

Source-Filter
Model

Vowel analysis

exploratory analysis

extract data

plotting

R packages

vowels

phonTools

Vowels

G. Moroz

27 May, 2017

Source-Filter Model of Speech Production

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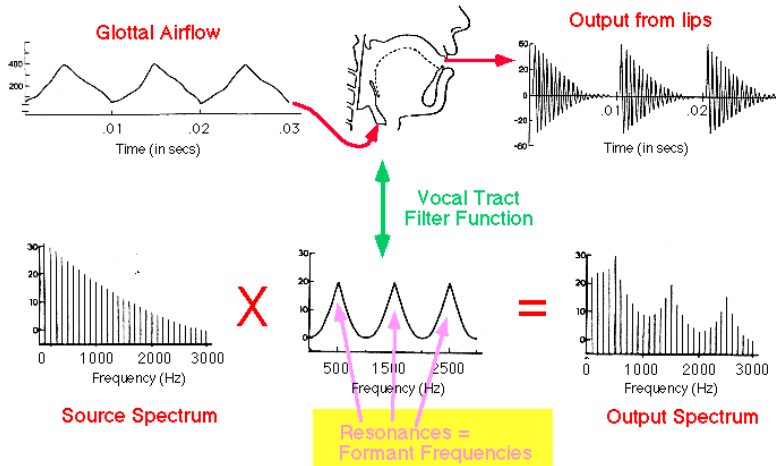
plotting

R packages

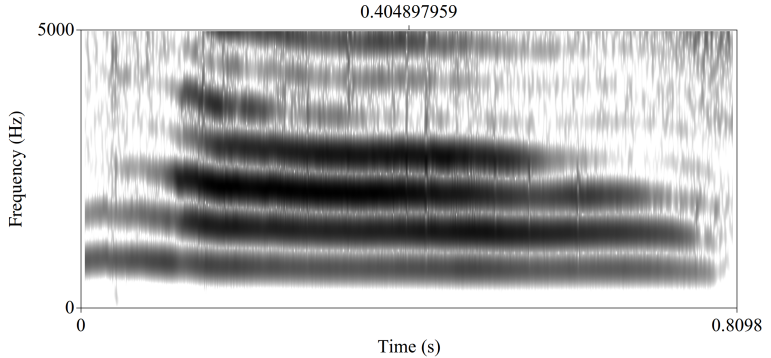
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The output energy (at the mouth) for a given frequency is equal to the amplitude the source harmonic, multiplied by the magnitude of the filter function for that the frequency.



???



Cat meow

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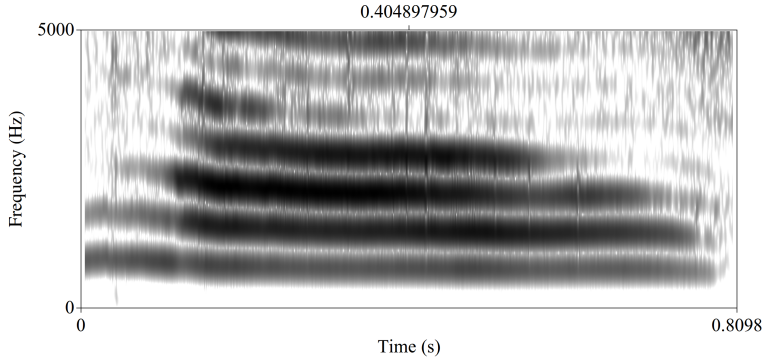
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Vowel chart

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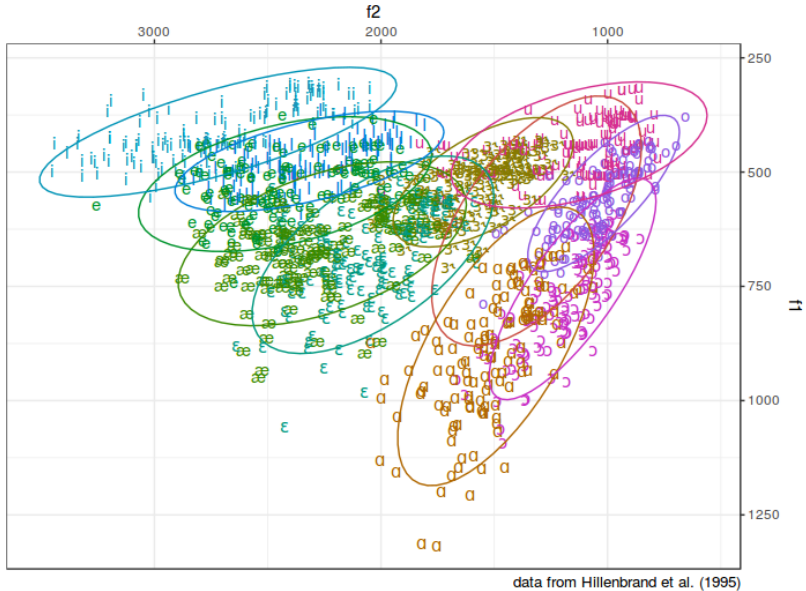
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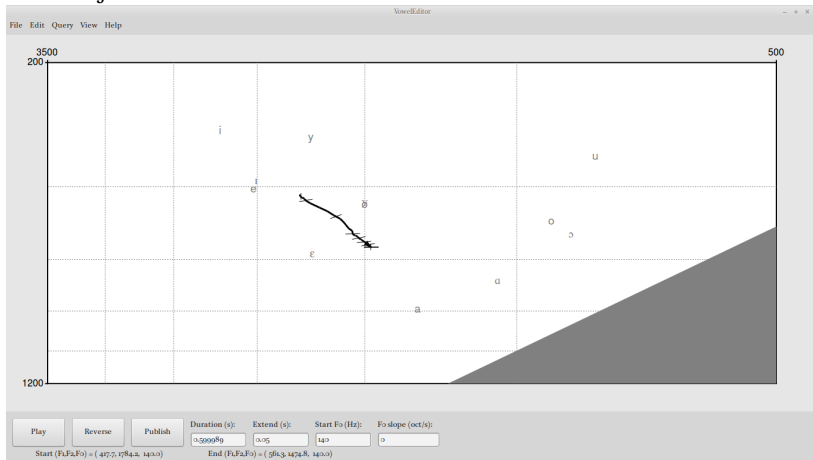


data from Hillenbrand et al. (1995)

презентация доступна: <https://goo.gl/rVcg6X>

Vowel editor

Praat objects > New > Sound > Create sound from VowelEditor...



How to analyse vowels?

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- record sounds
- annotate sounds
- make an exploratory analysis
- extract duration and formant information from your data
- create the plot

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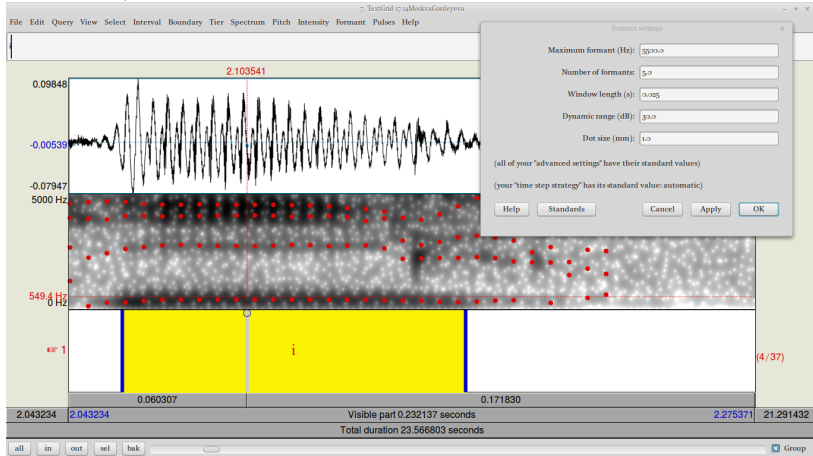
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Formants in Praat

Praat Analyser > Formant > Show Formants

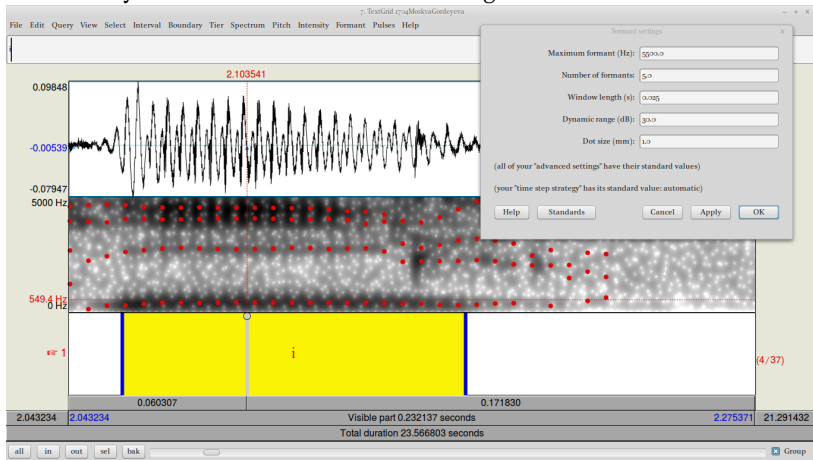


- F1 select the nearest first formant value or mean value for selection
- F2 select the nearest second formant value or mean value for selection
- F3 select the nearest third formant value or mean value for selection

презентация доступна: <https://goo.gl/rVcg6X>

Formants in Praat

Praat Analyser > Formant > Formant Settings...



During analysis you should set Maximum Formant value so as to distinguish [i], [a] and [u].

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Change writing preferences to UTF-8!

Praat Objects > Preferences > Text writing preferences...

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Praat scripting

Praat have its own scripting language. You can read about it:

Praat Objects > Help > Scripting tutorial

There are a lot of Praat scripts [here](#).

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Praat scripting: extracting duration

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- Open Praat Objects
- Open some TextGrid
- Praat Objects > Praat > New Praat script
- Copy script from [here](#) to the new window
- Select TextGrid
- Praat Script > Run > Run
- Provide some valid path for the result file
- Press OK

Praat scripting: extracting formant values

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- Open Praat Objects
- Praat Objects > Praat > New Praat script
- Copy script from [here](#) to the new window
- Praat Script > Run > Run
- Provide some path with your sound and TextGrid
- Provide Maximum Formant value
- Press OK

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Plotting formant values with ggplot2

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```
library(ggplot2)
setwd("...") # Put here path with the result.tsv file
df <- read.csv("result.tsv", sep = "\t", fileEncoding = "UTF-8")
ggplot(data = df, aes(F2, F1, color = intervalname, label = intervalname))+
  geom_text(show.legend = F)+
  scale_y_reverse(position = "right")+
  scale_x_reverse(position = "top")
```

Plotting formant values with ggplot2

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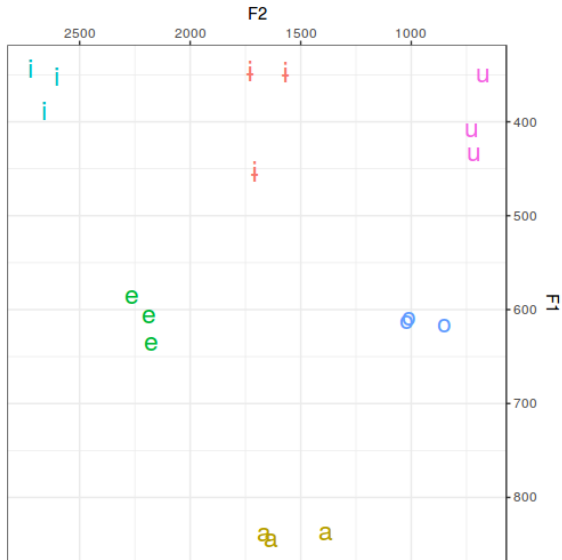
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vowels

- Version: 1.2-1
- Date: 2014-11-14
- Author: Tyler Kendall and Erik R. Thomas, [Kendall and Thomas 2014]

```
install.packages("vowels")
```

phonTools

- Version: 0.2-2.1
- Date: 2015-07-30
- Author: Santiago Barreda, [Barreda 2015]

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```
install.packages("phonTools")
```

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Thank you!

Please, don't hesitate to write me

agricolamz@gmail.com

Reference

- Barreda, S. (2015). phonTools: Functions for phonetics in R. R package version 0.2-2.1.
- Kendall, T. and E. R. Thomas (2014). vowels: Vowel Manipulation, Normalization, and Plotting. R package version 1.2-1.

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