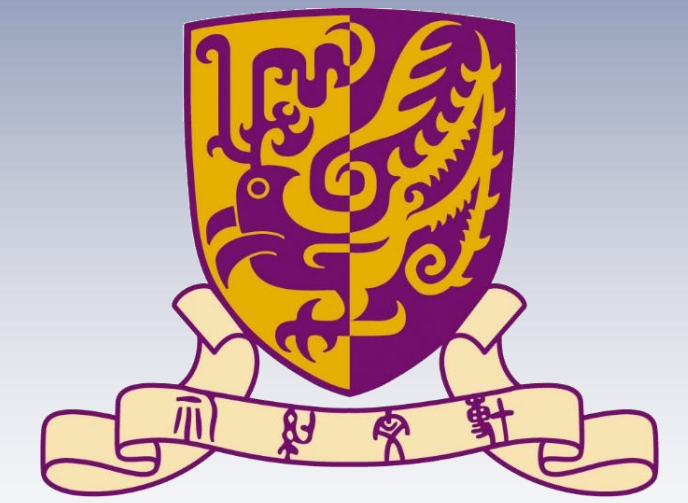# The production of Mandarin T3 sandhi and tonal changes by Japanese learners

Zhiqiang Zhu & Peggy Pik Ki Mok

The Chinese University of Hong Kong

zhiqiangzhu@link.cuhk.edu.hk   peggymok@cuhk.edu.hk

TAI

INTRODUCTION

- **T3 sandhi in Mandarin** [1,2,3]
  - Full-T3 sandhi: T3 [214]→ T2 [35] /___ T3 [214].
  - Half-T3 sandhi: T3 [214]→ half-T3 [21] / ___ T1 [55], T2 [35], T4 [51].

- **Tonal changes in Mandarin**
  - Tone change processes are applied in some lexical items in Mandarin, e.g., *Yi* "one" and *Bu* "not".
  - Tonal change of *Yi* : T1 [55]→ T2 [35] / ___T4 [51].
  - Tonal change of *Bu* : T4 [51]→ T2 [35] / ___ T4 [51].

- **T3 sandhi Vs. Tonal change** [4]
  - T3 sandhi is *phonologically conditioned*: rules must be applied when the phonological conditions are satisfied.
  - Tonal change of *Yi* and *Bu* is *morphologically conditioned*: rules are restricted only to specific words.
  - Our prediction: tonal change is easier than tone sandhi for L2 learners, because the tonal changes are restricted to *Yi* and *Bu*, while T3 sandhi is applied more widely.

- **Early and late bilinguals**
  - Past studies have shown that early language experience can provide a significant boost to speakers' production and perception of that language later in life in comparison to L2 learners with no prior experience [5].
  - Target group: Japanese learners of Mandarin.
  - Reasons: The manipulation of pitch is common in Japanese, because Japanese is a pitch-accent language. Meanwhile, Japanese is not a tone language, which can avoid cross-linguistic influences between tone systems.

- **The present study**: this study investigated the production of Mandarin T3 sandhi and tonal changes by Japanese-Mandarin simultaneous bilinguals (early bilinguals) and advanced Japanese learners of Mandarin (late bilinguals) to identify how contrastive tone rules could be acquired by non-tone language learners[5].

METHOD

- **Participants**
- Two target groups
  - Advanced Japanese learners of Mandarin (AJ group): 10 participants, who learned Mandarin as L2, with over 1-year immersion in Beijing and HSK-6 level.
  - Japanese-Mandarin simultaneous bilinguals (SB group): 10 participants, who acquired both Mandarin and Japanese from an early age with their mothers being native Mandarin speakers.
- One baseline group
  - Native Beijing Mandarin speakers (NM group): 9 participants, born and grow up in Beijing, have not learned Japanese.
- **Stimuli**
  - An equal number of disyllabic real words and disyllabic wug words with all possible tonal contexts for T3 sandhi and tonal change of *Yi* and *Bu*.
 - Table 1. Details of three sets of stimuli.

	Amount	Examples
T3 sandhi	60 tokens	Real word: "美好" (*Mei Hao*, "Beauty", T3T3)
		Wug word: "美閃" (*Mei Shan*, T3T3)
Tonal change of *Yi*	16 tokens	Real word: "一萬" (*Yi Wan*, "Ten thousand", T1T4)
		Wug word: "一妙" (*Yi Miao*, T1T4)
Tonal change of *Bu*	24 tokens	Real word: "不對" (*Bu Dui*, "Not true", T4T4)
		Wug word: "不麗" (*Bu Li*, T4T4)

- **Auditory analysis**
  - Three native Beijing Mandarin speakers judged the accuracy of each token. The final accuracy rates were averaged across the individual accuracy rates given by the three native speakers.

Reference: [1] Lin, Y. 2007. The Sounds of Chinese. Cambridge, England: Cambridge University Press. [2] Zhang, H. 2017. The effect of theoretical assumptions on pedagogical methods: a case study of second language Chinese tones. International Journal of Applied Linguistics (United Kingdom), 27(2), 363–382. [3] Yang, B. 2015. Perception and production of Mandarin tones by native speakers and L2 learners. Springer-Verlag Berlin Heidelberg. [4] Chen, M. Y. (2000). Tones in context. In Tone Sandhi: Patterns across Chinese Dialects (pp. 19–37). Cambridge University Press. [5] Montrul, S. A. (2008). Incomplete Acquisition in Bilingualism: Re-examining the Age Factor (John Benjamins Publishing, Amsterdam), pp. 1–312.
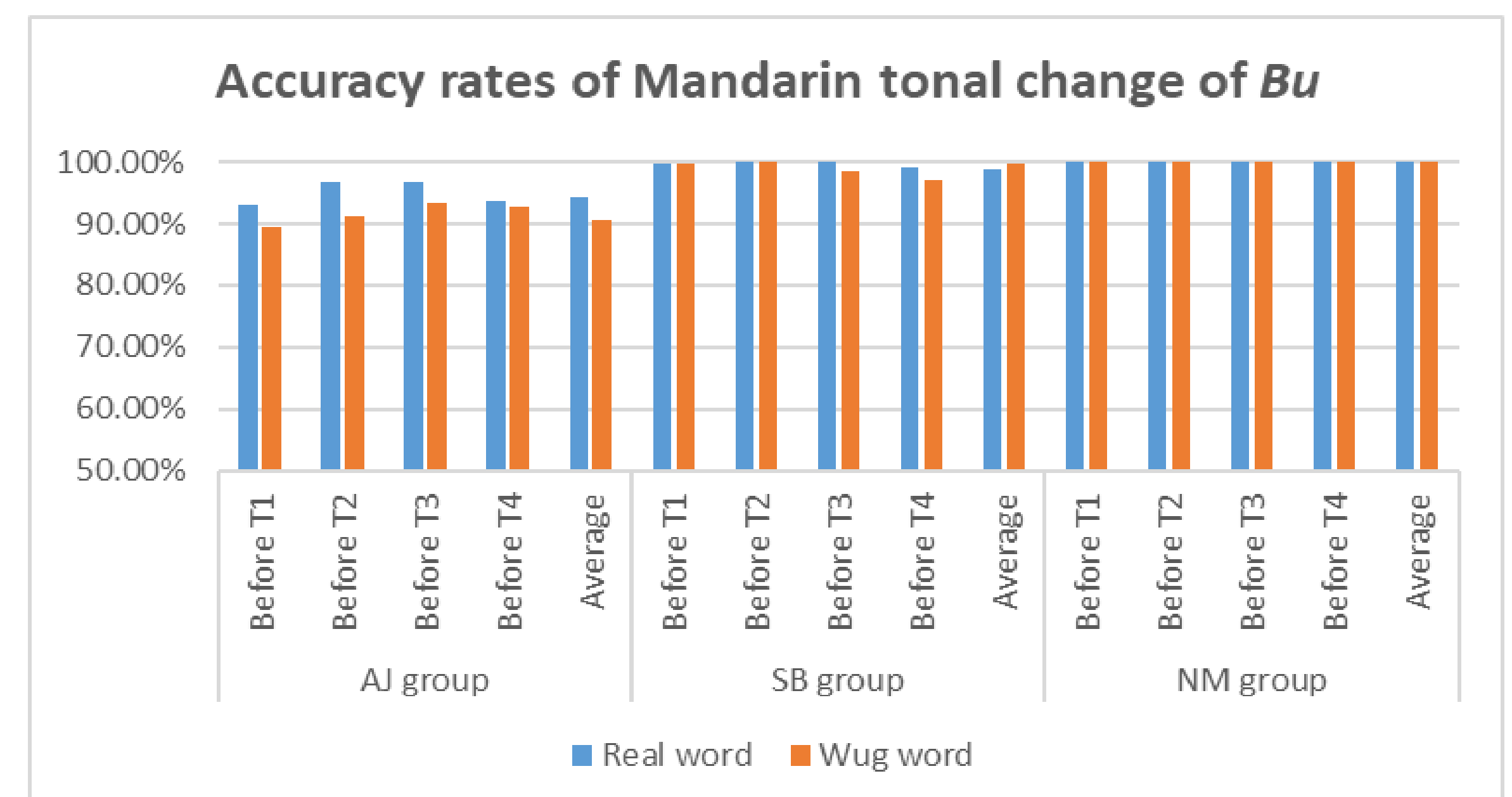
RESULTS

- Figure 1. Accuracy rates of Mandarin T3 sandhi by the AJ, SB and NM groups.
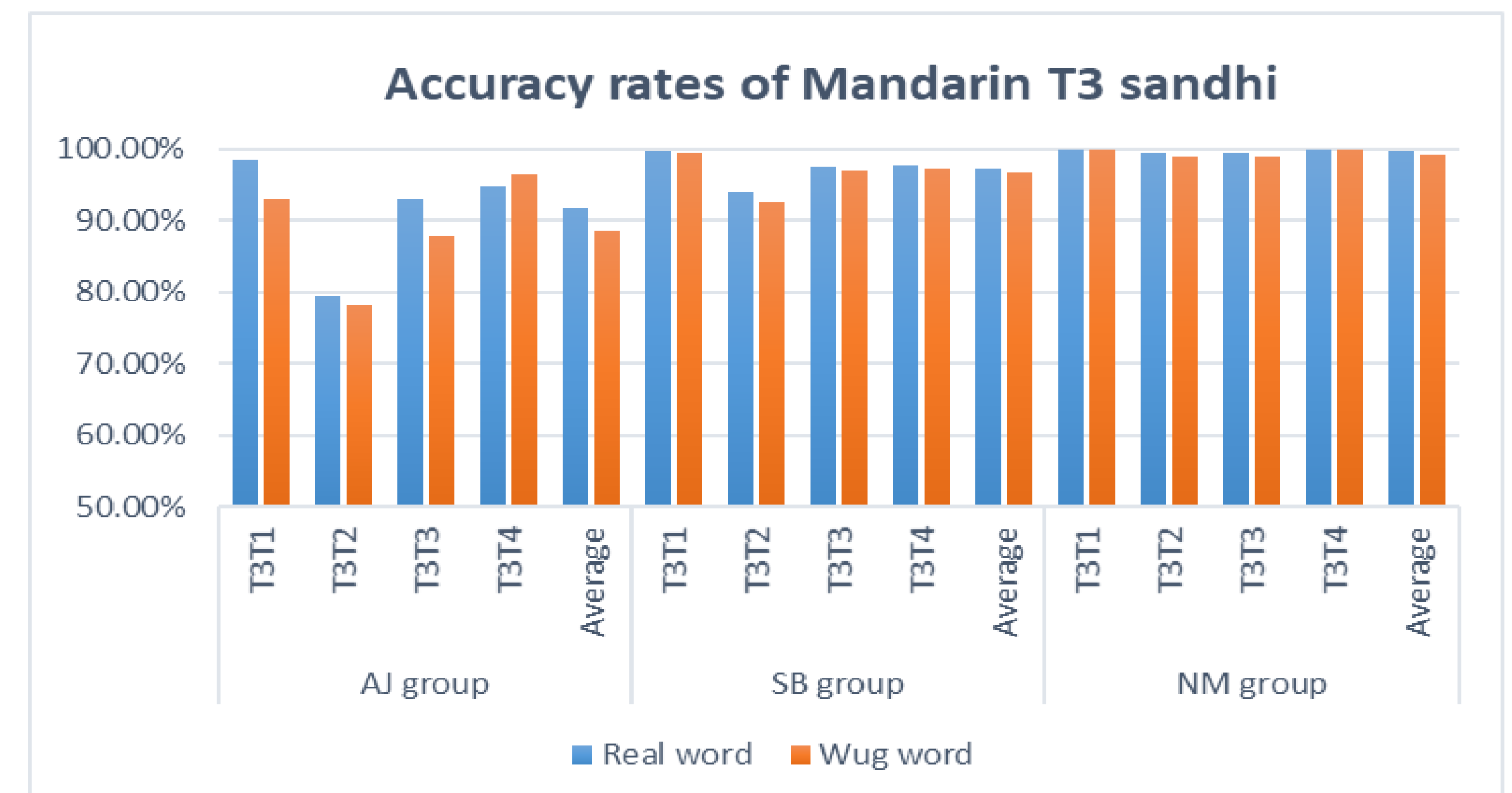
- Figure 2. Accuracy rates of Mandarin tonal change of *Yi* by the AJ, SB and NM groups in various tonal contexts.
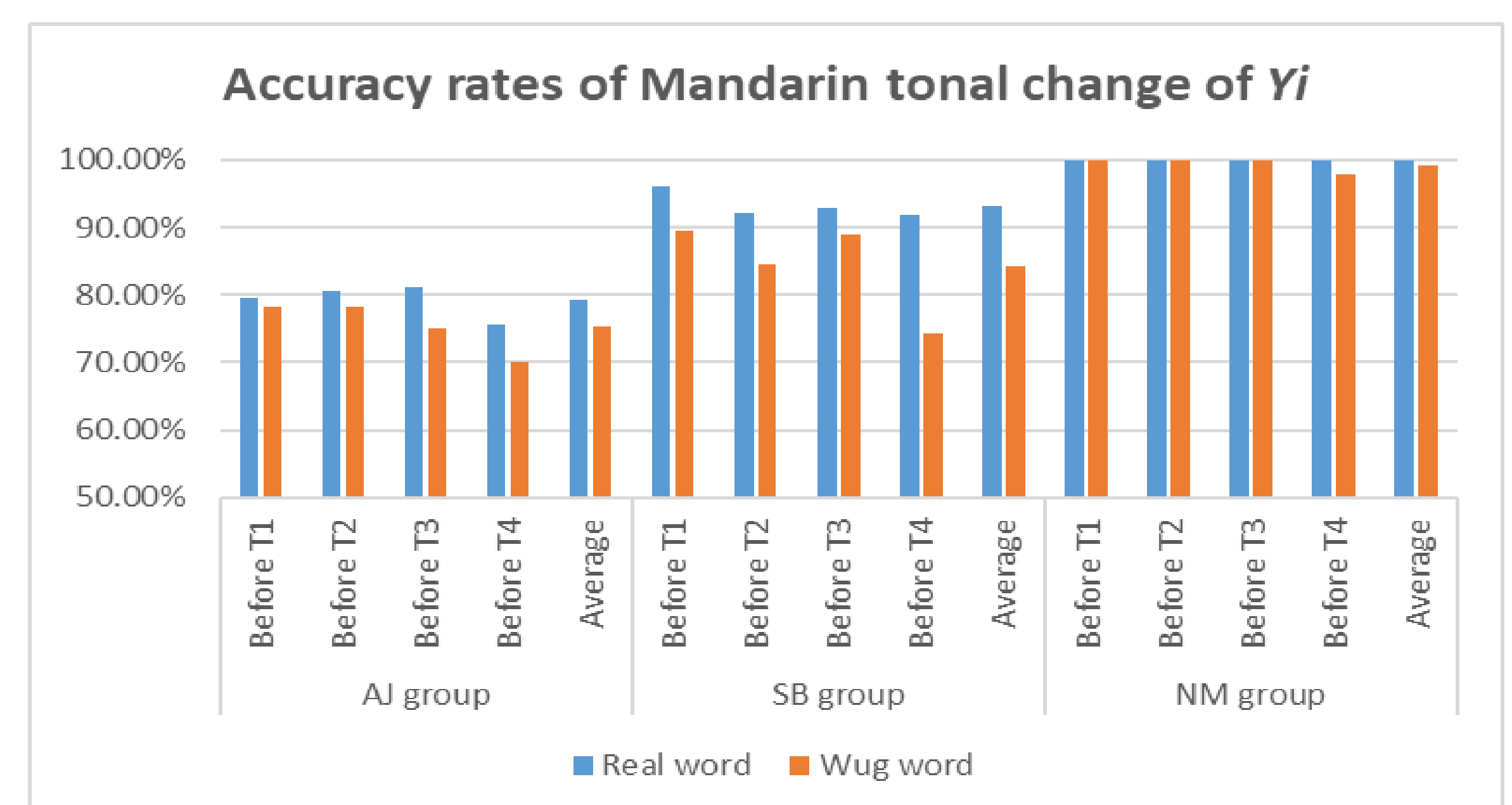
- Figure 3. Accuracy rates of Mandarin tonal change of *Bu* by the AJ, SB and NM groups in various tonal contexts.

- **Summary of accuracy patterns**
  - SB speakers > AJ speakers in all aspects.
  - In many cases (e.g., T3 sandhi in T3T1 sequence, tonal change of *Bu* before T1 and T2), the SB speakers performed as well as the NM speakers did.
  - General accuracy ranking for Japanese learners: tonal change of *Bu* > T3 sandhi > tonal change of *Yi*.
  - Mixed results for full-T3 sandhi and half-T3 sandhi by Japanese learners: T3T1 (half-T3 sandhi) > T3T4 (half-T3 sandhi) > T3T3 (full-T3 sandhi) > T3T2 (half-T3 sandhi).
  - Real words > wug words for Japanese learners.

DISCUSSION

- Early bilinguals had advantages over late bilinguals in producing tone sandhi and tonal change.
- Contrary to our prediction, the easiness between tone sandhi and tonal change for L2 learners remained unclear, because the difficulty of acquiring tonal change in different lexicons varies. The tonal change of *Bu* was easier than that of *Yi* for learners, which might be due to lexicon familiarity.
- The comparison between full-T3 sandhi and half-T3 sandhi showed mixed results. The half-T3 sandhi in the T3T2 sequence had the lowest accuracy, suggesting the intrinsic difficulty for L2 learners, possibly because L2 learners had difficulty discriminating between Mandarin T3 and T2.
- Further acoustic analysis on the T3 sandhi and the tonal changes will be carried out.