Taiwan Min Nan Checked Tones Sound Changes

Ho-hsien Pan[1] & Shao-ren Lyu[1]

[1]*National Yang Ming Chiao Tung University (Taiwan)*
hhpan@nycu.edu.tw, shaorenlyu@gmail.com

This study investigates the current state of sound change in Taiwan Min Nan (TMN) with regards to its seven lexical tones, which are related by tone sandhi chains. The sandhi rules are 55 → 13 → 33 → 31 → 51 → 55 and 3 → 5 → 3. Within a sandhi domain, a base tone surface in the tone sandhi domain final position, whereas sandhi tones surface in the non-final positions. The checked tones 3 and 5 are undergoing sound change that spans over generations. Fieldworks based on auditory impression noticed (1) deletion of glottal stops [ʔ], (2) vowel lengthening among base tone /5/ [5] (Liao, 2004, Chen, 2010, Ang, 2003), (3) lowering of f0 onset for base tone /5/ [5] (Chen, 2010, Ang, 2003) and (4) de-glottalized for base tone /5/ [5] (Chen, 2010).

To evaluate the current state of TMN checked tone change, native speakers of TMN, who were college students, discriminated AX stimuli pairs in citation forms containing sandhi-sandhi (SS), base-base (BB), and sandhi-base (SB) tonal pairs. Checked tones [3] and [5] were the most confusing, followed by level tones [55] and [33], and then low level and low falling tones [33] and [31]. Aside from similar tonal contours between two level tones or similar tonal registers between low tones [31] and [33], it is proposed that the tone sandhi relationship can induce perceptual confusion as well. For example, between the sandhi-related tonal pair [33] and [55], where the base tone /55/ [55] changes to the sandhi tone /55/ [33], is more prone to perceptual confusion than the sandhi-unrelated tone pair which includes the base tone /33/ [33] and the sandhi tone /51/ [55]. The two checked tones with two cyclic sandhi rules, 3 → 5 → 3, are most confusing perceptually.

This study also explores the acoustic similarities between checked tones. Read speech of disyllabic words containing sandhi tone in the first syllables and base tone in the second syllables were recorded from 40 TMN speakers, including four males and four females from each of the five dialect regions. Half of the speakers were under 30 years of age, whereas the other half were above 40 years of age. Following Pan (2017), the study compared the normalized f0, H1-A3c, and duration of sandhi and base checked tones with coda stops /p, t, k, ʔ/ realized as full stop, energy damping, irregular glottal pulse or complete deletion. As shown in Figure 2, and 3, in read speech, base tone 3 and 5 are merged in duration, f0 and H1-A3c domains, but sandhi tones 3 and 5 remain distinctive in terms of f0 and H1-A3c domains. As shown in Figure 4, deletion of coda stops was most prevalent among the glottal stops produced deep in the larynx, followed by the velar coda /k/ produced in the back of the mouth, and then by the /t/ produced in the front of the mouth. Coda stop /p/, which is visible, is least likely to be deleted. After coda deletion, vowels preceding deleted codas tend to be lengthened.

In summary, TMN checked tones are gradually losing their marked features, such as short duration and CV[stop] syllable structure. F0-wise, the merging of tonal registers gradually proceeds from checked base tones to checked sandhi tones. The loss of coda stops proceeds from glottal stops to velar stops, and then onto alveolar stops. Duration-wise, compensatory lengthening was proposed to cause duration lengthening after coda deletion. The lengthening of checked tones may cause further confusion between checked and unchecked syllables. Additionally, this tonal merging process begins with the less frequently occurring base tones and progresses towards the more commonly observed sandhi tones.

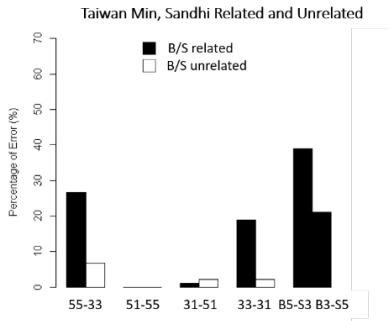

Fig.1 Percentages of error on sandhi related and unrelated tonal pairs in AX discrimination test.

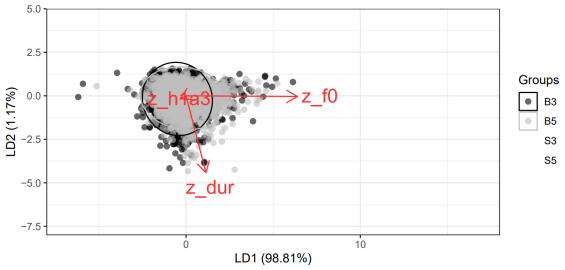

Fig.2 Results of Linear Discriminant Analysis on f0, duraiton and H1-A3c of base tones 3 and 5.

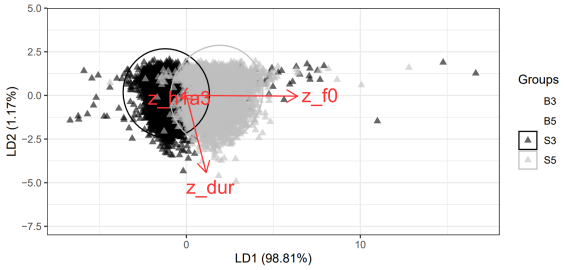

Fig.3 Results of Linear Discriminant Analysis on f0, duration and H1-A3c of sandhi tones 3 and 5.

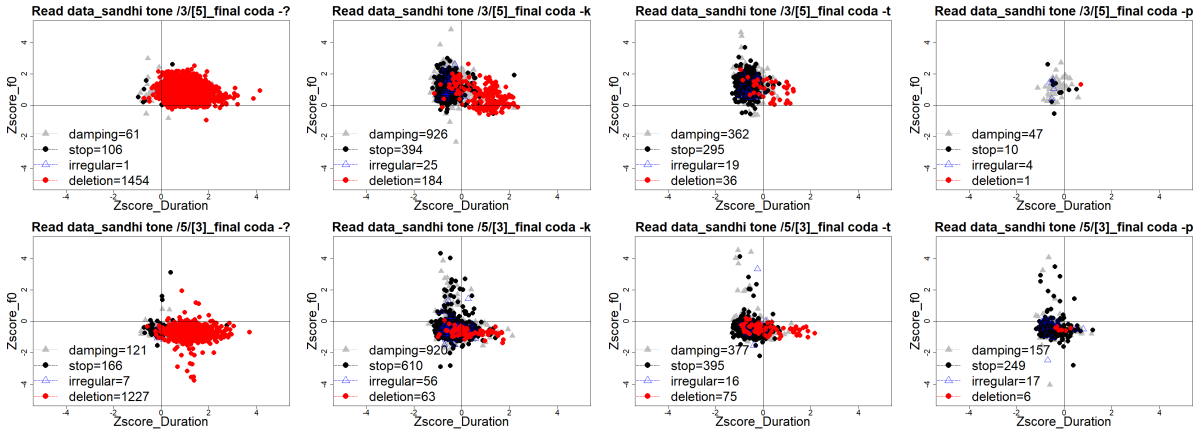

Fig.4 F0 and duration of sandhi tones 3 and 5 in different stages of coda weakening (▲: energy damping, ●: full stop, △: irregular glottal pulse, ●: complete deletion).

References

[1] Liao, J. C. (2004). *台語入聲調之現況分析* [*An investigation on the entering tones in Taiwanese*]. MA thesis, Taiwan : National Hsinchu University of Education.

[2] Chen, S.C. (2010). 台灣閩南語新興的語音變異 :台北市、彰化市及台南市元音系統與陽入原調的調查分析 [New sound variation in Taiwan Southern Min: Vowel system and the lower register entering tone in Taipei, Changhua and Tainan]. *Language and Linguistics, 11(2),* 425–468.

[3] Ang, U. J. *音變的動機與方向:漳泉競爭與台灣普通腔的形成* [*The motivation and direction of sound change: On the competition of Minnan dialects Chang-chou and Chuan-chou, and the emergence of General Taiwanese*]. Ph.D. dissertation, Taiwan : National Tsing Hua University.

[4] Pan, H. H., (2017). Glottalization of Taiwan Min checked tones. *Journal of the International Phonetic Association*, *47(1),* 37–63.