Vowel Tuner

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NLP M2

Software Project
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**UNIVERSITÉ
DE LORRAINE**

Outline

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Our idea

Main goal

- Help language learners improve their pronunciation

Initial plan

- Language - French
- Phonemes - Vowel (monophthongs only)

Possible extensions

- Diphtongs
- Consonants in isolation
- Syllables, words, sentences
- More accents than just Parisian French
- Custom feedback based on the speaker's L1

Interface - Proof of concept

Interface - Proof of concept

u
[y]

Tongue position:
- **High**, touching the roof of your mouth
- **Forwards**, touching your lower teeth
Lips: **rounded**.

[Some mouth drawing with
the current vs. expected
tongue position]

Move your tongue **higher**.

u
[y]

Tongue position:
- **High**, touching the roof of your mouth
- **Forwards**, touching your lower teeth
Lips: **rounded**.

[Some mouth drawing with
the current vs. expected
tongue position]

Almost there! **Round** your lips.

u
[y]

Tongue position:
- **High**, touching the roof of your mouth
- **Forwards**, touching your lower teeth
Lips: **rounded**.

[Some mouth drawing with
the current vs. expected
tongue position]

You got it! 👏

Set-up

- In informal conditions (relatively quiet room)
- 8 French speakers (5 L1 and 3 L2, highly fluent)
- Men and women
- All in their 20s and highly educated
- *si, fée, fait, fête, su, ceux, sœur, ce, sous, sot, sort, sa, pâte*
- All oral vowels of Parisian French and a few other dialects
- Vowels manually annotated using Praat
- Average F1, F2 and F3 extracted on a per-vowel basis

Results
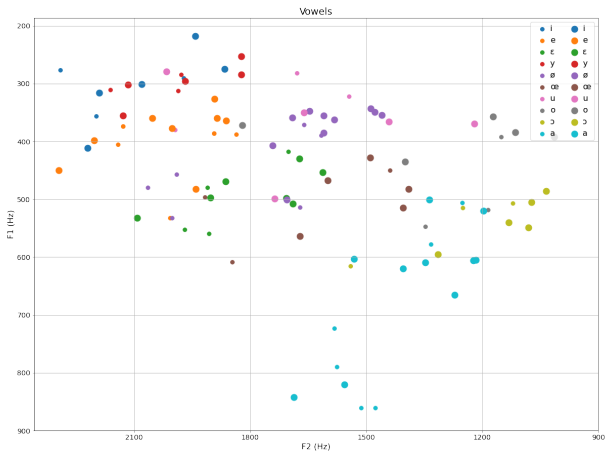
Results
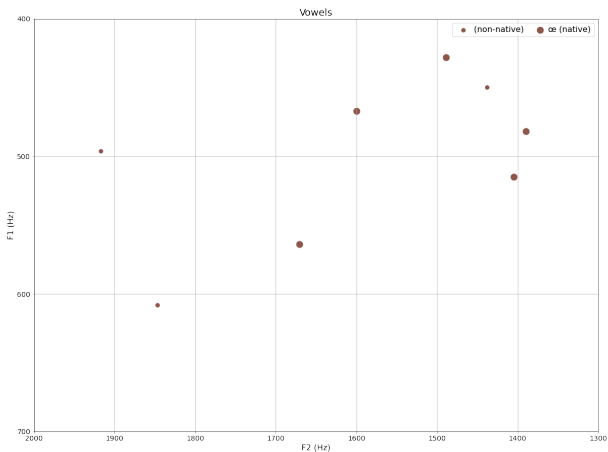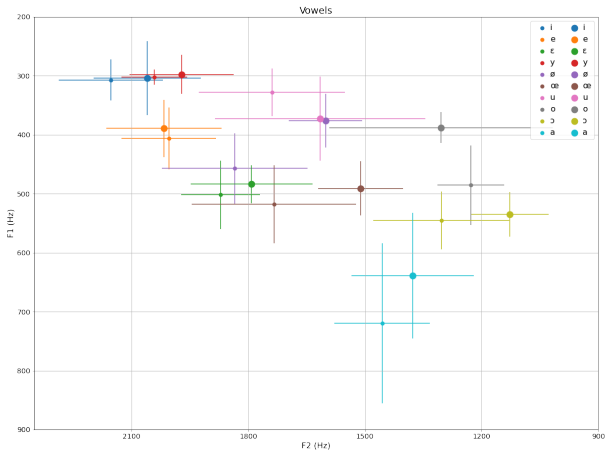
Results

Results

Two-sampled Hotelling test with 99% confidence

Vowel	value
i	**0.00000**
e	**0.00717**
ɛ	0.17131
y	0.05767
ø	**0.00000**
œ	**0.00001**
u	**0.00000**
o	**0.00000**
ɔ	**0.00000**
a	0.06120

$\rightarrow$ Vowels from L2 speakers can be detected (except /ɛ/, /y/ and /a/)

How it works

- Record standalone vowels
- Extract formants automatically
- Check if formants fall within given intervals (classifier?)
- Optional: compute a fluency score
- Provide customized feedback

Team

- Ajinkya KULKARNI: Auto-entrepreneur with hands-on experience in Speech synthesis, Speaker verification, Emotion recognition, Speech recognition, Speech enhancement, Optical character recognition, Machine transliteration, Spell correction
- Soklong HIM: CS background, worked on speaker diarization and speaker verification
- Nora LINDVALL: Linguistics background, worked on text classification and speaker verification
- Maxime MÉLOUX: CS/applied mathematics background, worked on neural POS-tagging models, text summarization and topic modeling
- Jorge VASQUEZ-MERCADO: CS background, worked on sentiment analysis, ux interface, BERT and speaker verification

Resources

L1 corpora

- CFPP2000: Parisian French corpus
- CFPQ: Québec French corpus
- MPF: Multicultural Parisian French corpus
- Rhapsodie: Spoken French, annotated for prosody and syntax

Resources

L2 corpora (young learners)

- The Dresden Corpus: 32 German children learning French
- FLLOC: Dutch and English native speakers (teenagers) learning French
- The Newcastle Corpus: British high schoolers learning French
- TCD Corpus: 5 L2 French children from different countries
- The Reading Corpus: 16-year-old Welsh pupils learning French

Resources

L2 corpora (continued)

- **LANGSNAP, LANGSNAP3:** British undergraduates learning French, before and after a year abroad
- **PAROLE:** 40 L2 French students from different countries
- **The UWI Corpus:** Adult Jamaican learners of French
- **IFCASL:** German and French speakers recording sentences in their native and non-native languages
- Other L1 and L2 French corpora:
  http://ircom.huma-num.fr/site/corpus.php

Aspects to be determined

- Chosen datasets
- Main project steps
- Workflow and time/task repartition
- Evaluation

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