A metrical analysis of light-initial tone sandhi in Suzhou

LSA 2020 Annual Meeting, January 3, 2020

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I. Main claims

1. 'Checked tones' as monomoraic syllables

- Traditionally transcribed as closed syllables with /ʔ/ codas (Qian 1992, Wang 2011)
- Contemporary status of /ʔ/ has not been studied phonetically
- Based on my fieldwork acoustic data, they are **plain short vowels in monomoraic (open) syllables**
- First-time phonetic evidence of contrastive vowel length (monomoraic vs. bimoraic)

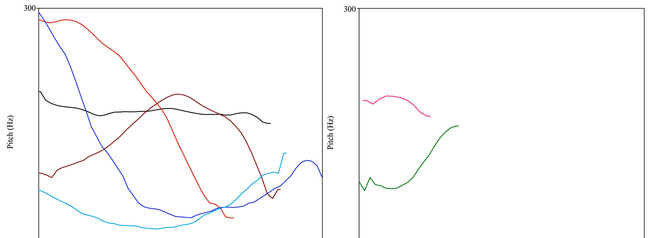
2. 'Exceptional' light-initial sandhi patterns

- The second syllable can influence tone sandhi **only** when the initial syllable is light (traditionally 'checked') — I refer to this as 'light-initial sandhi'
- Counter to previous descriptions, where only the initial syllable determines the sandhi pitch pattern ('Left dominance')(Duanmu 1999, Shi & Jiang 2013)
- I propose a more refined foot-based analysis for this novel light-initial pattern

II. Background

1. Lexical tones in Suzhou

- A Northern Wu dialect with seven lexical tones



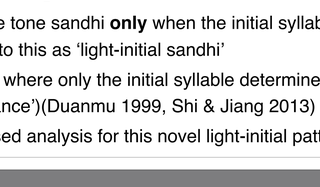
'Unchecked tones'. Bimoraic. 'Checked tones'. Monomoraic

Bimoraic, $T_{\mu\mu}$					Monomoraic, T_{μ}	
[H]	[LH]	[HL]	[HLH]	[LHL]	[H]	[LH]

2. Left dominance: the traditional tone-sandhi analysis

- Assumed for many Wu dialects (Chan & Ren 1989 for Wuxi, Duanmu 1999 for Shanghai, Chan 1995 for Danyang, Shi & Jiang 2013 for Suzhou)
- **Initial syllable determines the surface pitch**; everything else is irrelevant
- Captured by left-aligned, non-iterative syllabic trochees
- A strong syllable (σ^+) retains its tonal material; a weak footed syllable (σ^-) can receive tone through re-association, but cannot retain its own tone; third & fourth syllables are unfooted and are subject to phonetic implementation. (Shi & Jiang 2013)

/LH/ + T + T + T:



3. Complications in Suzhou

- Tone redistribution does not always happen:
  - /LH/ + T + T + T = [**L.H**.L.L], but
  - /HL/ + T + T + T = [**HL**.L.L.L]
- Complex contours (HLH, LHL) as initial syllables do not preserve everything
  - /HLH/ + T + T + T = [**H.H**.L.L]
  - /LHL/ + T + T + T = [**L.H**.L.L]

★ **When initial syllable is monomoraic/light, the second syllable tone plays a role**

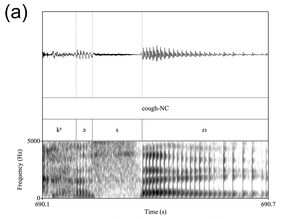
III. Findings of the current study

★ All phonetic data come from my fieldwork, mainly consisting of disyllabic nouns elicited in a carrier sentence

1. No phonetic evidence for /ʔ/

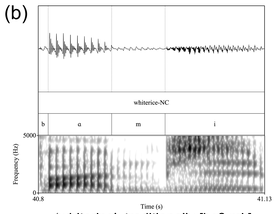
- No coda stop closure for the 'checked tones' (a and b)
- Intervocalic consonant durations are the same for 'checked' / 'unchecked' tones (a vs. c)
- 'Unchecked' vowels (≈250ms in running speech) are more than twice as long as 'checked' ones (≈100ms)

(a)



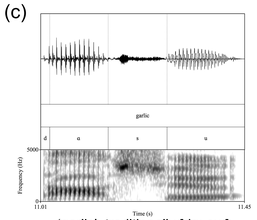
'cough', traditionally [kʰəʔ.sɛɪ]
No closure for 'coda' /ʔ/

(b)



'whiterice', traditionally [bɑʔ.miː]
No closure for 'coda' /ʔ/

(c)



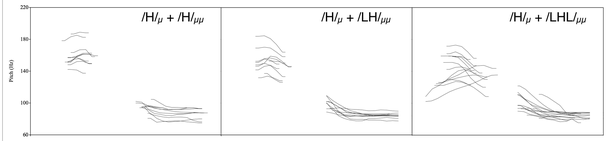
'garlic', traditionally [dɑːsuː]
[s] is similar in duration to that in (a)

★ **Conclusion: 'checked tones' are light monomoraic open syllables (e.g. [kʰə.sɛɪ])**

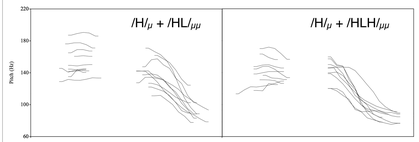
2. Second syllable plays a role in light-initial sandhi forms

★ What we would expect if the traditional analysis were true: **/H/$_{\mu}$ + T = [H$_{\mu}$.L$_{\mu\mu}$]** always; **/LH/$_{\mu}$ + T = [L$_{\mu}$.H$_{\mu}$L$_{\mu}$]** always

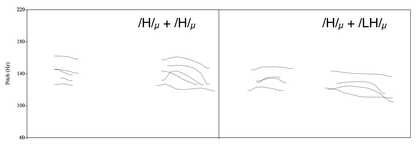
- Pattern A: **[H$_{\mu}$.L$_{\mu\mu}$]**



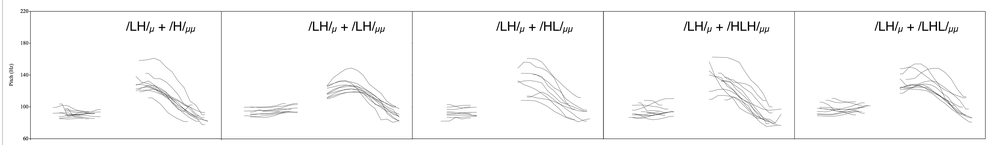
- Pattern B: **[H$_{\mu}$.H$_{\mu}$L$_{\mu}$]**



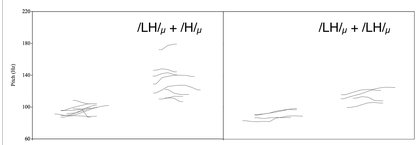
- Pattern C: **[H$_{\mu}$.H$_{\mu}$]**



- Pattern D: **[L$_{\mu}$.H$_{\mu}$L$_{\mu}$]**



- Pattern E: **[L$_{\mu}$.H$_{\mu}$]**



Rows: initial tone Columns: second tone	/T/$_{\mu}$ + /T/$_{\mu\mu}$					/T/$_{\mu}$ + /T/$_{\mu}$		Traditional Account
	/H/$_{\mu\mu}$	/LH/$_{\mu\mu}$	/HL/$_{\mu\mu}$	/HLH/$_{\mu\mu}$	/LHL/$_{\mu\mu}$	/H/$_{\mu}$	/LH/$_{\mu}$	
/H/$_{\mu}$	A	A	**B**	**B**	A	**C**	**C**	A
/LH/$_{\mu}$	D	D	D	D	D	**E**	**E**	D

A: [H$_{\mu}$.L$_{\mu\mu}$]
B: [H$_{\mu}$.H$_{\mu}$L$_{\mu}$]
C: [H$_{\mu}$.H$_{\mu}$]
D: [L$_{\mu}$.H$_{\mu}$L$_{\mu}$]
E: [L$_{\mu}$.H$_{\mu}$]

★ **Conclusion: When the initial syllable is monomoraic/light, the second syllable influences the sandhi form**

IV. Analysis for the light-initial sandhi

1. Tones

- (T): underlyingly floating; [T]: short duration
- Evidence for representations come from heavy-initial sandhi (not discussed here)

Bimoraic, $T_{\mu\mu}$					Monomoraic, T_{μ}	
/(HH)/$_{\mu\mu}$	/(LH)/$_{\mu\mu}$	/HL/$_{\mu\mu}$	/H(L)H/$_{\mu\mu}$	/(LHL)/$_{\mu\mu}$	/H/$_{\mu}$	/(L)H/$_{\mu}$
[H]	[LH]	[HL]	[HLH]	[LHL]	[H]	[LH]
μ μ H H	μ μ L H	μ μ H L	μ μ H L H	μ μ L H L	μ H	μ L H

2. Crucial observations

- A unified syllabic trochee ($\sigma^+.\sigma^-$) does not account for light-initial sandhi
  - /(LH)/$_{\mu\mu}$ + T$_{\mu\mu}$ = [L$_{\mu\mu}$.H$_{\mu\mu}$]
  - /(L)H/$_{\mu}$ + T$_{\mu\mu}$ = [L$_{\mu}$.H$_{\mu}$L$_{\mu}$] (but not *[L$_{\mu}$.H$_{\mu\mu}$])
- Second σ, as the non-initial "dependent", demonstrates contradicting behaviors
  - Initial σ is heavy: second σ cannot influence sandhi but hosts a bimoraic [H]
  - Initial σ is light: second σ *can* influence sandhi but *cannot* host a bimoraic [H]
- If we list all possible light-initial sandhi pitch patterns:
  - [H$_{\mu}$.L$_{\mu\mu}$]
  - [H$_{\mu}$.H$_{\mu}$L$_{\mu}$]
  - [H$_{\mu}$.H$_{\mu}$]
  - [L.H$_{\mu}$L$_{\mu}$]
  - [L$_{\mu}$.H$_{\mu}$]

  The third mora in a light-initial sandhi *never* carries [H]. This looks a lot like unfooted third&fourth syllables in a syllabic trochee. What kind of footing has a third unfooted mora?

★ **Conclusion: light-initial sandhi has a different foot structure: left-aligned moraic trochees. (Kager 1993)**

3. Alternating foot structures

- Moraic trochees in light-heavy disyllables violates syllable integrity, but ensures that the head (monomoraic) is *not lighter in quantity* than the dependent (Head-Dependent Asymmetries) (Kager & Martínez-Paricio 2018, Dresher & van der Hulst 1998)

(μ+.μ-)μ	(μ+.μ-)
PrWd Ft μ+. μ- μ	PrWd Ft σ+. σ- μ μ

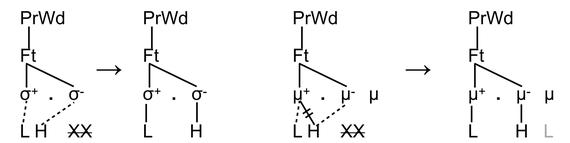
Moraic trochee for a light-heavy disyllable

Syllabic trochee for a light-light disyllable (no difference if it's moraic)

- Footing in Suzhou serves two purposes
  - (a). It constrains syllable quantity relationship between head and dependent
    - Heavy-heavy: syllabic
    - Heavy-light: syllabic
    - Light-light: syllabic
    - **Light-heavy:moraic**
  - (b). It licenses tone-TBU association
    - ($\sigma^+.\sigma^-$).Ø in a syllabic foot; ($\mu^+.\mu^-$)Ø in a moraic foot (Ø = toneless)
    - Third syllable toneless vs. third mora toneless; perfect parallel

4. Demonstration of tone sandhi

/(LH)/$_{\mu\mu}$ + T$_{\mu\mu}$ = [L$_{\mu\mu}$.H$_{\mu\mu}$] /(L)H/$_{\mu}$ + T$_{\mu\mu}$ = [L$_{\mu}$.H$_{\mu}$L$_{\mu}$] (but not *[L$_{\mu}$.H$_{\mu\mu}$])



Heavy-heavy disyllable; Syllabic Trochee

Light-heavy disyllable; Moraic Trochee