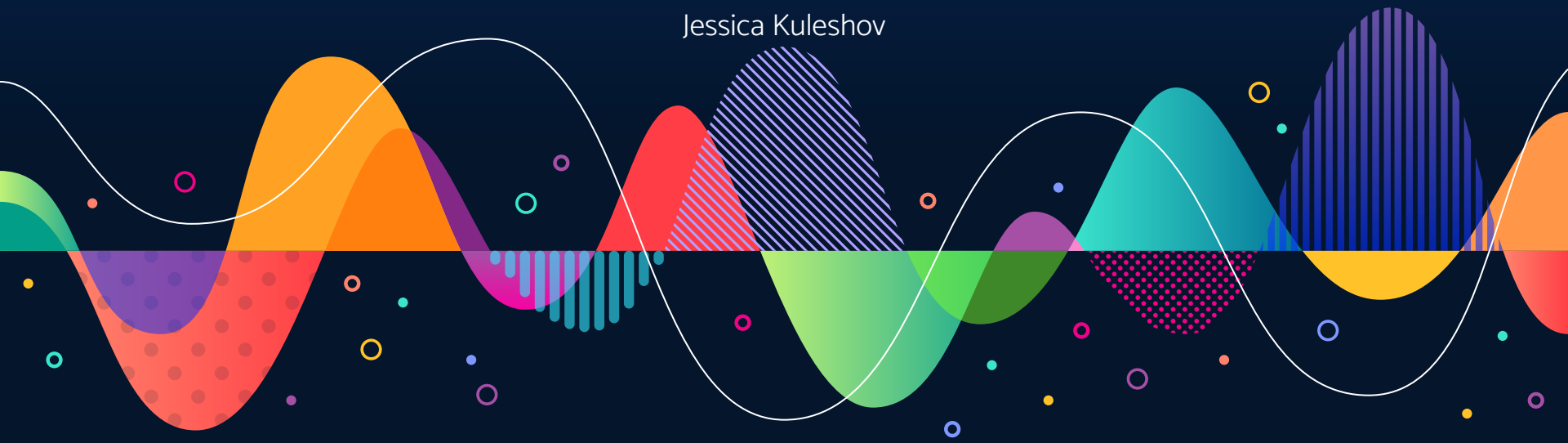
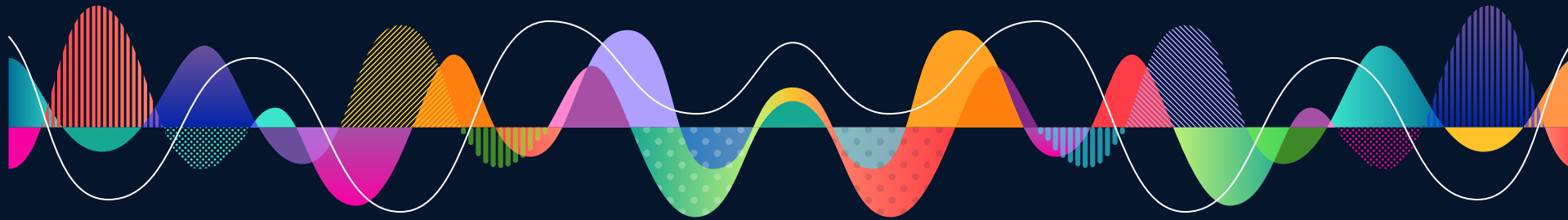
Phonetic Features and Perception of Russian L2 English

Jessica Kuleshov



Why Russian accents? Why quantification and perception?

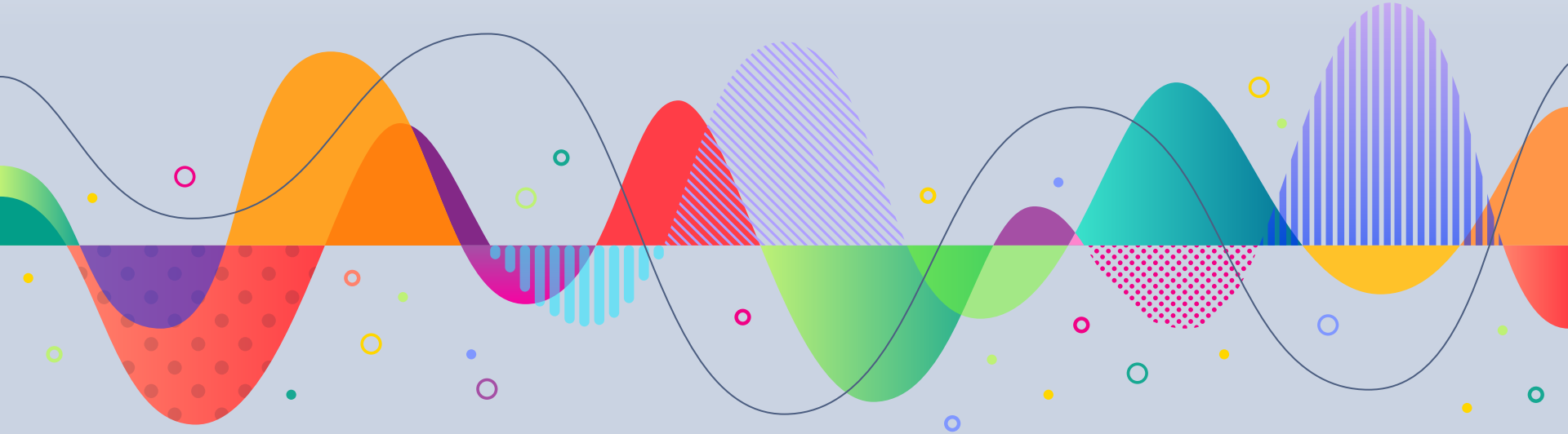
- I'm Russian and am surrounded by Russian accents
- Found my accent perception of family members to be fairly skewed as compared to others
- Interest in accents and methods of improving speech recognition models for accented speech
- Societal implications of accented speech also important!



1.

ACCENT QUANTIFICATION

Using frequency and pitch data, can a Russian accent be numerically quantified?



Data Sets

SPA: Speech Accent Archive

- Data set of various English accents, not just Russian
- Made to test all common English constructions
- Reading a constructed paragraph
- Native speaker perception data not available

ACS: Author-Collected Samples

- Data set of Russian immigrants to US in their 50's
- Made to test known common Russian accent features
- Reading a constructed paragraph
- Native speaker perception data available

Phonetic deviations to look out for!

Consonants:

- [l]-velarization
- [h]-velarization
- Vowel Palatalization
- [r]-trilling
- Final devoicing

Vowels:

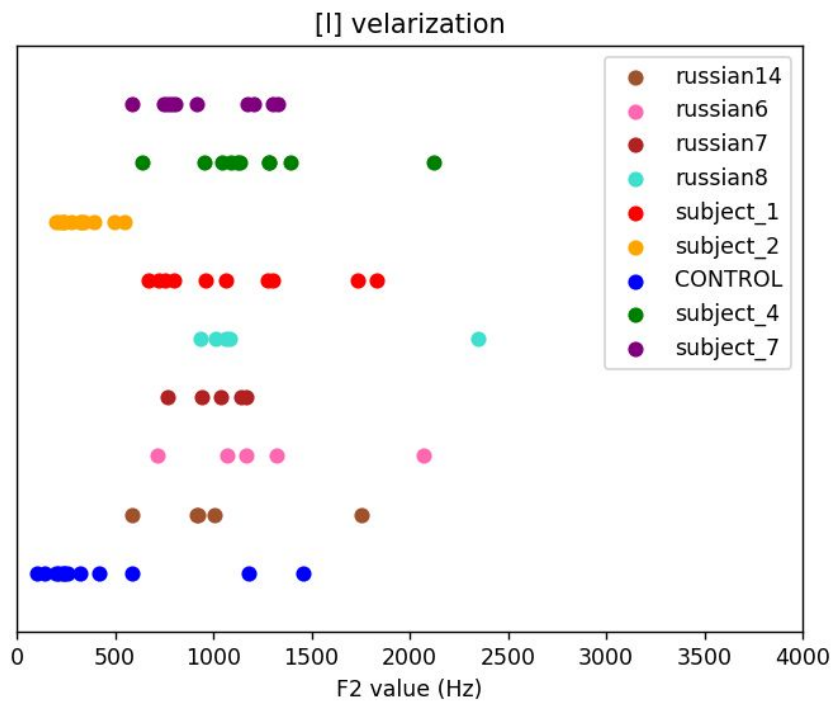
- [æ]-raising
- [i]/[ɪ]/[ɨ] alternations
- [ʊ]-raising

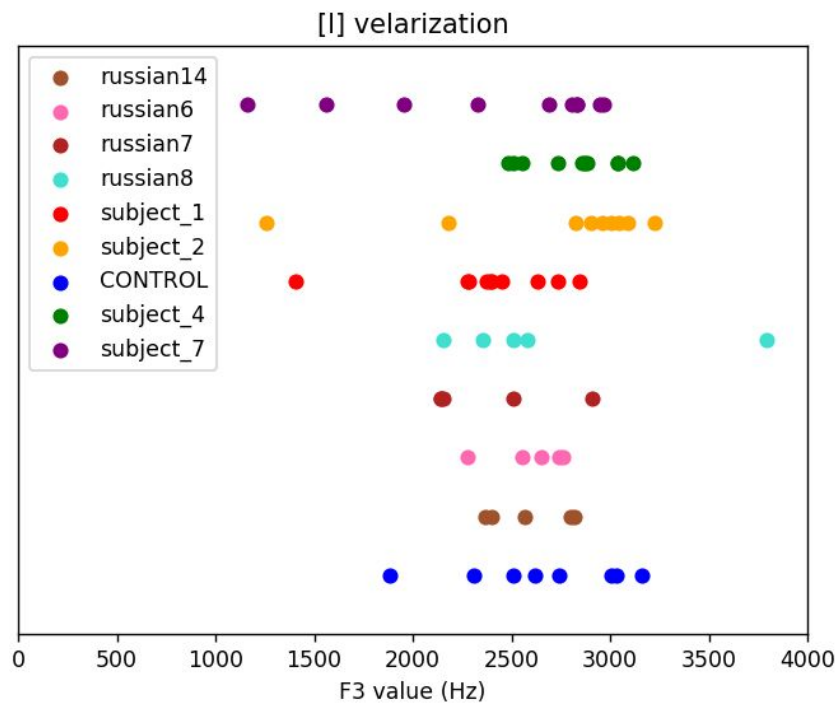
Method

- **Hand-label recordings** phone-by-phone using Praat
- **Extract formant values** (pitch (F0), F1, F2, and F3) per phone interval for vowels, **normalize features** using min-pitch normalization
- **Hand-count** consonant deviation instances
- **Observe trends** in frequency mean and variance for expected phonetic deviations
- BONUS: Observe pitch contour differences!

Results

- [æ] and [ʊ] F2 values seemed to have some nice visual separation
- [i]/[ɪ]/[ɨ] separation mostly by variance amount, but mostly inconclusive
- Consonants make more sense to compare to perception data only


[l] velarization
russian14
russian6
russian7
russian8
subject_1
subject_2
CONTROL
subject_4
subject_7
0
500
1000
1500
2000
2500
3000
3500
4000
F2 value (Hz)


[l] velarization
russian14
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russian8
subject_1
subject_2
CONTROL
subject_4
subject_7
0
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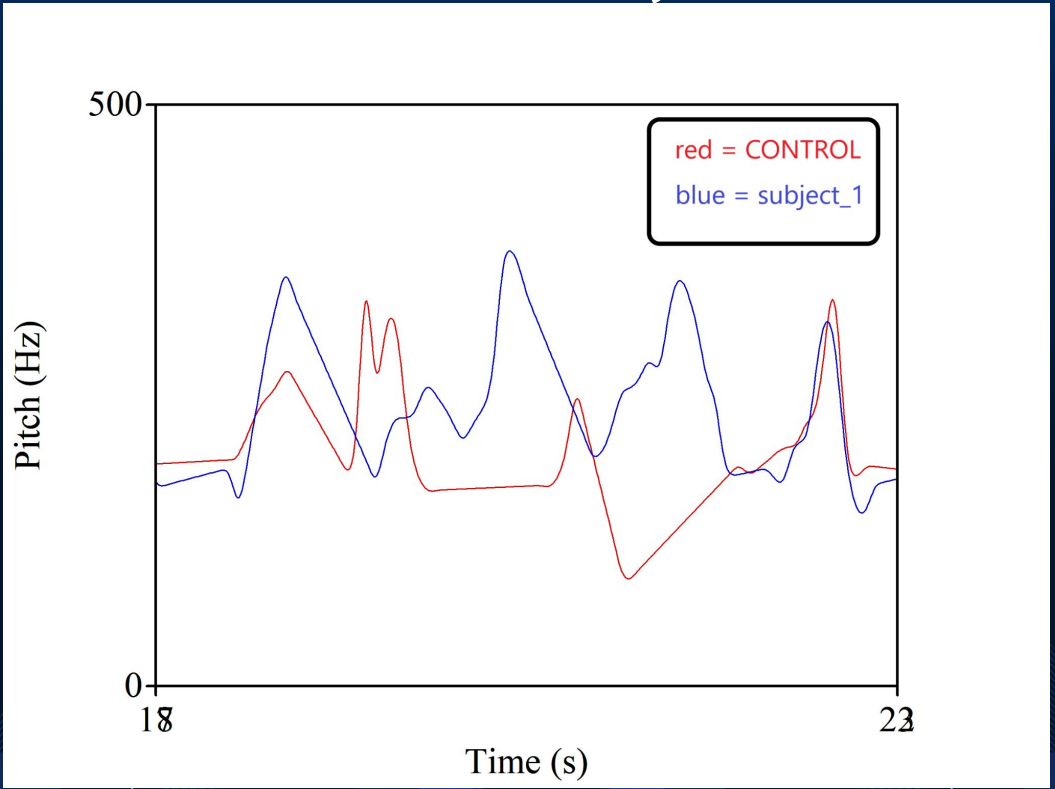
1000
1500
2000
2500
3000
3500
4000
F3 value (Hz)

Pitch - doesn't say much!

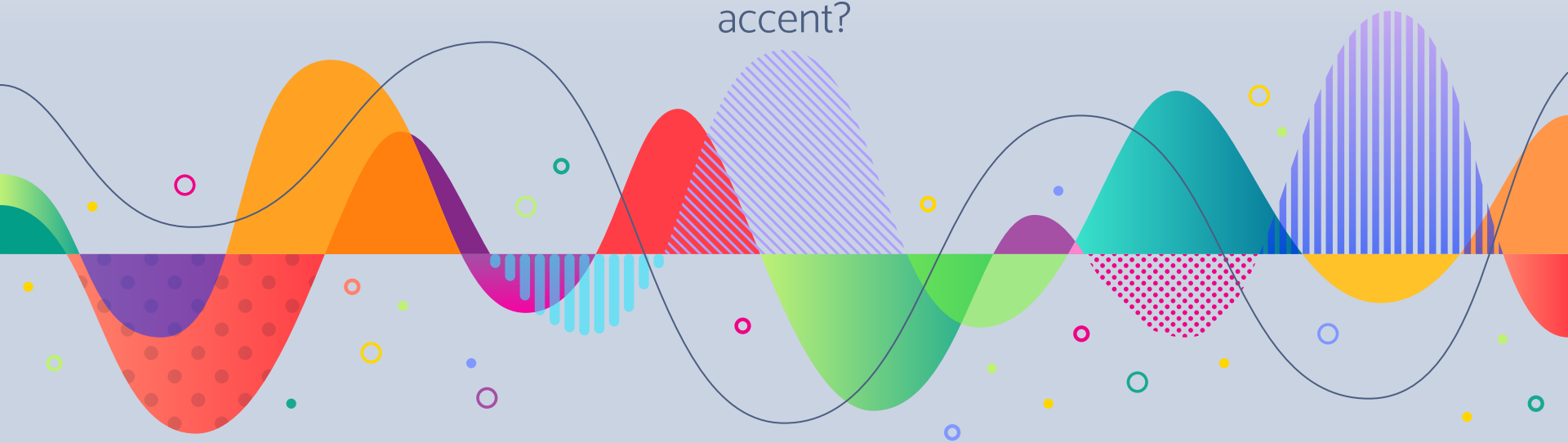


Elicited Sentence:
"Then, while eating lunch, I looked west and saw the whale!"

2.

ACCENT PERCEPTION

Comparing general trends from the accent quantification step to native speaker perceptions, what are the most telling features of a Russian accent?

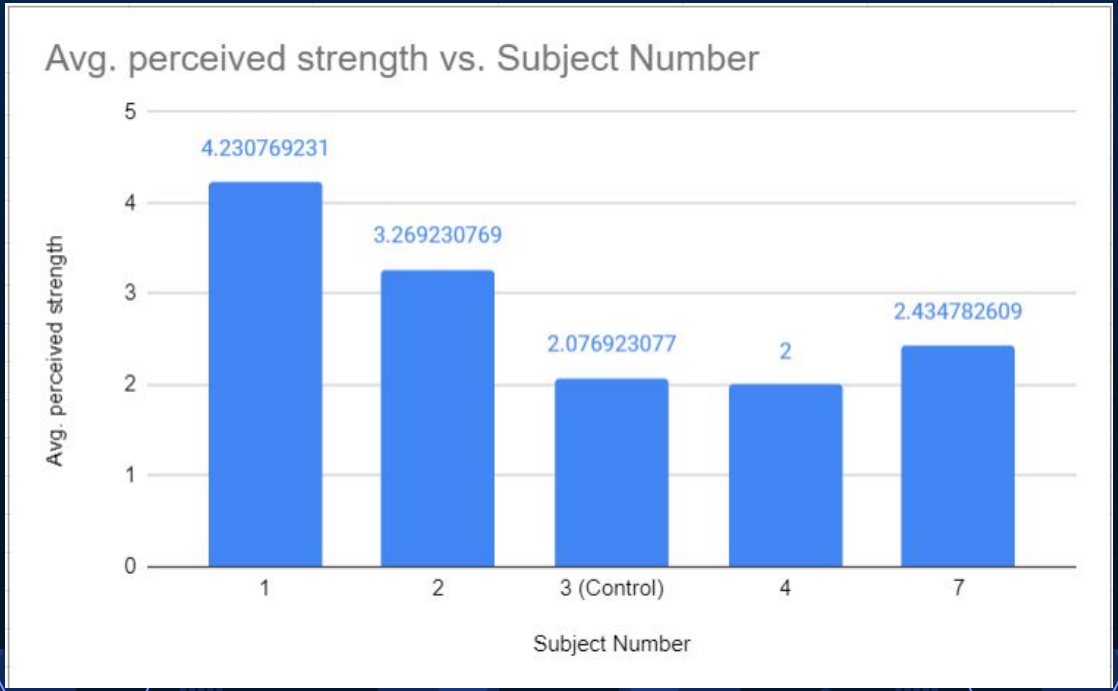


Survey Setup

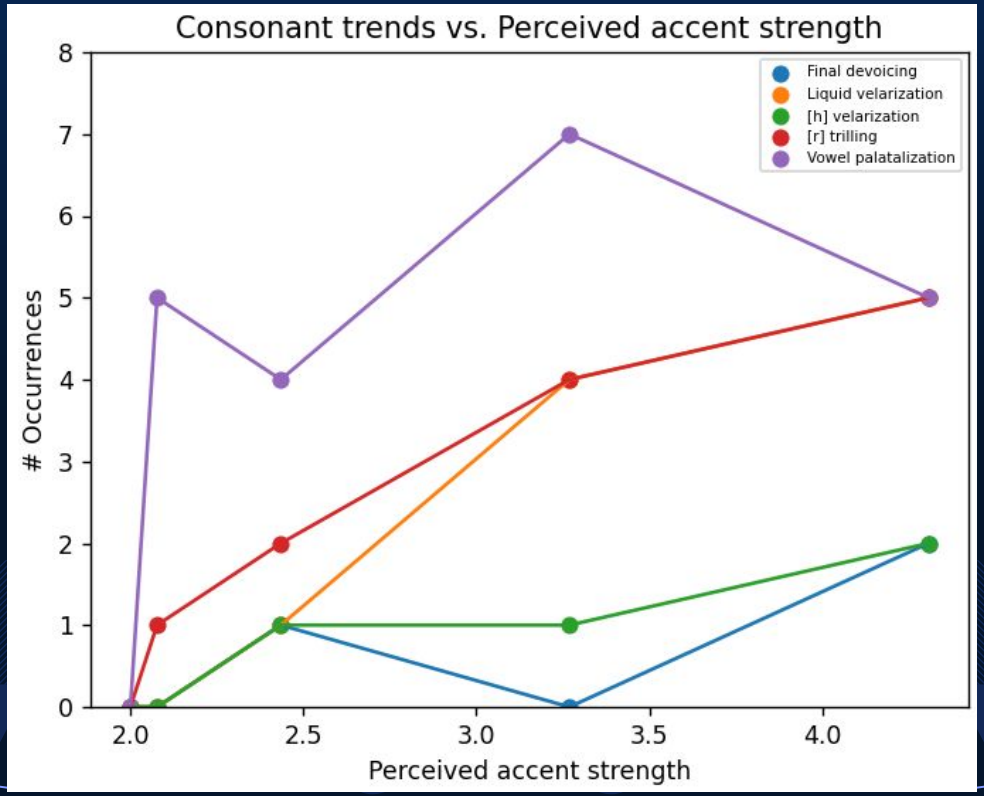
Objective: get ratings of perceived accent strength from native speakers.

- Google Form where native speakers of English listen to recordings and rate on scale from 1-5
- Also could guess the accent (I didn't tell them it was Russian) - made for fun results

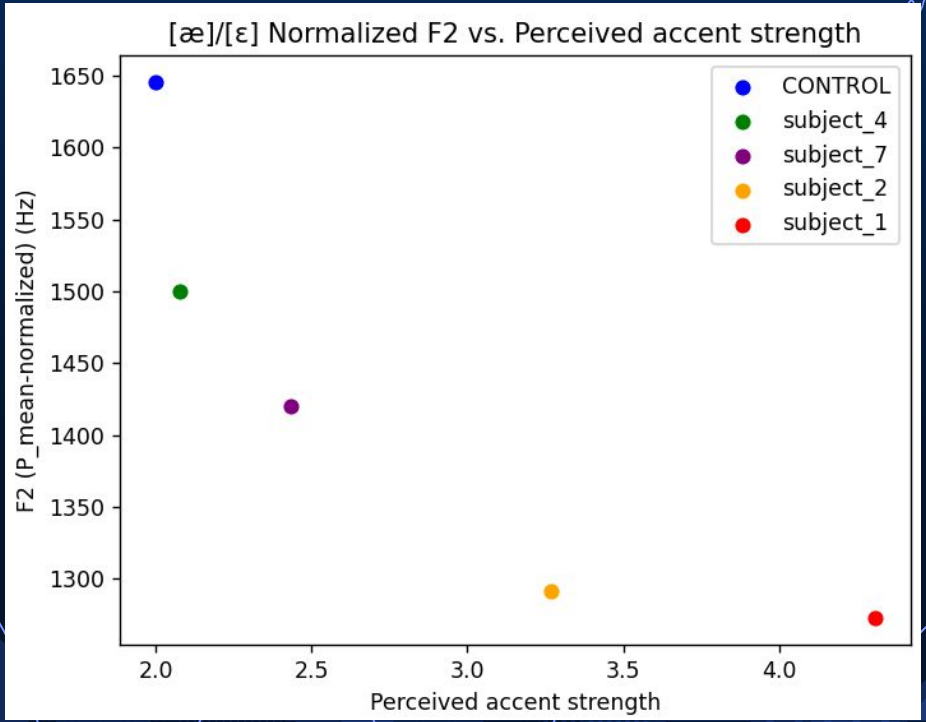
General Survey Results

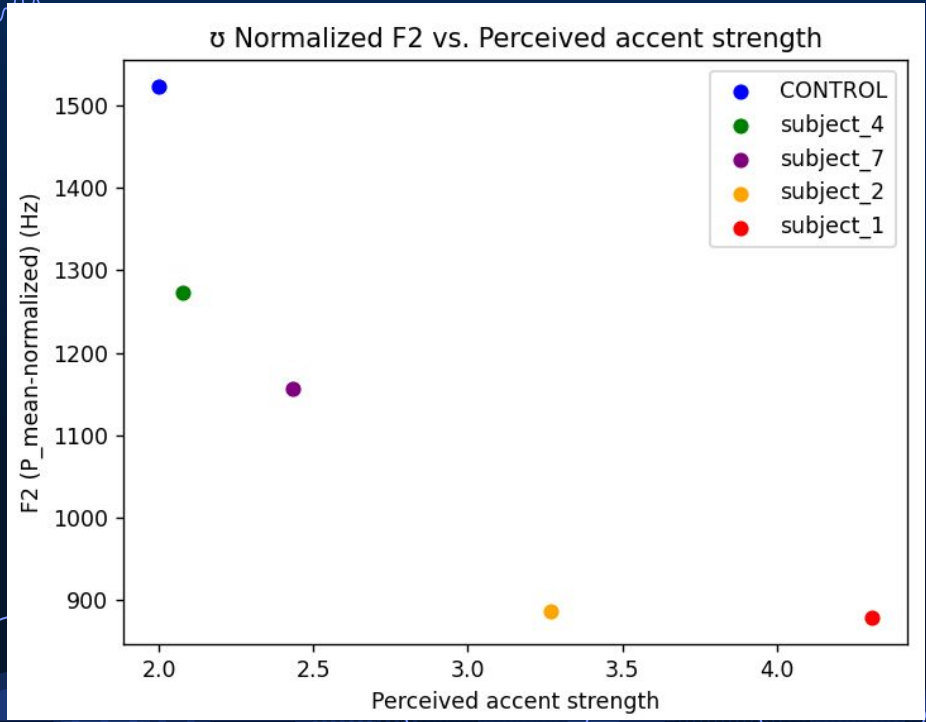


Results: Consonants



Results: Vowels

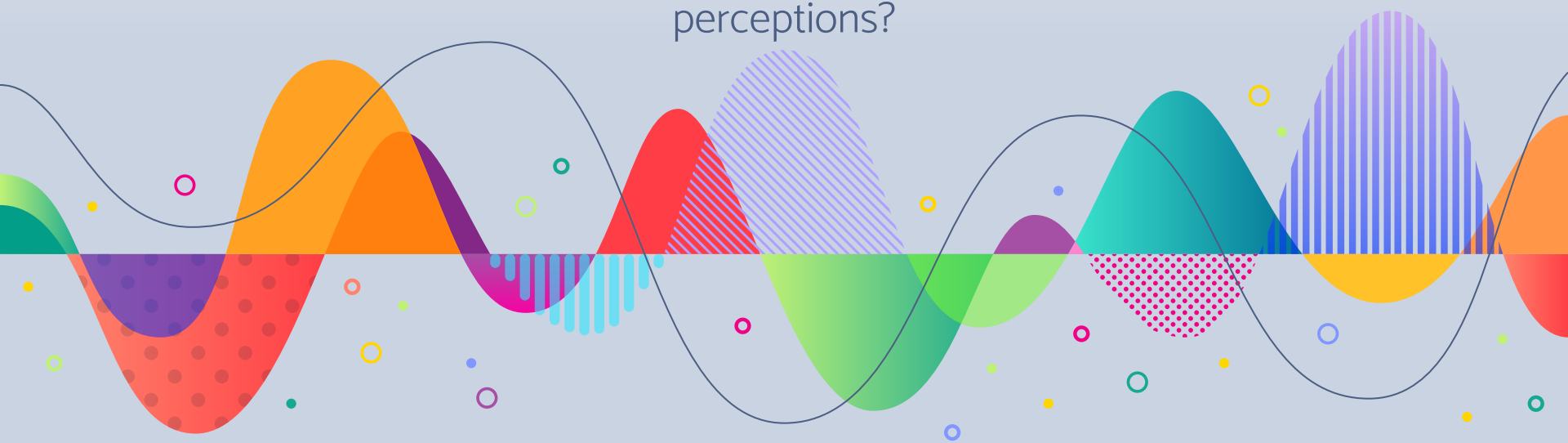




3.

ACCENT SELF-PERCEPTION

What do L1 Russian L2 English speakers think of their own accents? Does their own accent strength perception line up with native speaker perceptions?



Accent strength self-evaluation: Interestingly non-conclusive!

- Most speakers rated themselves around 2-3 (from 1-5) regardless of native speaker perception
- Makes sense! Have lived here awhile, everyone thinks they've improved but not perfect Standard American English speaker

Personal experience living in the U.S. with a Russian accent

- Respondents moved to U.S. in their 20's, lived here for 30 years, all have tertiary education
- At first, very difficult and conscious of their accent, but not anymore
- Most work either with Russian speakers or in tech - surrounded by nonnative speakers - don't mind accents
- Occasionally have moments of being conscious of accent

FINAL CONCLUSIONS

- Consonants
  - [r]-trilling
  - Palatalization and final devoicing stick around the longest
- Vowels
  - [æ] and [ʊ] exhibit similar raising characteristics
  - [i]/[ɪ]/[ɨ] have different variance across speakers, but no single formant correlates well with perceived strength
- Self-perception
  - Scores do not correlate well with native speaker scores

CREDITS

Thank you to my family, friends, and Prof. McWhorter and Prof. Landman for all of their guidance! Thank you especially to those speakers who so graciously allowed me to use their recordings and stories for this thesis.

THANKS!

I'll take some questions if you have any!

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