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A Preliminary Study on the Productivity of Tone Sandhi in the Baotou Jin Dialect by Child and Adult Speakers

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Introduction

- **The Baotou Jin dialect**

  As the largest city by population in **Inner Mongolia, China**, *Baotou* belongs to the *Da-Bao* **Jin**-speaking area. Locally-born Jin native speakers tend to have varying degree of language contact with Mandarin Chinese.

- **The five lexical tones in Baotou Jin**

Tone number	Pitch pattern	Pitch value	Examples
1	High rising	24	pa^{24} 疤 “scar”
2	High level	44	pa^{44} 拔 “pull out”
3	Low falling-rising	312	pa^{312} 把 “handle”
4	High falling	52	pa^{52} 壩 “dike”
5	Checked tone	(ʔ)4	$paʔ^{4}$ 八 “eight”

- **Two tone sandhi patterns in Baotou Jin** [1]

  Chinese languages often have complex patterns of tone alternation caused by adjacent tones or the prosodic/morphosyntactic environment in which a tone appears [2].

Sandhi pattern	Pitch value	Type	Example
T1 Sandhi	T1+T1 24+24➞24+**44**	**Left**-dominant	飛機 “plane” /$fei^{24}tɕi^{24}$/➞[$fei^{24}tɕi^{44}$]
T3 Sandhi (very similar to Mandarin T3 sandhi)	T3+T3 312+312➞**24**+312	**Right**-dominant	螞蟻 “ant” /$ma^{312}ji^{312}$/➞[$ma^{24}ji^{312}$]

➢ **Study focus:** The application of tone sandhi to novel materials involves the tacit knowledge of the sound system regarding the **“productivity” of tone sandhi.**

Method

- **Participants – native Baotou Jin speakers**

	Female	Male
Children (5-12 years old)	**7**	**7**
Adults (39-60 years old)	**5**	**5**

- **A picture-naming task** with four conditions was used to test both **real words** and **novel words** [3, 4, 5]. Each condition consisted of **5 disyllabic words** with T1 sandhi and another **5** with T3 sandhi.

Real words

Condition 1: Real words with one picture (Rw1P)

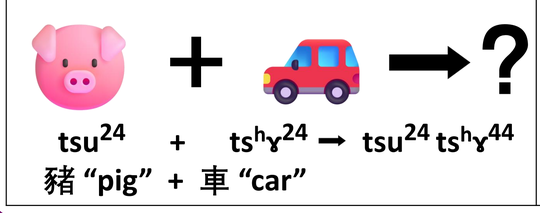
$ts\text{ɻ}^{24}\,tsu^{24}$ ➞ $ts\text{ɻ}^{24}\,tsu^{44}$
蜘蛛 “spider”

Condition 2: Real words combining two pictures (Rw2P)

tsu^{24} + $ɕiŋ^{24}$ ➞ $tsu^{24}\,ɕiŋ^{44}$
豬心 “pig heart”

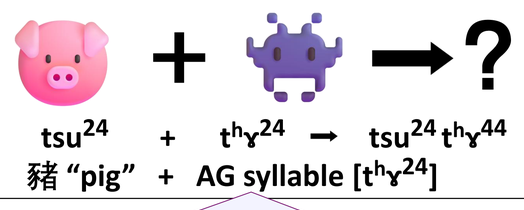
Novel words

Condition 3: Pseudo words (Pw)
Combining two pictures resulting in a nonword.



tsu^{24} + $ts^{h}ɤ^{24}$ ➞ $tsu^{24}\,ts^{h}ɤ^{44}$
豬 “pig” + 車 “car”

Condition 4: AG words (AGw) Combining a real monosyllable and an accidental gap (AG) syllable represented by an imaginary picture.



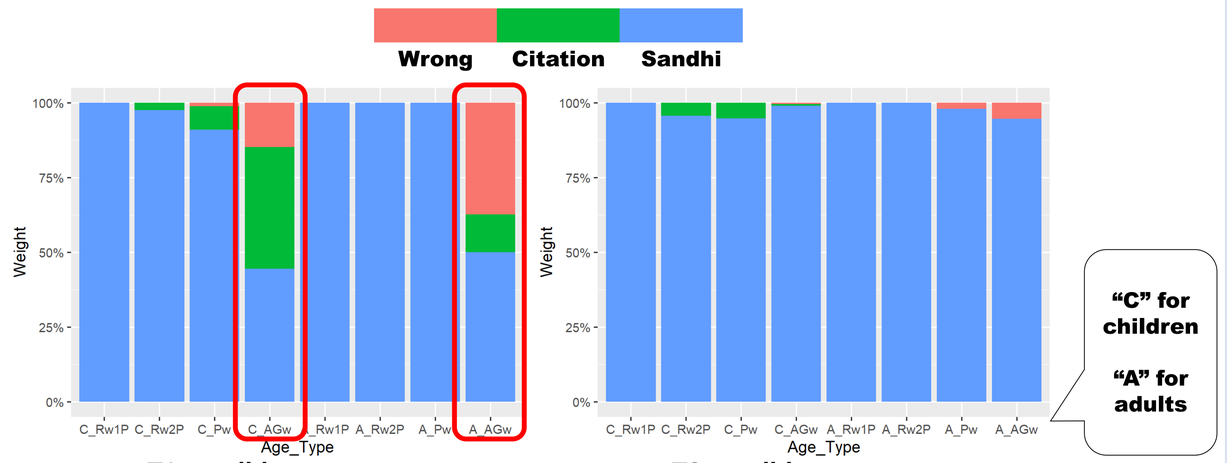
tsu^{24} + $t^{h}ɤ^{24}$ ➞ $tsu^{24}\,t^{h}ɤ^{44}$
豬 “pig” + AG syllable [$t^{h}ɤ^{24}$]

Since AG syllables are **non-existent** in Baotou Jin syllabary, an **auditory stimulus** of the syllable was presented to the participants to familiarize them with the syllable. The AG syllables were read by a trained phonetician who is a native female Baotou Jin speaker.

- Each token’s accuracy of tone sandhi application was **auditorily judged** by two Baotou Jin native speakers with phonetic training.
  The inter-rater consistency was around 94%.
- There were three types of accuracy judgments: **sandhi** (the correct sandhi tone), **citation** (the citation tone), and **wrong** (neither “sandhi” nor “citation”).

Results

1. The mean accuracy of the tone sandhi application

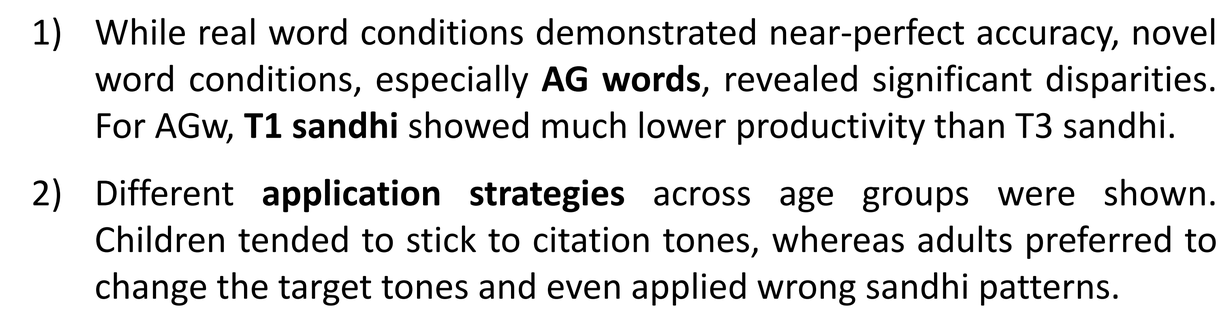


1) While real word conditions demonstrated near-perfect accuracy, novel word conditions, especially **AG words**, revealed significant disparities. For AGw, **T1 sandhi** showed much lower productivity than T3 sandhi.

2) Different **application strategies** across age groups were shown. Children tended to stick to citation tones, whereas adults preferred to change the target tones and even applied wrong sandhi patterns.

3) **Consistent wrong patterns** in all conditions and both age groups!
   a) The wrong productions in T1 sandhi were mostly **24+312** (i.e., the surface form of T3 sandhi) with very few exceptions.
   b) The wrong productions in T3 sandhi were mostly **44+312**, and this consistently wrong T3 sandhi pattern was not found in previous studies on Mandarin T3 sandhi [6, 7, 8].

2. Individual accuracy of AG words with T1 and T3 sandhi by all speakers (M5yrd = 5-year-old male) One vertical bar represents one speaker.



1) Two children aged 7 could reach 100% accuracy of T1 sandhi application in AG words, while only one adult could achieve it.

2) The high accuracy even for AG words in Baotou T3 sandhi is very similar to the findings of Mandarin T3 sandhi [6, 7, 8].

Discussion

- **Why is T1 sandhi application less robust than T3 sandhi application?**
  a. Language contact: The frequent contact between Baotou Jin and Mandarin Chinese in Baotou, along with the similarity of T3 sandhi patterns in both languages, likely enhanced the productivity of Baotou T3 sandhi.
  b. The unique left-dominant nature of Baotou T1 sandhi potentially further reduced its productivity.
- **We still have ongoing data collection to delve deeper into the productivity and mental mechanisms of tone sandhi in the Baotou Jin.**

Acknowledgements

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