

## Forensic Voice Comparison in Standard Thai using vowel formants

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This study is the first likelihood ratio (LR)-based forensic voice comparison (FVC) study focusing on the formants (F1, F2 and F3) of the three Thai long vowels /ii/, /uu/ and /aa/. In establishing good FVC practices for a particular language, it is important to identify acoustic and linguistic features which enable effective FVC for the language. The vowel formant has been used as the standard feature in acoustic-phonetics based FVC studies in many languages (e.g. Kinoshita (2001) for Japanese; Rose, P. & Winter, E. (2010) for English; Zhang, C., Morrison, G.S., & Thiruvaran, T. (2011) for Chinese). This study investigates how a FVC system will perform based on formant values in Thai. The twelve segmental combinations of the three long vowels of /ii, aa, uu/ and the four consonantal phonemes of /p, p<sup>h</sup>, b, m/ were permuted. Ten native speakers of Standard Thai were asked to read these segmental combinations for each of the five contrastive tones (3 vowels x 4 consonants x 5 tones = 60 different combinations) in two non-contemporaneous sessions separated by two weeks.

The speech signals were recorded directly into a computer using a professional microphone and stored as WAV files at a sampling rate of 44.1 kHz and 16 bit amplitude resolution. The formant values associated with the steady-midpoint of each vowel were extracted using the speech analysis tool of the EMU speech database system (Cassidy, S. and Harrington, J. 1996). Likelihood ratios were calculated using the multivariate likelihood ratio formula (Aitken & Lucy 2004) with cross validation. The performance of the FVC system was assessed by the log likelihood ratio cost (Cllr).

### References

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