The role of musical aptitude in the pronunciation of English vowels among Polish learners of English

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About the project

- musical hearing in the acquisition of EFL pronunciation
- 2015 – 2017
- Polish advanced learners of English
- National Science Centre Poland
Background

- music and language evolution (Brown 2001, Mithen 2005)
- music and neurolinguistics (Patel 2008, Fadiga et al. 2009)
- music and L1 acquisition (Carlton 2000, Strait et al. 2012)
- music and L2 acquisition (Pastuszek-Lipińska 2008)
- music in didactics and pedagogy (Franklin et al. 2008)
- popular science
Issues to address

- difficult to measure and define
- difficult to control and assess
- scarcity of empirical data for musical hearing
- scarcity of longitudinal studies
- general language proficiency vs specific aspects of pronunciation
- general musical aptitude vs specific aspects of musical hearing
Research questions

● What is the influence of musical hearing on the acquisition of EFL pronunciation?

● To what extent are pitch perception, melodic memory and musical rhythm correlated with the acquisition of English vowels, intonation and language rhythm?

● To what extent do musical experience and musical education influence the process of second language acquisition?
Project roadmap

1st year
- Recording session #1
  Oct – Nov 2015
- Data analysis #1
  Jul – Dec 2016

2nd year
- Data analysis #2
  Jul – Dec 2017
- Recording session #2
  May – Jun 2016
- Recording session #3
  May – Jun 2017
Participants

- 80 Polish advanced learners of English
- 1BA English studies programme
- 19-20 years old
- General British model
- intensive two-year pronunciation course
- extensive one-year phonetics and phonology course
Recording sessions

- Polish spontaneous speech (casual conversation)
- Polish wordlist (six vowels in different consonantal contexts)
- English spontaneous speech (casual conversation)
- English reading passage (*Please Call Stella*)
- English dialogues (four dialogues with different intonation patterns)
- English wordlist (ten vowels in different consonantal contexts)
Musical tests (Mandell 2009)

- pitch perception ~ vowel production
- melodic memory ~ intonation
- musical rhythm ~ language rhythm
Vowel measurements

- sample: 100 tokens per vowel (h_d context) in 20 speakers
- Praat (Boersma and Weenink 2015)
- forced-alignment method | NORM | *Vowels* in R (Tyler and Kendall 2015)
- all vowels plotted (10 English monophthongs)
- participants’ formant values vs GB model formant values (Cruttenden 2014)
- pitch perception test vs Euclidean distance
Results  Pitch perception test
Results

All vowels (Bark difference normalized)
Results

P045 (female, adaptive pitch test result: 3 Hz)
Results  P041 (female, adaptive pitch test result: 19.2 Hz)
Results

P037 (male, adaptive pitch test result: **1.8 Hz**)

![Graph showing results](image-url)
Results

P043 (male, adaptive pitch test result: 20.4 Hz)
Results

Euclidean distances

[Box plot showing Euclidean distances for different categories: KIT, FLEECE, DRESS, TRAP, STRUT, START, FOOT, GOOSE, LOT, THOUGHT.]
## Results
pitch perception test ~ Euclidean distance

<table>
<thead>
<tr>
<th>Vowel</th>
<th>R</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>KIT</td>
<td>0.2056</td>
<td>0.045</td>
</tr>
<tr>
<td>FLEECE</td>
<td>0.1963</td>
<td>0.711</td>
</tr>
<tr>
<td>DRESS</td>
<td>0.2456</td>
<td>0.010</td>
</tr>
<tr>
<td>TRAP</td>
<td>0.0002</td>
<td>0.879</td>
</tr>
<tr>
<td>STRUT</td>
<td>0.1686</td>
<td>0.102</td>
</tr>
<tr>
<td>START</td>
<td>0.0003</td>
<td>0.997</td>
</tr>
<tr>
<td>FOOT</td>
<td>0.128</td>
<td>0.213</td>
</tr>
<tr>
<td>GOOSE</td>
<td>-0.230</td>
<td>0.024</td>
</tr>
<tr>
<td>LOT</td>
<td>-0.152</td>
<td>0.141</td>
</tr>
<tr>
<td>THOUGHT</td>
<td>0.010</td>
<td>0.918</td>
</tr>
</tbody>
</table>
Conclusions

- mixed effect for *pitch perception ~ production of EFL vowels*
- KIT and DRESS most stable in production
- THOUGHT most prone to variation
- GOOSE and LOT stand out
- good pitch perception can be helpful in acquisition of certain vowels
- other factors as important in the acquisition of EFL vowels
To be continued...

- look more carefully into individual speakers
- analyse vowels in other consonantal contexts
- compare with the next two recording sessions
- check for other possible factors:
  - musical experience
  - language exposure
  - stress level
References


