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

   ![Tone Patterns](image)

   | Bimoraic, \( \tau_{Bm} \) | Monomoraic, \( \tau_{M} \) |
   |---------------------------------|
   | [H] [LH] [HL] [HHL] [HLL] | [H] [L] |

2. Left dominance: the traditional tone-sandhi analysis
   - Assumed for many Wu dialects (Chan & Ren 1989 for Wu; 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 (\( o^{r} \)) retains its tonal material; a weak footed syllable (\( o^{r} \)) 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)

   \[ /LH/ + T + T + T : \]

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3. Complications in Suzhou
   - Tone redistribution does not always happen:
     \[ /MHL/ + T + T + T = [MHL] \]
   - Complex contours (HLH, LHL) as initial syllables do not observe everything
     \[ /MHL/ + T + T + T = [MHL] \]

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

III. Findings of the current study

1. No phonetic evidence for \( /T/ \)
   - 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)

   ![Waveform](image)

   * Conclusion: ‘checked tones’ are light monomoraic open syllables (e.g. [ʔa.ːs])

2. Second syllable plays a role in light-initial sandhi forms
   - What we would expect if the traditional analysis were true: \( \Lambda \Lambda \Lambda + T = [\Lambda \Lambda \Lambda L] \) always; \( \Lambda \Lambda \Lambda + T = [\Lambda \Lambda \Lambda L] \) always
     - Pattern A: \([\Lambda \Lambda \Lambda L]\)

     ![Waveform](image)

     Pattern B: \([\Lambda \Lambda \Lambda L]\)

     Pattern C: \([\Lambda \Lambda \Lambda L]\)

   - Conclusion: ‘checked tones’ are light monomoraic open syllables (e.g. [ʔa.ːs])

3. Alternating foot structures
   - A unified syllabic trochee (\( o^{r} \) or \( o^{r} \)) does not account for light-initial sandhi
     \( /LH/ + T + T = [\Lambda \Lambda \Lambda L] \)
     \( /LH/ + T + T = [\Lambda \Lambda \Lambda L] \) (but not \( [\Lambda \Lambda \Lambda L] \))
   - Second \( o \), as the non-initial ‘dependent’, demonstrates contradicting behaviors
     Initial \( o \) is heavy: second \( o \) cannot influence sandhi but hosts a bimoraic [H]
     Initial \( o \) is light: second \( o \) can influence sandhi but cannot host a bimoraic [H]
   - If we list all possible light-initial sandhi pitch patterns:
     \- \([\Lambda \Lambda \Lambda L]\)
     \- \([\Lambda \Lambda \Lambda L]\)
     \- \([\Lambda \Lambda \Lambda L]\)
     \- \([\Lambda \Lambda \Lambda L]\)

   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)

IV. Analysis of the light-initial sandhi

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

   | Bimoraic, \( \tau_{Bm} \) | Monomoraic, \( \tau_{M} \) |
   |--------------------------|
   | [L] [LH] [HL] [HHL] [HLL] | [L] [H] |

2. Crucial observations
   - A unified syllabic trochee (\( o^{r} \) or \( o^{r} \)) does not account for light-initial sandhi
     \( /LH/ + T + T = [\Lambda \Lambda \Lambda L] \)
     \( /LH/ + T + T = [\Lambda \Lambda \Lambda L] \) (but not \( [\Lambda \Lambda \Lambda L] \))
   - Second \( o \), as the non-initial ‘dependent’, demonstrates contradicting behaviors
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   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 violate 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)

   ![Waveform](image)

   Monosyllable 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-heavy: moraic
   (b). It licenses tone-TBU association
   \( o^{r} \) in a syllabic foot (\( \mu^{r} / \mu^{r} \)) in a moraic foot (\( \mu^{r} / \mu^{r} \))

3. Demonstrations of tone sandhi
   - Light-heavy: moraic
   - Heavy-heavy: syllabic
   - Light-heavy: syllabic
   - Heavy-heavy: moraic

   ![Waveform](image)

   Heavy-heavy disyllables; Syllabic Trochee
   Light-heavy disyllables; Moraic Trochee

   Third syllable toneless vs. third mora toneless; perfect parallel

   ![Waveform](image)

   Third syllable toneless vs. third mora toneless; perfect parallel

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   Third syllable toneless vs. third mora toneless; perfect parallel