The Earliest Stage of Fricative Acquisition among Thai Learners of Mandarin Chinese

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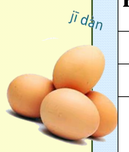
1. Question:

Will Thai learners find similar sounds easier or more difficult to acquire than different sounds? (Lado versus Flege)

2. Background:

- Mandarin fricatives = / f, s, ʂ, ɕ, x/
- Thai fricatives = /f, s, h/ (+ tɕ, tɕʰ)



3. Hypothesis:

Thai learners find different L2 sounds more difficult to produce than similar sounds (Lado 1957) due to their complexity of articulation, variability in realisation by native speakers, and lack of articulatory routine for their production.

4. Participants:

4.1. Experimental Group = 3 Thai native speakers with English L2 experience for 20+ years (27-35 years old) = 1 Male & 2 Females = No experience in Mandarin

4.2. Comparison Group = 2 native speakers of Mandarin Chinese (23-25 years old) = 1 Male & 1 Female

5. Teaching Project:

- Mandarin classes taught by a female Mandarin native speaker.
- Class duration: 14 hours
- Teaching method: Pinyin + Picture + English (as translation)

6. Data Collection:

A picture naming task

7. Data Analysis:

- Transcribed by 3 native Mandarin speakers + 1 native Thai speaker (with formal IPA training).
- Transcription reliability = 80%

Table 1: Percentage of production of each of the Mandarin fricatives by non-native speakers.

Phoneme	Realisation	Female1 (%)	Female2 (%)	Male1 (%)
/f/	[f]	100	100	100
/s/	[s]	100	100	100
/ʂ/	[ʂ]	-	40	40
	[s]	-	20	60
	[tʂʰ]	20	40	-
	[tɕʰ]	40	-	-
	[tɕ]	40	-	-
/ɕ/	[ɕ]	40	40	20
	[ʂ]	-	20	20
	[tɕ]	-	-	20
	[s]	60	40	40
/x/	[h]	100	100	100

8. Discussion of auditory analysis

8.1. Support Contrastive Analysis Hypothesis (Lado 1957) → Similar sounds = easier: All productions of /f, s/

8.2. Error patterns: Fronting/Backing/Affrication & Aspiration/Affrication

8.3. Other interesting findings:

- Variations of /x/: [x, h, χ] in Mandarin speakers & misleading of pinyin → Thai learners acquire only [h] (also in Thai), but not a standard variant in Mandarin
- The various substitutions indicate different learning of individual learners.

9. Acoustic Study

- Acoustic measurements = 1) peak location & spectral moments (2)centroid, 3)standard deviation, 4)skewness, 5)kurtosis) → 40 ms, Gaussian Window around the temporal mid-point
- 1), 2) & 4) higher > fronter place of articulation, 3) & 5) higher > flatter spectrum
- Velar fricative is excluded due to variation
- Independent t-test on the correlation of gender of Mandarin speakers and five acoustic measurements → only peak location is correlated significantly with gender ($t(38) = 2.28$, $p < .05$).

10. Logistic Regression

- Logistic regression on the judgement of which acoustic parameters are needed → centroid and standard deviation

Table 2: Results of hierarchical linear model for native speakers of Mandarin of five fricatives.

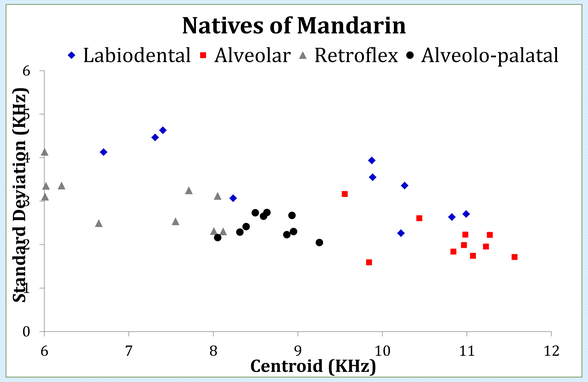
Coefficient for	-2 Log Likelihood of Reduced Model	Chi-Square	df	p-Value
Intercept	62.716	62.716	3	0
Peak Location	7.213	7.213	3	0.065
Centroid	32.982	32.982	3	**0**
Standard Deviation	50.624	50.624	3	**0**
Skewness	.000	0	3	1
Kurtosis	.000	0	3	1

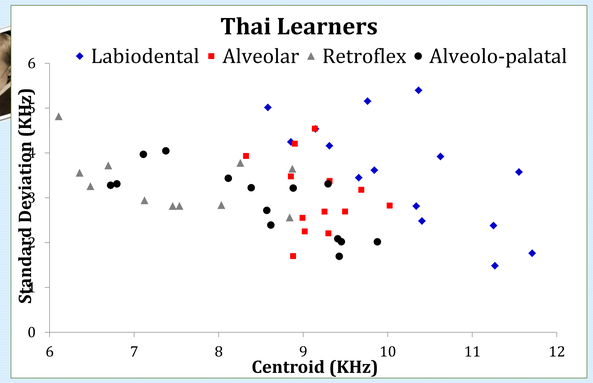
NOTE: Significant p-values are in yellow boxes.

11. Independent t-test

- Independent t-test to measure the significant differences of centroid and standard deviation of each fricative between native speakers of Mandarin and Thai learners → centroid of alveolar ($t(23) = 4.80$, $p < .05$), and standard deviation of alveolar ($t(23) = -3.496$, $p < .05$) and alveopalatal ($t(18.62) = -2.49$, $p < .05$) are significantly different between these two groups.

Figure 1: Standard deviation plotted against centroid frequency for natives (top) and non-natives (bottom).





12. Discussion on Acoustic Study

- Between groups of natives and non-natives, the productions of labiodental and retroflex are not significantly different. → the findings of retroflex production is contrastive to auditory analysis
- It is possible that the Mandarin retroflex is actually realized as postalveolar → Thai speakers correctly produce these due to positive transfer of L2.
- The different productions of alveolo-palatal fricative among two groups → not surprising since this sound does not exist in the Thai sound system → coherent with the auditory analysis.
- Interesting point = the production of alveolar fricatives → different between these two groups → contrasts with the auditory results → it might be possible that alveolar fricatives in Thai and Mandarin are actually different. → Further study should be conducted.

13. References

Lado, R. 1957. *Linguistics Across Cultures: Applied Linguistics for Language Teachers*. Ann Arbor: University of Michigan Press.

Flege, J. E. 1995. 'Second Language Speech Learning Theory, Findings, and Problems'. In W. Strange (ed.) *Speech Perception and Linguistic Experience: Issues in Cross-Language Research.* Timonium, MD: York Press.