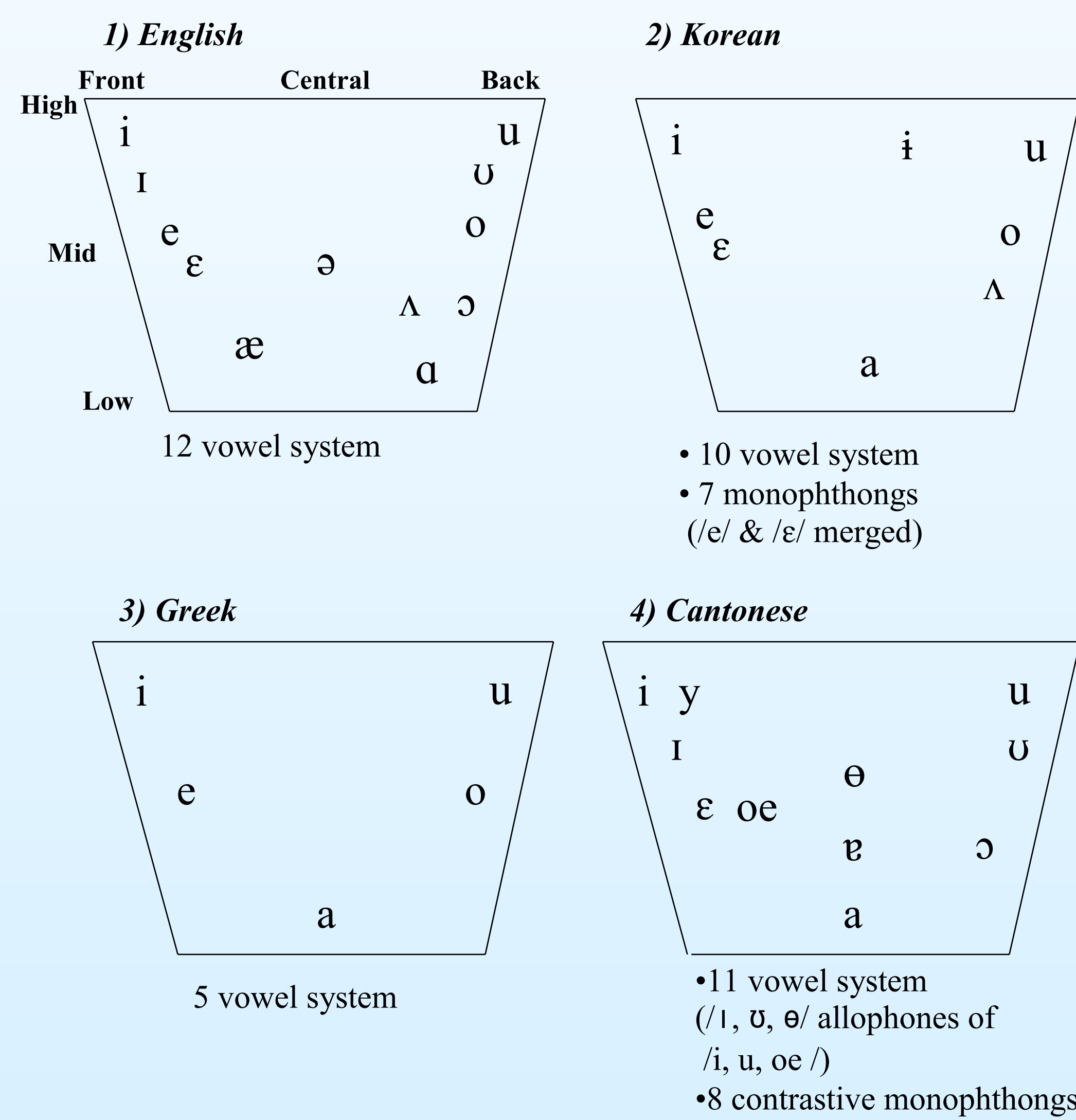


INTRODUCTION

- Children generally produce most of the vowels of their native language correctly by age 2, based on transcription analysis.
- However, a few studies (e.g., Davis & MacNeilage, 1990) suggest that the picture is considerably more complicated.
- There is little cross-linguistic research on the related question of how children master the language-specific characteristics of vowels in their native language.
- This study examines cross-linguistic variation in vowel acquisition across four languages: Cantonese, English, Greek, and Korean.

VOWEL SYSTEM OF EACH LANGUAGE



HYPOTHESES

1. There will be cross-linguistic differences in the location of shared vowels in the overall vowel space (e.g. Bradlow, 1993; Rvachew et al., 2006).
2. These cross-linguistic differences will increase with age.

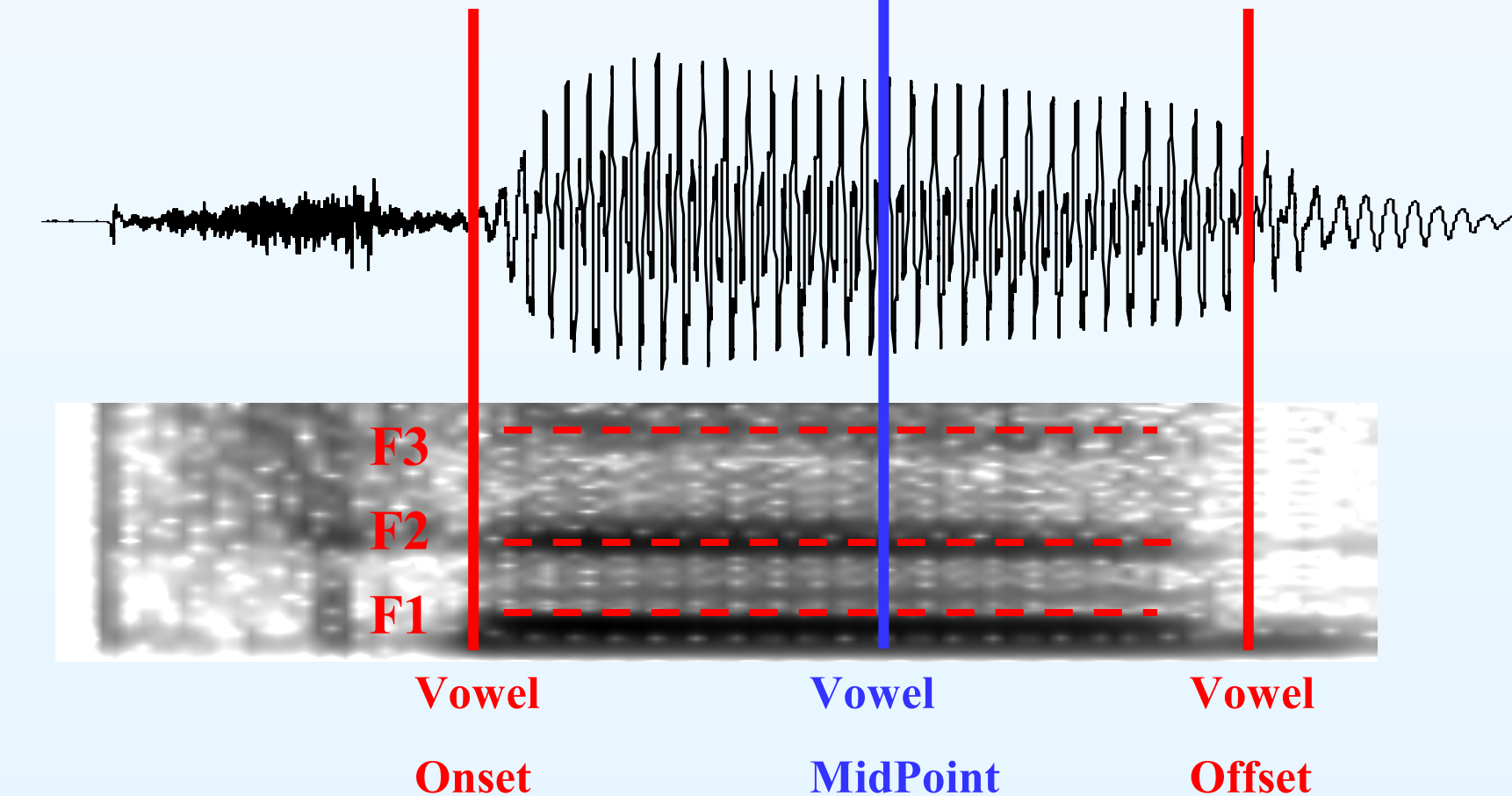
PARTICIPANTS

	English	Korean	Greek	Cantonese	TOTAL
2-year-olds	10	10	10	10	40
5-year-olds	10	10	10	10	40
Adults	10	10	10	10	40
TOTAL	30	30	30	30	120

METHODS

1. **Stimuli:** Familiar words beginning with CV sequences (obstruent and one of the vowels /i, a, u/, the three common vowels across the four languages)
2. **Procedure:** Word repetition task
 - Children and adults saw pictures and heard digitized productions of familiar real words.
 - Participants asked to repeat what they heard and their responses were recorded.
3. **Analysis:** Transcription
 - A native speaker transcribed the initial consonant and vowel as correct or incorrect.
 - Subsequent analyses used only vowels judged as correct.
 - Accuracy rates were uniformly high for 5-year-olds.
 - Accuracy rates for 2-year-olds ranged from a low of 56% for /u/ in Cantonese to a high of 96% for /i/ in Greek.

ACOUSTIC ANALYSIS

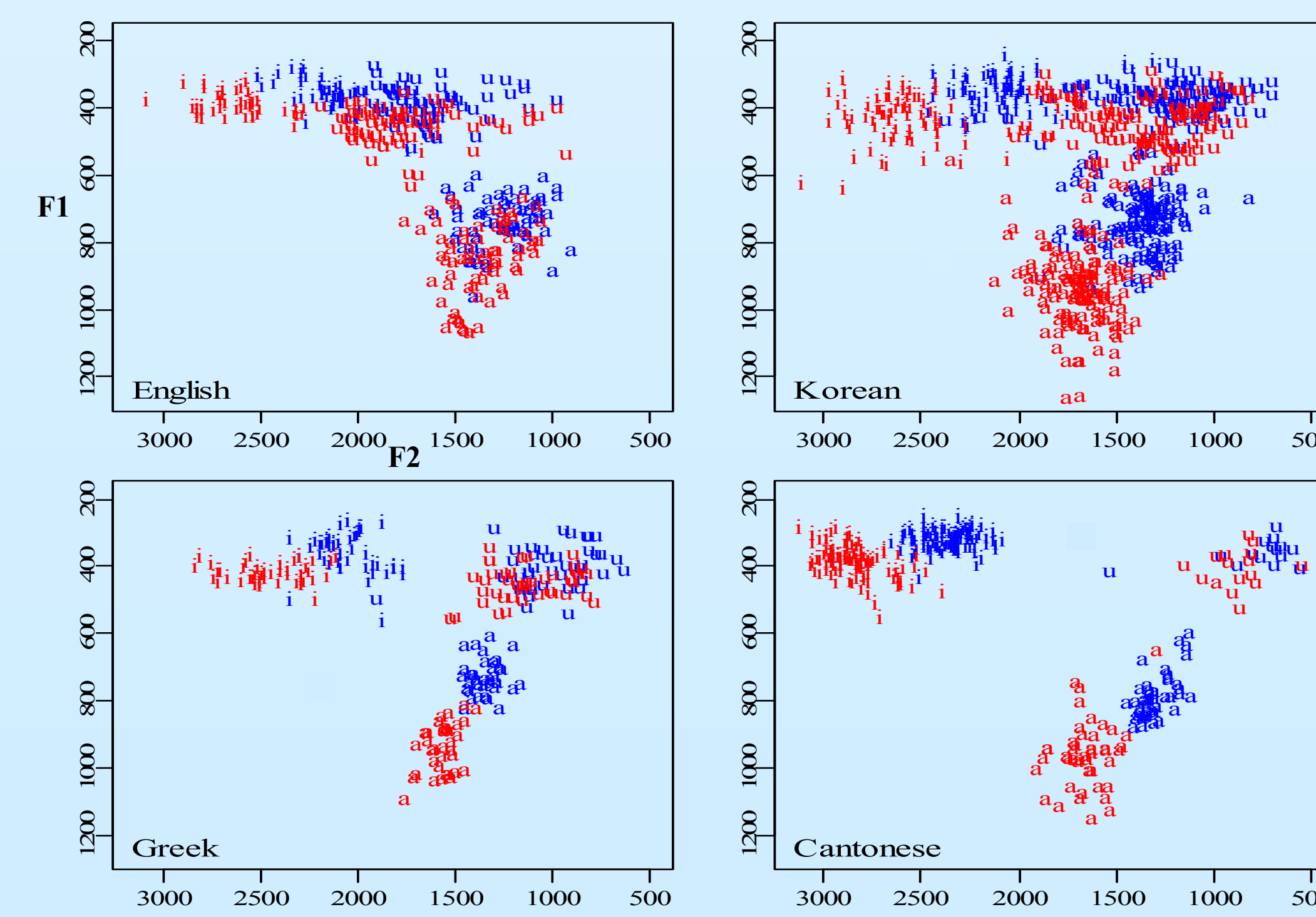


- Vowel onset was identified as the first clear vertical glottal pulse in F2
- Vowel offset was identified as the point at which F2 starts to fade out
- F1 and F2 were measured at the vowel midpoint
- This is where the influence of preceding and following consonants is minimal.
- Hand correction was used in case of formant mistrackings

RESULTS

1. CROSS-LINGUISTIC DIFFERENCES

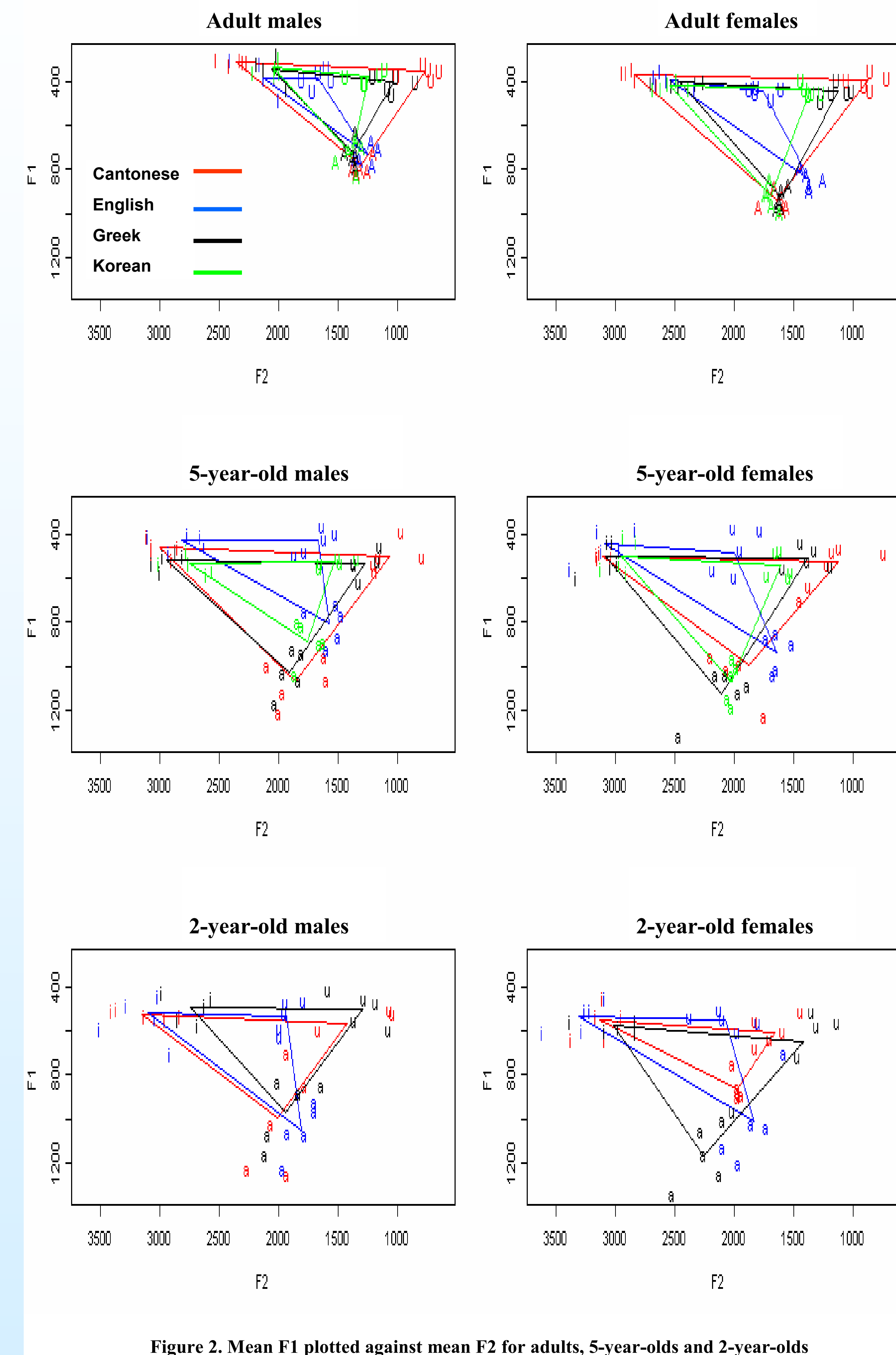
1) Scatter Plots: Adult



1. Observations

- Cantonese has the largest vowel space of the four languages
- Vowels are better-separated for Greek and Cantonese than English and Korean.

2) Individual Means



CONCLUSION: 1) Cross-linguistic Differences

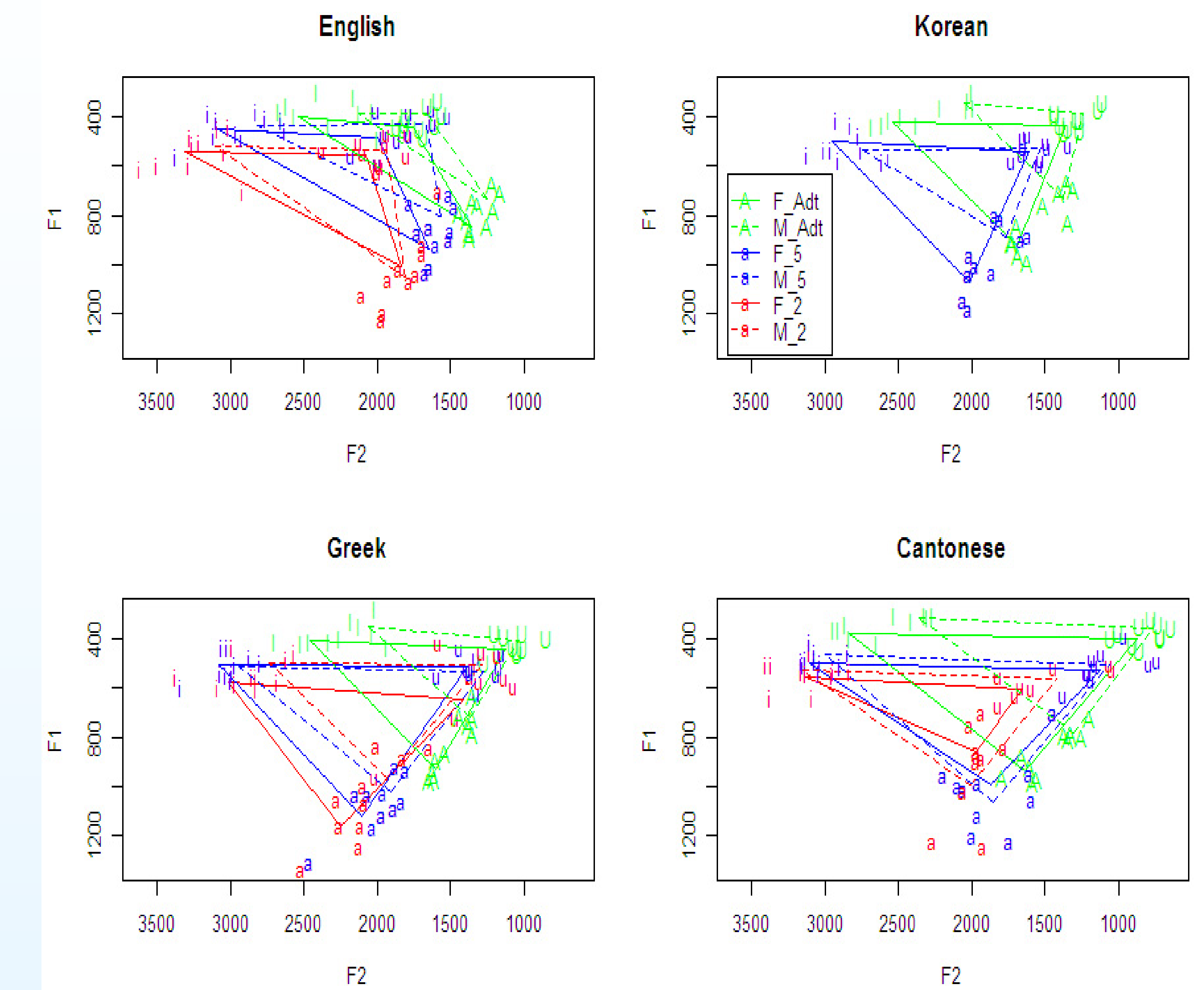
1. Observations:

- Cross-linguistic differences in vowel space were observed for both adults and children.
- Vowel spaces of 5-year-olds closely resembled those of adults for each language.

2. Statistical results of interest

- Two four-way ANOVAs were performed.
- Independent variables: vowel, language, age, sex
- Dependent variables: F1, F2
- Significant main effect of language
- Significant vowel by language interaction

2. DEVELOPMENTAL PATTERN



CONCLUSION: 2) Developmental Pattern

1. Observations:

- Children's productions are more variable than adults.
- Children's vowel spaces are larger than those of adults.
- This is due, at least in part, to their smaller vocal tracts.
- Exception: Cantonese 2-year-olds

2. Statistical results of interest

- Significant main effect of age
- Significant age by language interaction

DISCUSSION

1. Theoretical Perspectives

- The importance of fine phonetic detail in the ambient language to the development of speech production

2. Applied Perspectives

- Relevant for foreign accent reduction
- Supports the importance of early onset of second language acquisition

FUTURE DIRECTIONS

- Normalize formant frequencies to account for difference in vocal track length
- Include incorrect vowel productions
- Examine perception of children's vowel productions across languages

ACKNOWLEDGMENTS

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