**INTRODUCTION**

[Acquisition of voiceless silent frictionatives]
- Late acquisition across languages (Jacobsen 1968, Tamplin 1957, and Studd-Gammon & Dunn 1985)
- Opposite error patterns in English and Japanese: English: /ʃ/ → /s/ (Prather et al., 1975; Ingram 1941)
  Japanese: /s/ → /ʃ/ (Nakamura et al., 1972)

[Covert Contrast]
- Covert contrast: perceptually indistinguishable, but statistically significant acoustic difference (e.g., Macken & Burton 1979; Scofield et al., among others)
- Baum & McNaught (1996): covert contrast in both amplitude and spectral manifestations between front /s/ and target /ʃ/ in the productions of mismutated children.
- Tanuma (2004): covert contrast was found between target /ʃ/ and error /ʃ/ in 5 Japanese-acquiring children.

**OBJECTIVES**
- To verify the error patterns in both languages using both native speaker transcription and acoustic analysis.
- To look for possible covert contrast in both languages, and describe patterns of covert contrast.
- To distinguish between language-specific and language-universal aspects of the course of first language acquisition for both languages.
- To offer possible accounts for the opposite error patterns of the two languages.

**METHODS**

[Participants and Task]
- 50 participants in all, including 5 adults for each language and 10 two-year-olds and 10 three-year-olds per language
- Word-repetition task
  - For children: both pictures and audio prompts were provided
  - For adults: audio prompts only

**RESULTS**

[Adults]
- English vs. Japanese
- The /ʃ/s/ contrast account for more of the variability in all acoustic parameters for the English speakers, perhaps because...  
  - The /ʃ/s/ contrast in - in contrast to primary in - contrast in tongue position in - rounded in - contrast in tongue position in - and did the native speaker transcriptions. W e...

[Children]
- English children
- Japanese children

**PHONETIC DESCRIPTION OF 2-3 YEAR-OLD ENGLISH AND JAPANESE**

**CONCLUSION & DISCUSSION**

- For adults’ productions, all six parameters clearly differentiate the two varieties for both languages, but the English contrast is more robust than the Japanese one.
- For children’s productions, the opposite error patterns ([ʃ] for /ʃ/ in English and [s] for /s/ in Japanese) was confirmed by transcription analysis for both languages.
- The covert contrast patterns in native speaker transcriptions suggest that Cent and MPP are the primary acoustic parameters for discriminating the contrasting frictionative pairs.
- Four levels of phonetic development were identified, as evidenced by results of both the transcription and acoustic analyses, with covert contrast being either the manifestation of incorrect mapping to non-primary parameters or less robust mapping to the primary parameters.
- Japanese-acquiring children develop the /ʃ/ contrast relatively later than English-acquiring children. This may be due, at least in part, to the greater overlap of the two lingual silent frictionatives in Japanese.

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