



# A Phonetic and Phonological Investigation of the Urdu vowels

Ishrat Rehman (i.rehman@kent.ac.uk)

& Amalia Arvaniti (a.arvaniti@kent.ac.uk)



BAAP 2016, Lancaster, 30<sup>th</sup> March – 1<sup>st</sup> April

English Language & Linguistics LingLab

## 1 Background

- There are many disagreements about the phoneme inventory of Urdu, particularly with respect to the vowels
- The present study focussed on the vowel system of Urdu as spoken in Punjab, Pakistan
- The following system was tested

	Long	Short	Total
Oral	i: e: æ: a: ɔ: ɒ: u:	ɪ ɛ ə ʌ ʊ	12
Nasal	ĩ ẽ ã ã̃ õ ã̃ ã̃		07
Diphthong	ai ɔi aʊ iə eə ʊə		06
TOTAL			25

- The results presented here focus on oral monophthongs and address the following questions in particular:
  - Are /ɛ/ and /æ:/ distinct phonemes (Saleem et al., 2002), and is /ɛ/ the short counterpart of /æ:/ (Fatima & Aden 2003)?
  - Are there two central and two back mid vowels, /ʌ/ /ə/ and /ɔ:/ /ɒ:/ respectively? Is there a length difference between the members of each of these pairs?

## 2 Methods

### Materials

bi:t̪ bɪd̪ bɪk̪ be:d̪ pət̪ bæ:t̪  
 bəd̪ bʌd̪  
 bɑ:d̪ pɑ:d̪ pɒ:d̪ bʊd̪h̪ bu:d̪h̪ ku:d̪ su:t̪ pu:t̪

Each test word was embedded in a:

- carrier phrase (CP); e.g. /mɛ ɪsɛ bi:t̪ ek bar kəhõ gɪ/ "I will say \_\_\_ once"
- full sentence (FS); e.g. /kəi gʰente bi:t̪ gæ:/ "Many hours have passed"

### Speakers

- 22 speakers (11 males, 11 females; aged 19-55)
- Raised in Punjab, Pakistan, living in the UK
- Their native language is Punjabi; they use Urdu regularly in their everyday lives

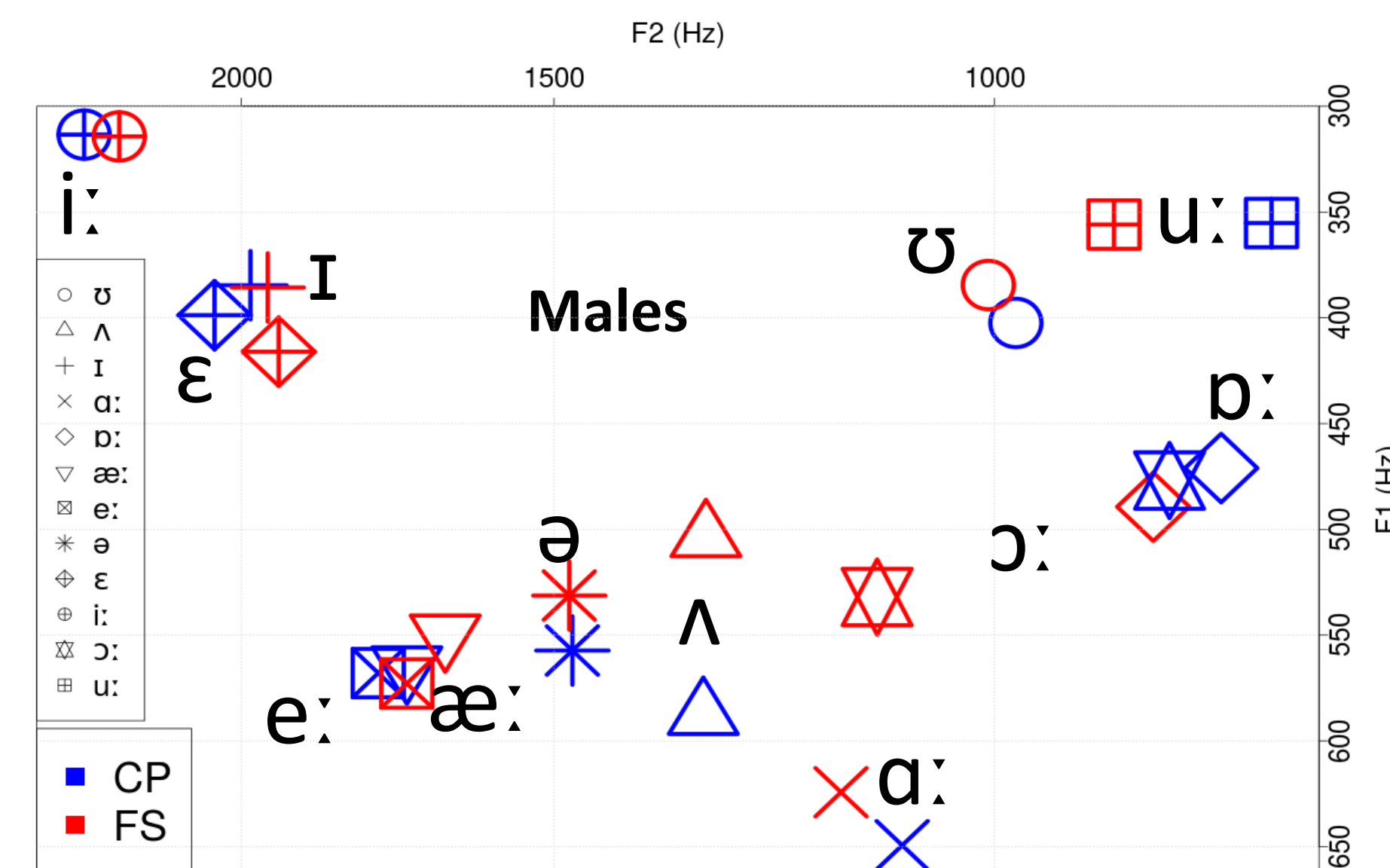
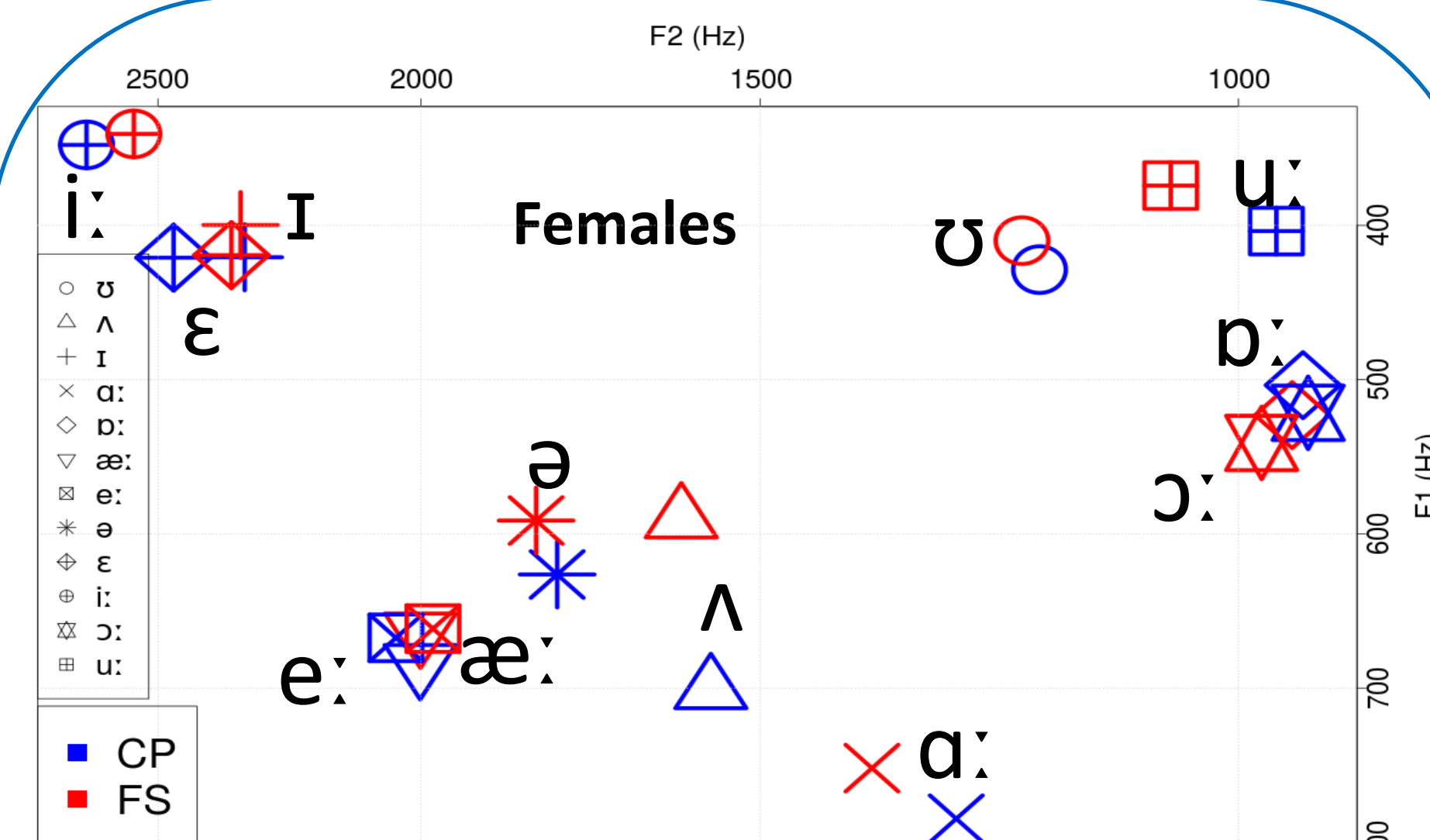
### Procedures

- Participants read five sets of CP and FS in pseudo-randomised order, presented on a laptop screen one at a time using PowerPoint
- Recordings in .wav format (Zoom Handy Recorder H4n; 44.1 kHz/16 bit)

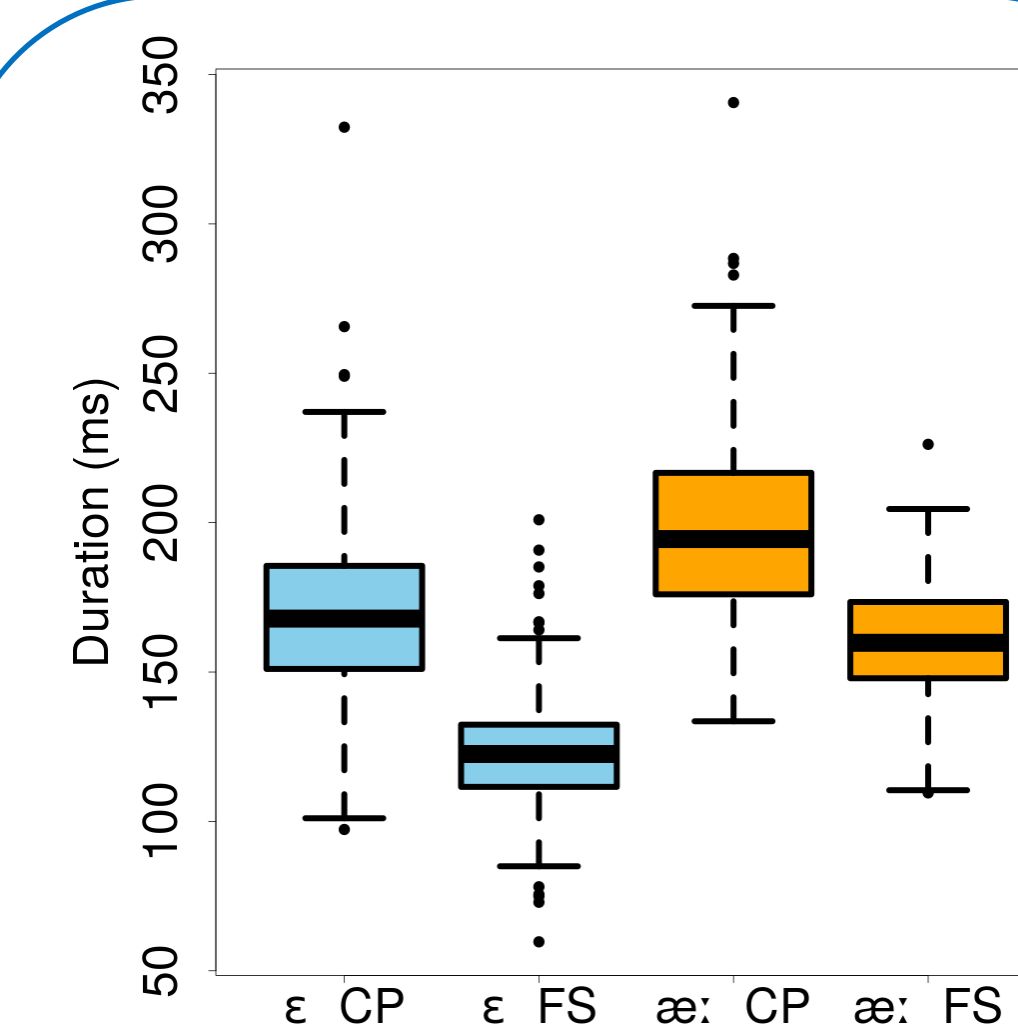
### Analysis

- Praat scripts with default settings used on annotated files to measure:
  - vowel duration
  - F1 and F2 at vowel midpoint
- Statistica for Analyses of Variance (ANOVAs)

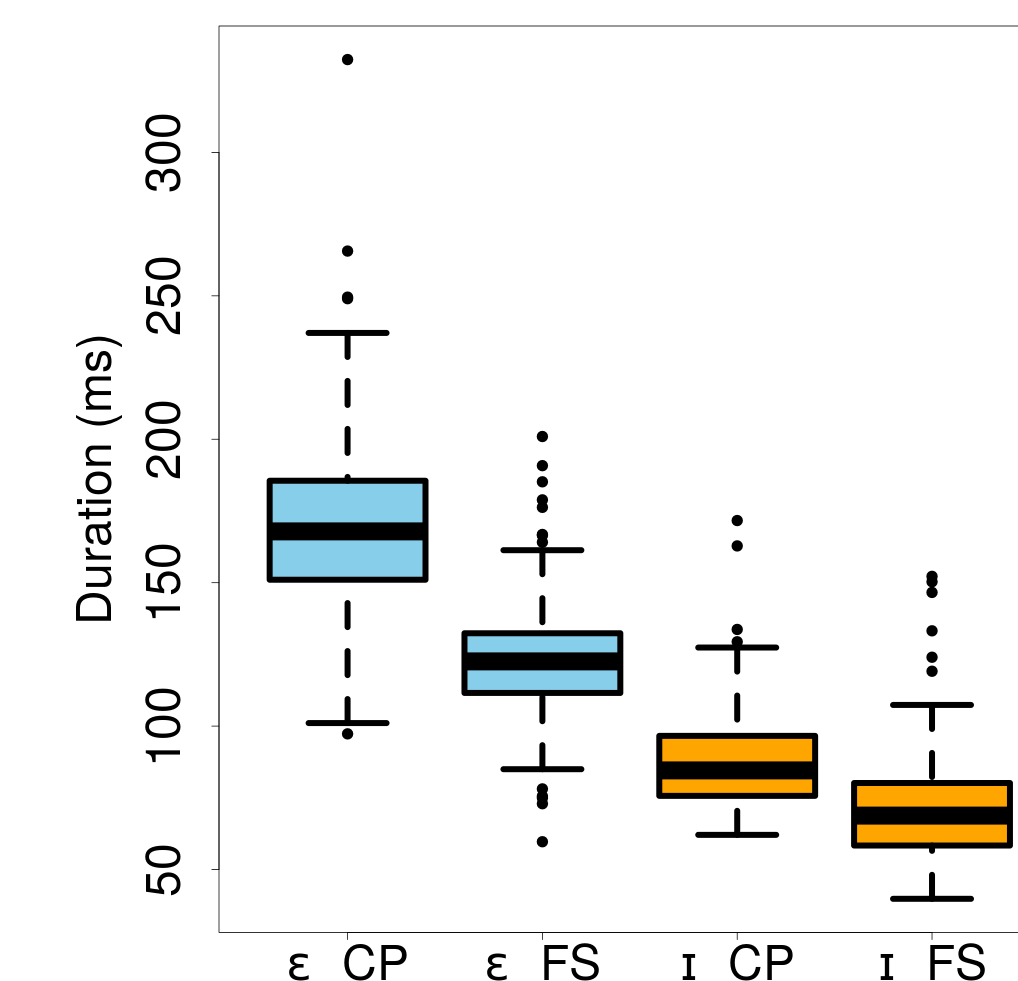
## 3 Results



Mean F1 and F2 at the midpoint of the monophthongs for females (top) and males (bottom)



/æ:/ is longer than /ɛ/ but both are long vowels [F(1, 411) = 125.2, p > .001]



/ɪ/ is shorter than /ɛ/ [F(1, 567) = 1137.1, p < .001]

## 4 Discussion

- /ɛ/ and /æ:/ are distinct, distinguished by both F1 and F2 [F1: F(1, 411) = 126.4, p < .001; F2: F(1, 411) = 242.34, p < .001]; /ɛ/ is also shorter than /æ:/ but not as short as other short vowels
- /ə/ and /ʌ/ are distinct central vowels, distinguished by their F1 and F2 [F1: F(1, 606) = 9.37, p < .01; F2: F(1, 606) = 162.05, p < .001]
- /ɔ:/ and /ɒ:/ do not differ either in quality [F1 and F2, n.s.] or in duration [n.s.], so they must be considered as one phoneme
- In addition, the results revealed that /ɪ/ and /ɛ/ are close in quality but distinct [F1: F(1, 567) = 25.6, p < .001; F2: [F(1, 567) = 5.6, p < .05]; they are also distinguished by duration, with /ɪ/ being significantly shorter than /ɛ/; the duration of /ɛ/ suggests it is **not** a short vowel
- /e:/ and /æ:/, on the other hand, do not differ either in quality [F1 and F2, n.s.] or in duration [n.s.], so they must be considered as one phoneme
- The above results suggest the following Urdu inventory of monophthongs: **six long vowels**, i: ɛ: æ: a: ɔ: u:, and **four short vowels**, ɪ ə ʌ ʊ