35, 213[3]. The informant is then asked if the words in one tone category all carry the same tone.

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[3] For the full list of elicitation, please refer to Liu (2009).

(2)   a.   51   [ta]   "big"   b.   35   [ta]   "to reply"   c.   213   [ta]   "to hit"
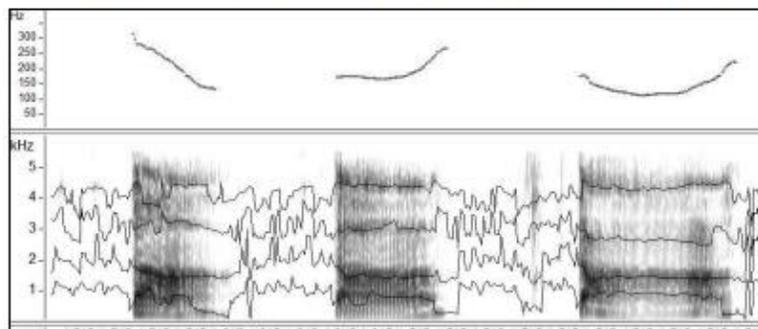

Figure 2: Pitch contour and spectrogram for [ta] "big", [ta] "to reply" and [ta] "to hit".

A comparison between Mandarin, Old Dalian and Modern Dalian is illustrated in (3). It can be observed that the falling contour tone has three historical sources apart from some words from the entering tone: Ia III and IIb. Recall that the merger of IIb with III took place in the ninth century (§2); the migration of Ia into III is a relatively recent process.

(3)

MC category	Mandarin	Old Dalian	Modern Dalian	
Ia	55	312	51	
Ib	35	34	35	
IIa	213	213	213	
IIb	51	53	51	
IIIa	51	53	51	
IIIb	51	53	51	

In order to know if there exists a phonetic difference between the falling contour tone derived from Ia and the one derived from III, we had the informant read nine pairs with five repetitions. We measured then their respective pitch duration. It can be seen in (4) that the contours derived from III have consistently a shorter duration compared with their counterparts derived from Ia:

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(4)

	Duration of /HL/ derived from Ia		Duration of /HL/ derived from III
[hwa] flower	473	[hwa] to paint	363
[tʰɑŋ] soup	346	[tʰɑŋ] hot to touch	328
[toŋ] winter	522	[toŋ] to freeze	375
[fɑŋ] perfume	443	[fɑŋ] to set free	306
[fɛj] to fly	473	[fɛj] to abolish	218
[ʂɨ] to lose	431	[ʂɨ] soldier	342
[san] three	365	[san] to come loose	293
[u] house	516	[u] fog	456
[fɑŋ] square	328	[fɑŋ] to set free	250
Average duration	433	Average duration	326
Standard deviation	67.77ms	Standard deviation	61.24ms

This result is not surprising given that the falling contour derived from Ia was pronounced as 312 in the 1960s, and a complex contour tone generally has a longer duration compared with a falling contour tone. It is interesting that the *quantity* of the pitch duration derived from Ia is preserved, even it is merging with the falling tone derived from III.

Recall that, after classifying the words into three tonal categories, the informant was asked if words belonging to one category carry the same tone. The falling contour category includes words derived from Ia and those derived from III, mixed in a random way. The informant replied that words derived from Ia and those derived from III bear the same tone. The fact that speakers consistently report that two classes of sounds are 'the same,' yet consistently differentiate them in production at better than chance level, is largely reported in the literature. Labov, Yaeger and Steiner (1972), for instance, find that speakers differentiate words like *source* and *sauce* in production, but report no distinction between them in perception. Similar near mergers have been

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reported in other varieties of English (e.g., *fool* and *full* in Albuquerque (Di Paolo 1988); *too* vs. *toe* and *beer* vs. *bear* in Norwich (Trudgill 1974); *line* vs. *loin* in Essex (Labov 1971, Nunberg 1980); *meat* vs. *mate* in Belfast (Harris 1985, Milroy and Harris 1980).

Given that our data is drawn from one informant, a natural question arises as to whether the tone merger in progress in Modern Dalian is due to individual variation. A close look at other Jiao-Liao Mandarin dialects is necessary in order to shed light on what is happening in Modern Dalian.

3.2   Tone merger in other Jiao-Liao Mandarin dialects

In Lien's 1986 survey, the majority of the northern variety still keep the distinction of Tone Ia and Tone Ib. A tendency of tone merger from four tones to three tones is observed in the last two decades in Jiao-Liao Mandarin. Working on the dialects spoken in Shandong province, Qian *et al*. (2001) notice that, in several dialects spoken in east Shandong Peninsula, a migration of Tone Ib into Tone III is observed, especially among young speakers:

(5) MC category	Weihai	Yantai	Fushan	Haiyang	Zhauyuan	Laixie
Ia	53	31	31	53	214	214
Ib	(33)	(55)	(55)	(43)	(42)	(42)
IIa	214	214	214	213	55	55
IIb	33	55	55	43	42	42
IIIa	33	55	55	43	42	42
IIIb	33	55	55	43	42	42

A comparison with the tendency of tone merger in dialects spoken in Shangdong province suggests that Modern Dalian is experiencing a similar process, with Ia migrating into III. The tendency found in Shangdong province gives thus indirect support to the tone merger in progress found in our data.

The next section will focus on the consequence of the near merger in tone sandhi in Modern Dalian.

4.   Tone sandhi in Modern Dalian

As noted in the previous section, Ia is migrating into III in the modern dialect. Nevertheless, their underlying contrasts are preserved in tone sandhi contexts. Note that the left-most column indicates the tone on the first syllable, whereas the top row refers to the tone on the second syllable.

(6)

	Ia 51	Ib 35	II 213	III 51
Ia 51	35.213			
Ib 35	35.213			
II 213	35.213	21.35	35.213	21.51
III 51	55.213		55.213	

Of sixteen possible combinations, nine sequences are subject to change. In cases where tone sandhi does occur, the second syllable retains its underlying tone. However, when 51 derived from Ia is on the second syllable, it systematically surfaces as 213 whatever the tone of the preceding syllable is. Examples of tone sandhi rules are given in (7):

(7) a. 51 (Ia) + 51 (Ia) → 35.213   [tsʰwɤn tʰjɛn] "Spring"
  b. 35 (Ib) + 51 (Ia) → 35.213   [zɤn tɕiʰ] "one's wife"
  c. 213 (II) + 51 (Ia) → 35.213   [ku ʂu] "old books"
  d. 51 (III) + 51 (Ia) → 55.213   [toŋ tʰjɛn] "freezing day"
  e. 213 (II) + 35 (Ib) → 21.35   [mi tʂoŋ] "parasite"
  f. 213 (II) + 213 (II) → 35.213   [jan ʂi] "gum (of eyes)
  g. 213 (II) + 51 (III) → 21.51   [tswɔ ʂaŋ] "upper left"
  h. 51 (III) + 213(II) → 55.213   [taj ʂu] "kangaroo"
  i. 51 (Ia) + 213(II) → 51.213   [tɕʰio v] "autumn rain"

Disregarding the falling contour derived from Ia for the moment, when tone sandhi occurs, it is the first tone that undergoes change. This fact is consistent with Northern Mandarin dialects, all right-dominant, in which the tone of the first syllable, in weak position, is subject to tone change under certain circumstances.

If Dalian is also a right-dominant language, why does /51/ derived from Ia surface as [213] on the second syllable? In other words, why are the falling contour derived from Ia and the one derived from III realized differently in disyllabic sequences while they are pronounced as a falling contour in citation form?

The falling tone derived from Ia systematically surfaces as [213] on the second syllable. Recall that in Song's 1963 data, the lexical tone derived from Ia was /312/, a falling-rising contour tone. It seems reasonable to hypothesize that, in Modern Dalian, the surface tone [213] of Ia on the second syllable is actually the lexical tone /312/ in Old Dalian, and that it has merged with the falling contour in the modern dialect. The rationale of this conjecture is that, in a right-dominant language, when a

disyllabic sequence undergoes tone sandhi, it is the tone of the first syllable that is subject to change, and the lexical tone of the second syllable remains the same. Putting aside the slighttranscription difference, both 312 and 213 are falling-rising contour tones.[4]

We posit that the underlying form of Ia is 21(3), with a final floating high tone. The difference between Ia and III resides in that the former has a final floating high tone whereas the latter has a fixed final high tone:

(8) a. 51 derived from Ia

    Underlying form   Citation form

    M L H   →   M L   →   H L
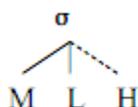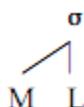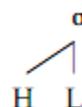
  b. 213 derived from III

    M L H
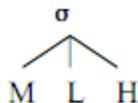
At a later stage, the floating high tone of Ia is delinked in citation form, and the remaining part is fused with the falling contour derived from III after a rule of register adjustment. However, the underlying difference between Ia and III is still preserved in tone sandhi[5]. Assuming this analysis, we can say that Dalian is a right-

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[4] It is well known that different informants pronounce tones with a slight phonetic difference, and not all descriptors transcribe tones in the same way: a same falling-rising contour tone might be transcribed as 413, 313 or 312 by different persons. This transcription difference does not change the fact that they all represent one single phonological object, i.e. a dipping tone.
[5] Tone sandhi preserves an earlier stage of a language is a frequent phenomenon in Sinitic

dominant language, and that the second syllable retains its lexical tone just as other northern Mandarin dialects. This hypothesis is also advanced by Chomsky & Halle (1968) in support of their analysis of English: the underlying representation of the phonological system is also the surface representation of an earlier stage.

One puzzle remains: 51 (Ia) + 213 (II) yields [51.213] with four pitch changes on two syllalbes, rather than *[55.213] as predicted by our constraint ranking:

(9)

	51 (Ia)	213 (II)
51 (Ia)	35.213	**51.213 (*55.213)**
213 (II)	35.213	35.213

The input 51 (Ia) + 213 (II) should have undergone tone sandhi but didn't: if the underlying form of Ia on the first syllable was 21(3), then the output should have been *[35.213] as in other cases. If the underlying form of Ia was 51, then the output should have been *[55.213]. Note that this is the only instance where Ia surfaces as 51 in tone sandhi.

Maybe a broader question is involved in the present case: what is the consequence of an incomplete merger on the phonological processes of a language?

Recall that 51 (Ia), which can be represented as underlyingly 21(3), is merging with

51 (III) in Modern Dalian, and 21(3) only surfaces on the second syllable in a disyllabic

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languages. In Jinjing (Min dialect) for example, there are seven lexical tones but eight sandhi tones. The tone category III (*Qu*) has two sandhi tones:

(a) puã31 → puã55 lɔ31 « halfway »

(b) pŋ31 → pŋ11 si24 « spoon»

Ting (1984) remarks that, from a diachronic point of view, (a) had a high register and (b) had a low register; these two registers have merged into one lexical tone in the modern dialect. On the basis of sandhi tones, we can conclude that there are seven lexical tones but eight base tones in this dialect. Another example comes from two dialects of Lingao on the Hainan Island (Ting 1982): there are six lexical tones in these two dialects, five of which are the same. The remaining tone is 11 in the A dialect, and 35 in the B dialect. There is no sandhi tones in the A dialect, and the sandhi tone in the B dialect is just 11. A comparative analysis implies that the base tone in B is 11.

This hypothesis is reminiscent of the liaison in French, a phenomenon of segmental sandhi, whose conservative character is largely admitted : take the word *grand* for example, it was written as *grant* and was pronounced [grãt] both in masculin and in feminin in the twelvth century. The final consonant, in weak position, dropped, but is preserved if the following word begins with a vowel. The change in spelling (*grant→grand*) can be explained by the influence of latin etymology *grandis*, and allows to illustrate the regular alternation between *grand* and *grande* (an alternation such as *gran ~ grande* or *grant ~ grande* would be weird and irregular) as well as the lexical relation with *grandeur, grandir, grandiloquent*, etc.

sequence. However, this tone merger in progress cannot have no effect on tone sandhi. It is possible that the tone merger in progress results in competing forms in tone sandhi and a reorganization of the grammar:

(10) Ia → 21(3)   in Old Dalian and in tone sandhi   --------------------
        ↘ 51   in Modern Dalian   ---------------------
                                                                                ↑
                                                        Competing forms
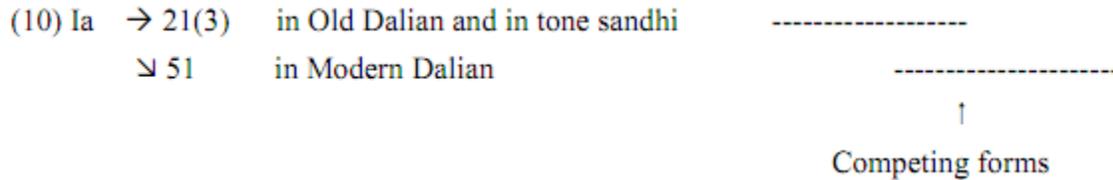
There are two competing forms in Dalian: Ia is realized as a falling-rising contour in Old Dalian and in tone sandhi in the modern dialect. Meanwhile, Ia is realized as a falling contour in citation form in Modern Dalian. 51 (Ia) + 213 (II) being the only case where Ia surfaces as the current citation form, we would like to suggest that this sequence is actually an innovation and a variation during the tone merger in progress.

The phenomenon in Dalian buttresses Dauzat and Wang's position according to which sound change is more complicated than the regularity hypothesis claimed by Neogrammarians :

> *The phonetic law does not affect all items at the same time: some are designed to develop quickly, others remain behind, some offer strong resistance and succeed in turning back any effort at transformation.*(Gauchat, cited in Dauzat 1922)

> *It is generally believed that splits can only result from a conditioned change, and that contrasts are possible only after something happens to the condition of the change. But if we accept the fact that a sound change (conditioned or unconditioned) may not complete its course due to other competing changes, then clearly we may also need to recognize incomplete sound changes as a cause of splits.* (Wang 1969:21)

5.   Conclusion

The present work has dealt with the current state of tone merger in northern Chinese, with a special focus on Dalian. It has been suggested that Modern Dalian is experiencing a tone merger, Ia (Yinping) being integrated into III (Qu). However, the tone merger in Modern Dalian is incomplete on two grounds. On one hand, a slight phonetic difference is observed between the falling contour derived from Ia (Yinping) and the one derived from III (Qu). Both of them have similar F0 values, but the falling contour derived from Ia has a longer duration compared with the falling contour derived from III. Meanwhile, the underlying contrasts of these two contours surface in tone sandhi contexts. The above phenomena attest, as claimed by Wang (1969), that sound change is not lexically abrupt, and could take a long period of time to complete its course.

It has been suggested in the literature that the underlying category difference in a

near merger situation may be supported by contact with another dialect that maintains the distinction (Labov 1994) or by orthographic differences (Faber and Di Paolo 1995). Yu (2007), who works on the near tone merger between the lexical rising tone and the morphologically derived rising tone in Cantonese, mentions that underlying category difference in a near merger situation can be sustained by grammar-internal factors as well. The present study illustrates another instance of preservation of underlying category difference in a near merger situation: the underlying difference between Ia and III is preserved in tone sandhi contexts.

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