

Mandarin Trilinguals' Perception of L3 Japanese Stops

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Background

- ◆ Trilingual speakers experience cross-language interactions in speech acquisition

☀️ **Perceptual boundaries: Mandarin occurs at longer VOT values than English, which in turn longer than Japanese** (Caramaza et al., 1973; Ran et al., 2014, p. 37; Shimizu, 1977; Zhang, 2014, p. 60)

Mandarin: 35 - 55 ms

English: 20 - 40 ms

Japanese: 15 - 35 ms



Research Question 1

- ① How do Mandarin trilinguals **perceive** L3 Japanese word-initial stops?

◆ Research hypothesis ①

Trilinguals experience cross-language interference among the phonetic systems of the languages they have acquired (apply SLM and SLM-r* to multilingual domain) (Aoki & Nishihara, 2013; Liu & Lin, 2021; Sun & Profita, 2020; Sypiańska, 2016; *Flege & Bohn, 2021)

- ① Mandarin trilinguals' L3 performance will exhibit interference from their L1 Mandarin and their earlier acquired L2 English

Methods

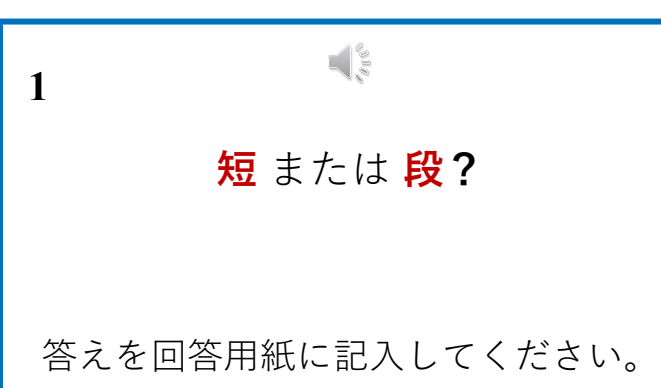
◆ Participants

- ① **MT group: 31 Mandarin trilinguals** (international students, mean age = 25)
 - **L2 English:** TOEFL iBT > 85 or TOEIC > 850 (CEFR B2 to C1 level)
 - **L3 Japanese:** JLPT N1 level (pre-advanced or higher; Ishikawa, 2017, p. 14)
- ② **NJ group: 34 native Japanese speakers** (university students, mean age = 21)
 - Average English use < 5%; English proficiency level: intermediate or lower

◆ Perception experiment

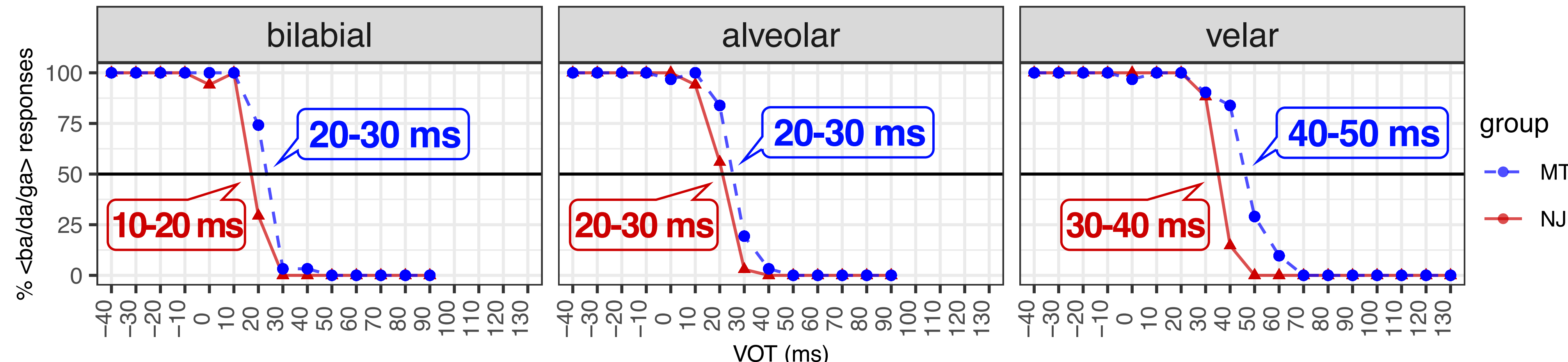
- ① **Stimuli synthesis (three continua)**
 - Continuum VOT range (steps)
 - **bilabial /ban-pan/** -40 to +90 ms (14)
 - **alveolar /dan-tan/** -40 to +90 ms (14)
 - **velar /gan-kan/** -40 to +130 ms (18)
- ② **Identification: a two-alternative forced choice task**
 - Offer the original sounds of each stop continuum
 - **Select either side of the continuum** after hearing each stimulus

- A native Japanese (Tokyo dialect) recorded パン, 番, 短, 段, 缶, 癌
- * one speaker to control variables
- ✓ a 10-ms increment
- ✓ synthesis tutorial: Winn (2020)
- ✓ **communication language: Japanese**



Results 1 & Discussion

◆ Results: Perceptual boundaries



➤ Statistical analysis: Generalized linear mixed-effects model in R

- **Dependent variable:** Response
- **Independent variables:** Group, Continuum, VOT_s (VOT range)
- **Random intercept:** Participant
- **Main effects: Group** ($\chi^2(1) = 20.07, p < .001$); **VOT_s** ($\chi^2(1) = 133.15, p < .001$); **Continuum** ($\chi^2(2) = 101.99, p < .001$)

Continuum	VOT	Estimate	SE	z ratio	p value
bilabial	20	2.2642	0.638	3.547	.005*
alveolar	20	1.4546	0.593	2.453	.1384
	30	2.3123	0.842	2.745	.066
velar	40	3.4352	0.687	5.001	<.001*

☀️ **Alveolar: category boundaries of MT and NJ occurred at similar VOT values**
Bilabial and velar: category boundaries of MT occurred at significantly longer VOT values than those of NJ

◆ Discussion (Hypothesis ①)

😊 **Interference from the phonetic system of L1 Mandarin: MT's category boundaries at longer VOT values than NJ**

* Mandarin norms: bilabial: 30-40; alveolar: 30-40; velar: 50-60 ms (Zhang, 2014, p. 60)

😊 **Interference from the phonetic system of L2 English: MT's category boundaries diverged from L1 Mandarin norms**

* English acquisition experience helped them discover the phonetic differences between the stops in L1 and L3, and consequently modify their realization rules

* English norms: bilabial: 20-30; alveolar: 30-40; velar: 30-40 ms (Shimizu, 1996, p. 13)

Research Question 2

- ② Is there a correlation between Mandarin trilinguals' perception of Japanese stops and their **FTE years of Japanese input**?

◆ Research hypothesis ②

The longer the FTE, the more sensitive native Japanese speakers were to the phonetic differences between English /r/ and Japanese /R/*

- ② The longer the FTE years of Japanese input, the more closely the performance of Mandarin trilinguals resembles that of native Japanese speakers

(*Flege et al., 2021, p. 91)

Results 2 & Discussion

◆ Results: Correlation analysis on Mandarin trilinguals' performance and their FTE year of Japanese input

FTE = LOR in Japan × Japanese use %

average LOR = 3.71 years (range = 2 - 6.75)

average Japanese use = 27.3% (range = 8 - 60)

average FTE = 1.1 years (range = 0.3 - 2.7)

- Correlation coefficient = - 0.007
 $p = 0.778$

☀️ **No significant linear relationship between MT's performance and their FTE**

◆ Discussion (Hypothesis ②)

😞 **A longer FTE year of Japanese input does not necessarily result in a more target-like performance**

- FTE only is not sufficient to account for accuracy in perception for speakers with limited exposure to the target language (Gorba, 2023)

Reference

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