# VOWEL INSERTION AT SYLLABLE EDGES IN TURKISH

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# INTRODUCTION

Turkish has two distinct vowel insertion processes:

- insertion that splits underlying onset clusters ([CC)
  - e.g., /tren/ “train” [tiren]
  - /klip/ “clip” [kɯlip]

- insertion that splits some underlying coda clusters (CC])
  - a vowel is inserted between certain underlying coda consonants:
    - /fikr/ “opinion” [fikir]
    - /ømr/ “life” [ømyr]
  - some coda clusters are allowed (mostly sonorant + obstruent)
    - /ilk/ “first” [ilk]
    - /renk/ “color” [renk]
  - it’s clear that the vowels are inserted, because of morphological alternations, for example:

| no underlying vowel (CC]) | underlying vowel (CVC]) |
| --- | --- |
| • /fikr+I/ “his/her opinion” → [fikri] | • /simit+I/ “his/her Turkish bagel” →[simidi] |
| • /ømr+I/ “life” →[ømry] | • /mydyr+I/ “manager” → [mydyry] |

# INTRODUCTION

- Vowels inserted in onset clusters ([CC)
  - are not typically written,
  - are potentially very short,
  - do not occur in some registers,
  - vary in these ways from speaker to speaker

- Vowels inserted in coda clusters (CC])
  - are pronounced as full vowels,
  - are always written,
  - are not subject to register differences,
  - do not vary from speaker to speaker

- Bellik (2016) proposes a difference between the two types of insertion:
  - vowel insertion between coda clusters is claimed to be **phonological epenthesis**
    evidence for this: agreement in backness and rounding, and consistency of occurrence
  - insertion between onset clusters is argued to be **phonetic intrusion** (Hall 2006)
    intrusive vowels are argued to be gestureless vowels, without a phonological target

# THIS STUDY

**MAIN QUESTION**

Is there any difference between the vowels inserted in underlying onset clusters ([CC) and underlying coda clusters (CC]), and underlying vowels that exist in otherwise identical phonological contexts ([CVC and CVC])?

**PREDICTIONS**

If Bellik's (2016) hypothesis is right:

- Epenthetic vowels (in CC] contexts) should be similar to other vowels with phonological targets
- Intrusive vowels (in [CC contexts) should be more like a "schwa" vowel, and more susceptible to non-insertion and acoustic influence of surrounding consonants

**MEASUREMENTS INVESTIGATED**

The following properties of the vowels in these four contexts ([CC, CC], [CVC, CVC]) are investigated:

1. frequency of occurrence of each vowel
2. quality (F1 and F2) of each vowel
3. duration of each vowel

# METHODOLOGY

**PARTICIPANTS**

- two male and two female native speakers of Turkish with knowledge of English
- all participants speak standard Turkish or a standard-like dialect of Turkish
- ages between 20-35

**STIMULI**

- Target words with [CC, CC], [CVC, CVC] contexts, all with expected [i] vowel
  - Four consonantal contexts: /br/, /kl/, /kr/, /dr/
  - Alternation between whether the vowel was underlying ([CVC, CVC]) or not ([CC, CC])

| | b_r | k_l | k_r | d_r |
|---|---|---|---|---|
| CC] | *kabir* ‘grave’ | *şekil* ‘shape’ | *fikir* ‘opinion’ | *kadir* ‘worth’ |
| [CC | *Bret* ‘Brad’ | *klip* ‘[video] clip’ | *krem* ‘cream’ | *drenaj* ‘drainage tube’ |
| CVC] | *tabir* ‘expression’ | *tekil* ‘isolated’ | *bakir* ‘virgin’ | *sedir* ‘a type of couch’ |
| [CVC | *birim* ‘unit’ | *kilim* ‘rug’ | *kireç* ‘lime (material)’ | *dirsek* ‘elbow’ |

# METHODOLOGY

**CARRIER SENTENCE**

- Target words embedded in a carrier sentence
  - *Hasan* _____ *kelimesini yazdı*. ‘Hasan wrote the word _____.’
- Some filler sentences were also included.
- All sentences were randomized and repeated twice.

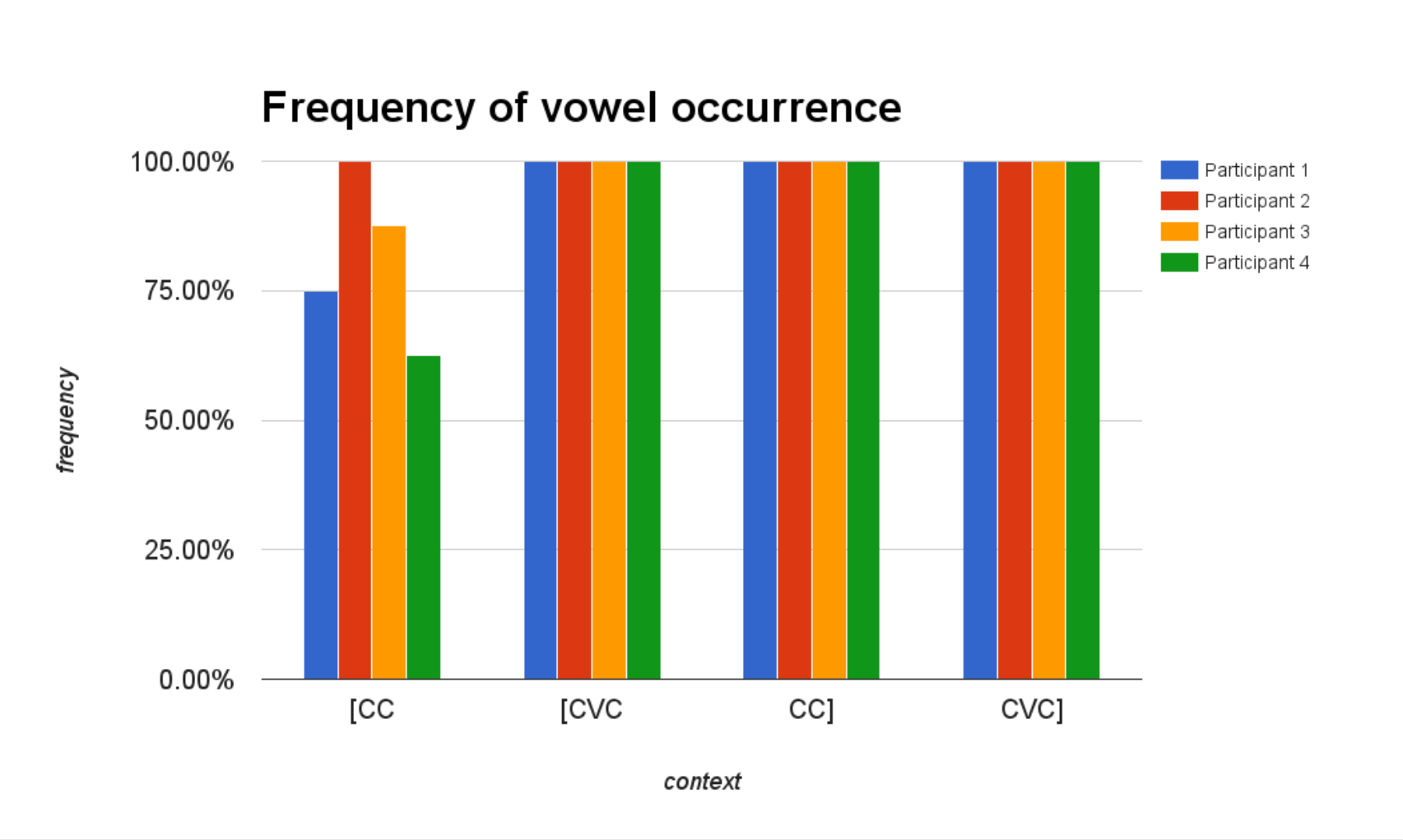
**PROCEDURE**

- Recordings were made using smart phones in quiet informal settings.
- The randomized stimuli were presented on several sheets of paper, in large print.
- The participants were asked to read the sentences in a colloquial or relaxed way in order to avoid influence from formal speech styles.

**MEASUREMENTS**

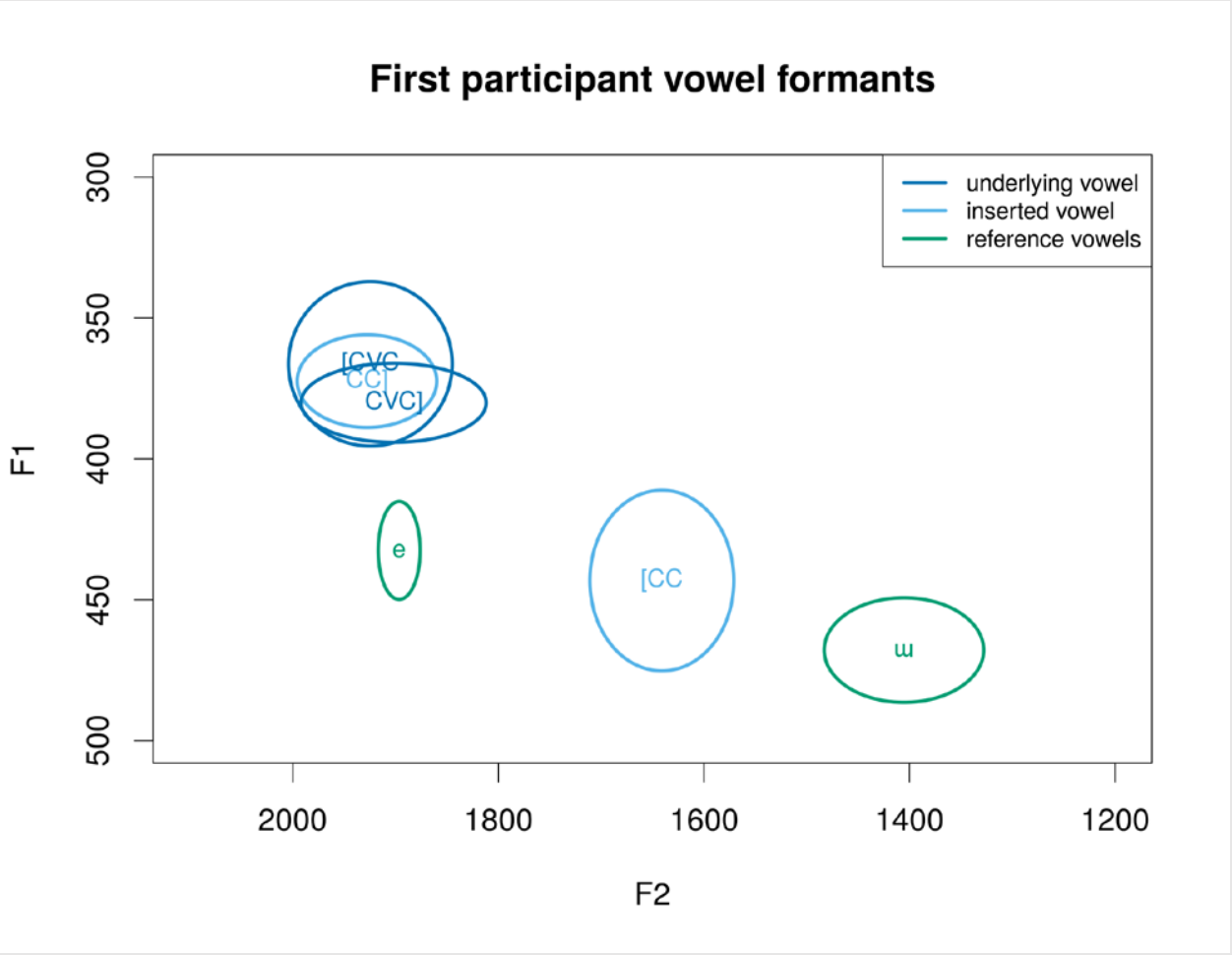
- Clusters were examined to determine presence of target vowels; these were counted.
- Duration, F1, F2 measurements (at vowel midpoints) were performed using Praat.
- To compare inserted and underlying [i] with other vowel qualities, reference vowels were extracted from non-target words (8 of each per speaker) and measured as well:
  - 2$^{nd}$ [e] in *kelimesini*
  - [ɯ] in *yazdı*

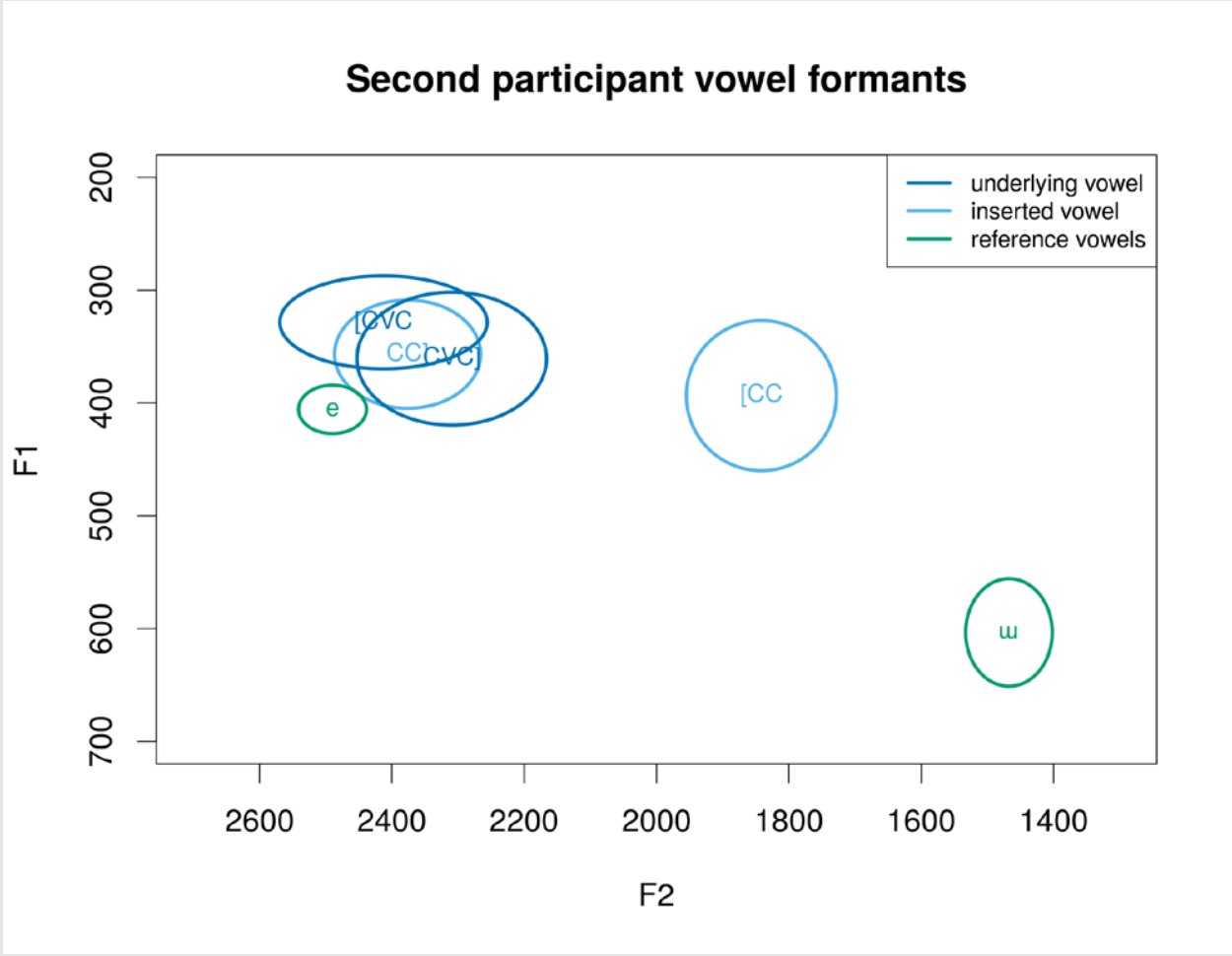
# RESULTS: Frequency of Occurrence



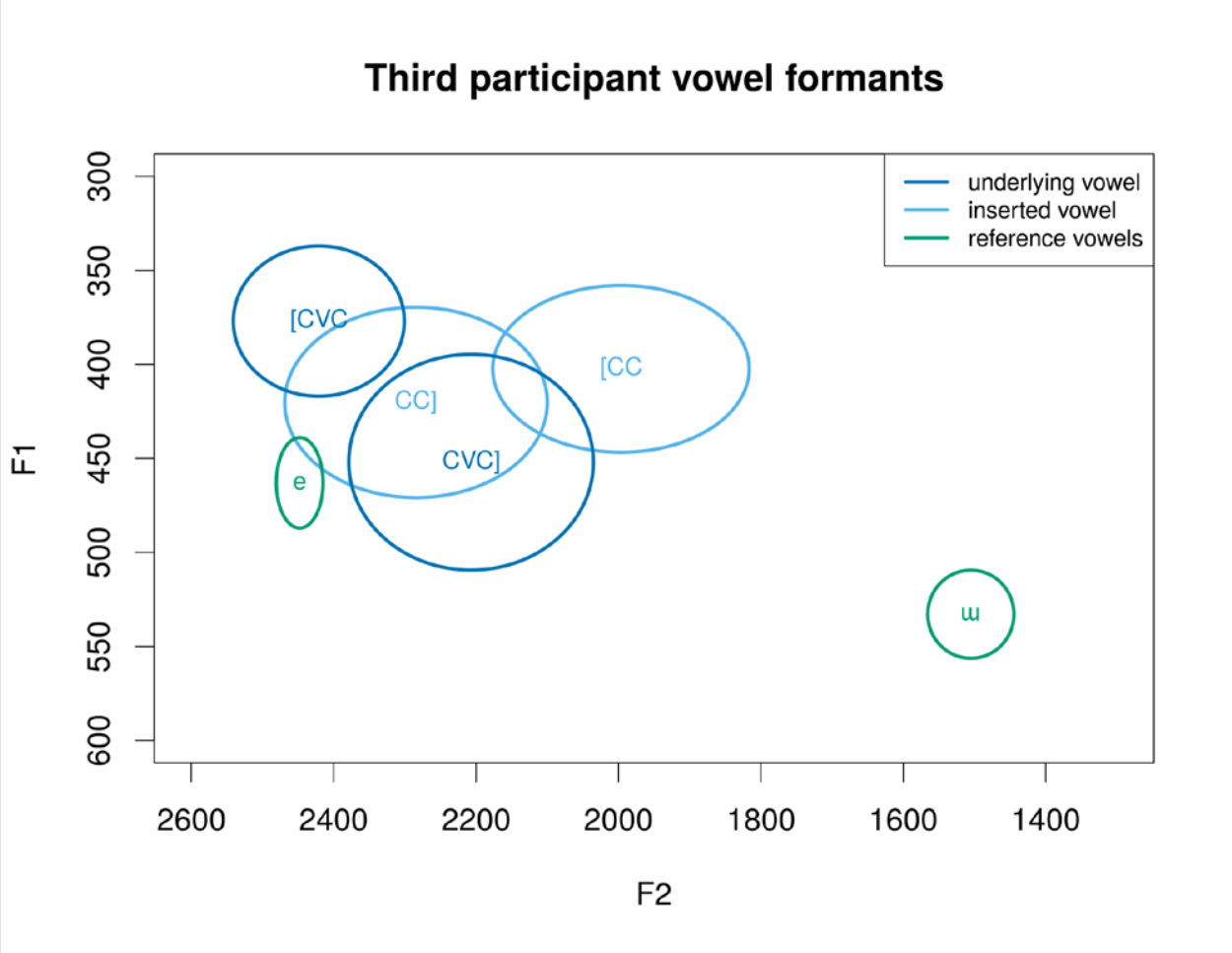

- [CC words where no vowel was inserted: klip (3), krem (2), Bret (1)

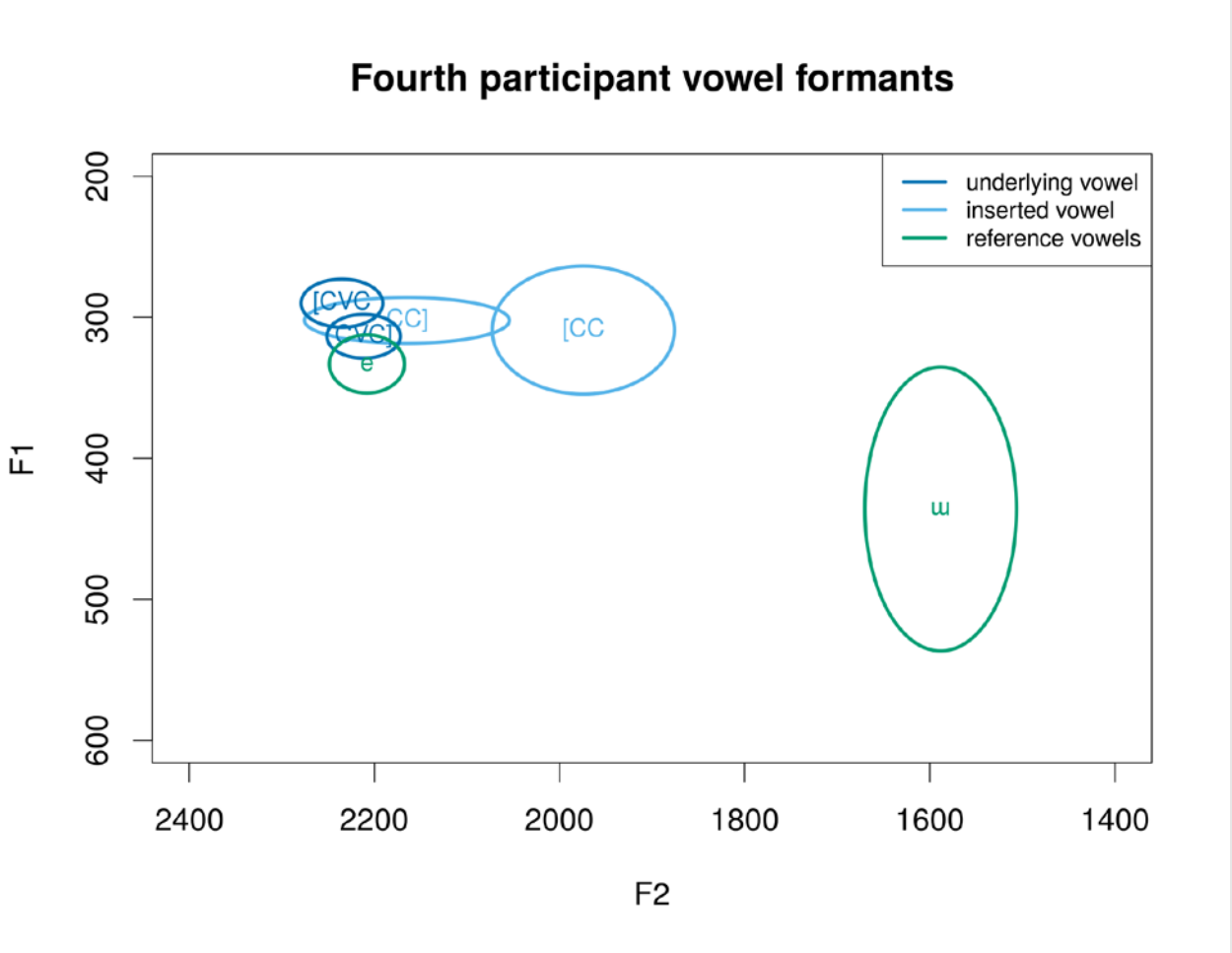
# RESULTS: Formant measurements



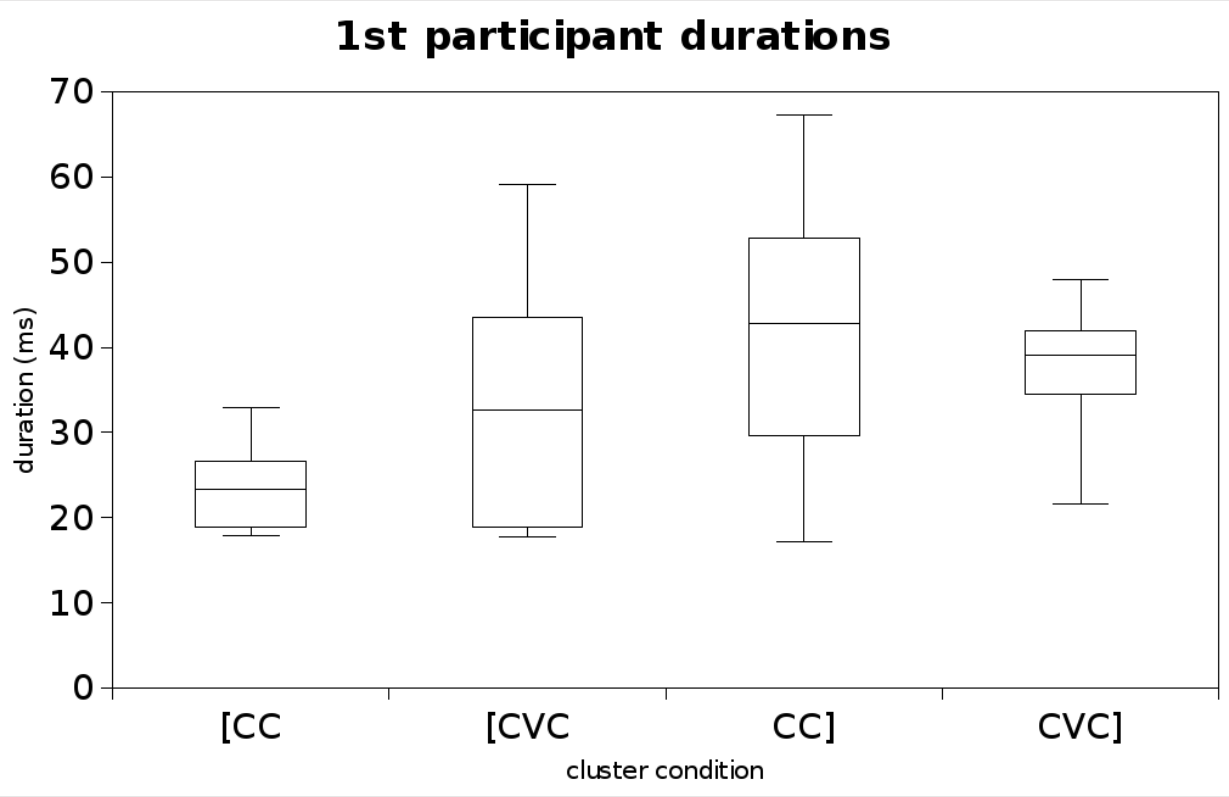



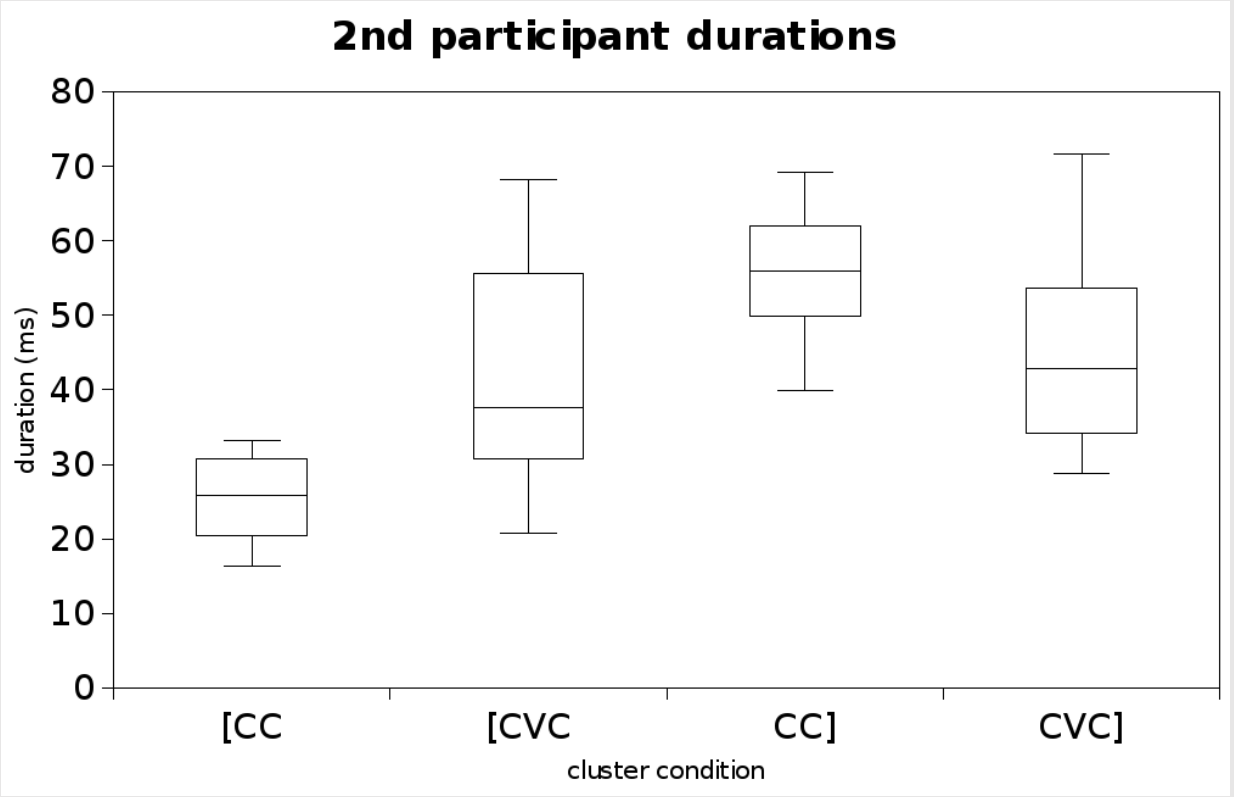
# RESULTS: Formant measurements (continued)



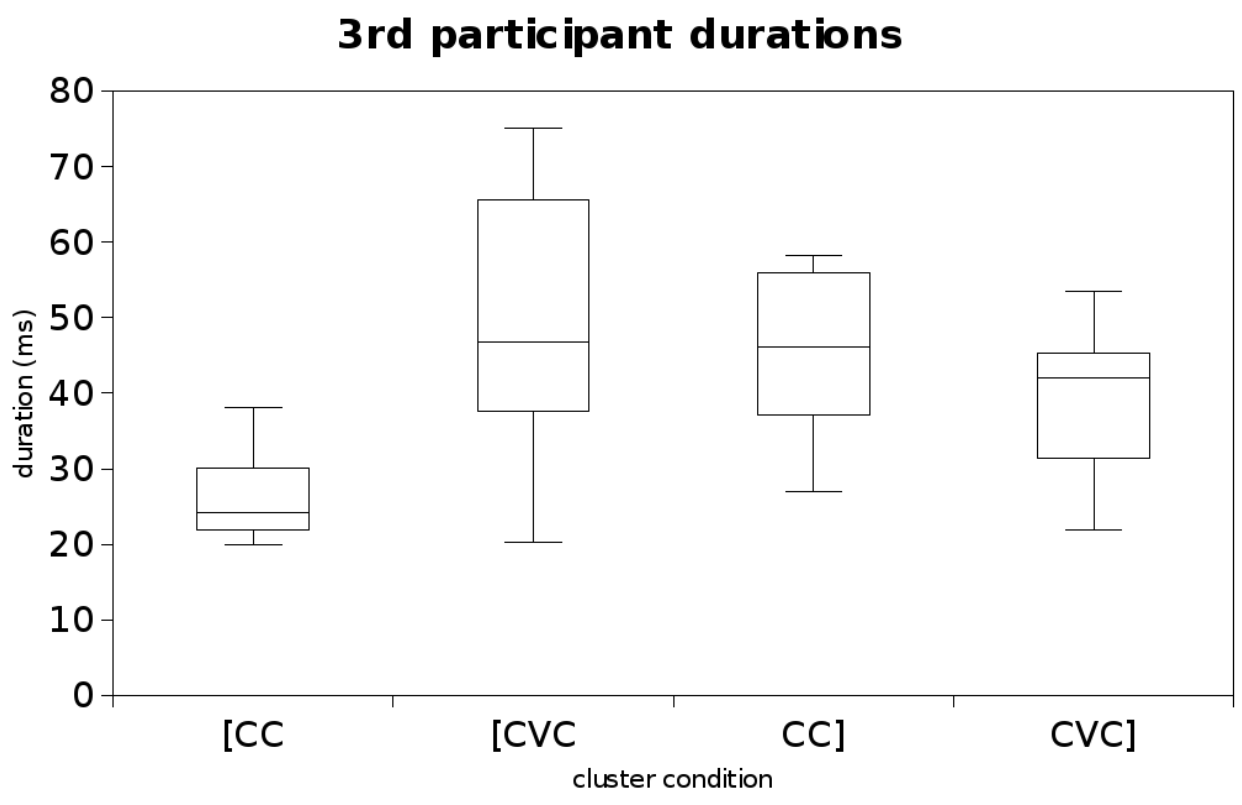



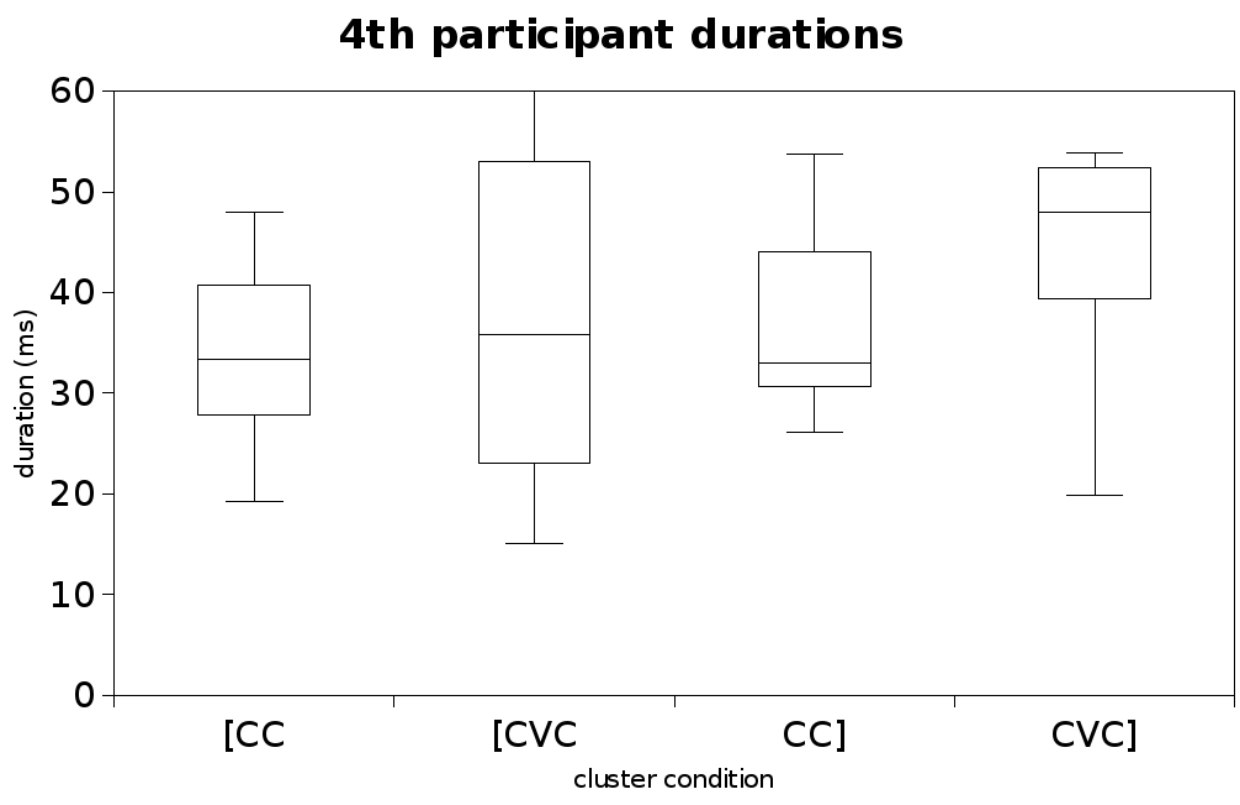
# RESULTS: Duration measurements



# RESULTS: Duration measurements (continued)



# DISCUSSION

- Variation in frequency of insertion in [CC contexts, 100% insertion in CC]
- Vowel quality (F1xF2) in [CC contexts is different from other [i] vowels:
  - consistently backer vowel quality (lower F2)
  - sometimes lower vowel quality (higher F1)
- Duration is shorter for [CC contexts than other contexts:
  - Smaller range of duration in [CC contexts
  - The top range of [CC durations is less than the median durations for other contexts for most speakers
- These findings show:
  - Inserted vowels in [CC contexts are schwa-like (shorter, more central, not consistently inserted), or lack an articulatory target.
  - Inserted vowels in CC] contexts are indistinguishable from underlying vowels.

# CONCLUSION

- The vowels inserted in [CC conditions behave differently than the vowels inserted in CC] conditions:
  - Inserted vowels in [CC conditions appear to lack an articulatory target
  - Inserted vowels in CC] conditions appear to have a phonological presence
- This supports Bellik's (2016) proposal that:
  - [CC insertion is phonetic instrusion
  - CC] insertion in phonological epenthesis

# FUTURE WORK

- Investigate vowels in a wider range of consonantal contexts, although limited by the phonological distribution in Turkish.
- Investigate whether inserted vowels are really subject to vowel harmony in the way predicted by Clements and Sezer (1982), or if they’re instead mostly dependent on adjacent consonants.

# REFERENCES


Bellik, Jennifer (2016). Turkish onset-repair: an ultrasound study. Unpublished manuscript.

Clements, G. N. and E. Sezer (1982). Vowel and consonant disharmony in Turkish. In Harry van der Hulst and Norvin Smith (eds.), The Structure of Phonological Representations, Part 2, 213-256.

Göksel, Aslı and Celia Kerslake (2005). Turkish: A Comprehensive Grammar. London: Routledge.

Hall, N. (2006). Cross-linguistic patterns of vowel intrusion. Phonology 23: 387–429. Cambridge University Press.

Hillenbrand, James, Laura A. Getty, Michael J. Clark, and Kimberlee Wheeler (1995). Acoustic characteristics of American English vowels. In Journal of the Acoustical Society of America v. 97 (5), pp. 3099-3111.

Levi, Susannah V. (2001). Glides, laterals, and Turkish Vowel Harmony. In CLS: The Main Session, pp. 379-393. The Chicago Linguistics Society.

Topbaş, Seyhun and Handan Kopkallı-Yavuz (2008). Reviewing sonority for word-final sonorant+obstruent consonant cluster development in Turkish. In Clinical Linguistics & Phonetics, v. 22 (10-11), pp. 871-880.