Positive transfer from the heritage language? The case of VOT in German/Turkish and German/Russian learners of L3 French, Russian, and English

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1 MEZ and the phonological subproject
2 Our empirical study
2.1 What is VOT?
2.2 Hypotheses
2.3 Methods and data
2.4 Results
2.5 Discussion
3 Outlook and concluding remarks
**MEZ and the phonological subproject**

- part of a larger project on multilingual development (educational context in Germany)

**Multilingual Development: A Longitudinal Perspective**
https://www.mez.uni-hamburg.de/en.html

- **German** (language of environment)
- heritage languages (HL) **Turkish** and **Russian**
- foreign languages (FL) **English**, **French**, and **Russian**

- subproject on (prosodic and segmental) **phonology**

**Our focus today**

- cross-linguistic influence (CLI)
- Voice Onset Time (VOT) of voiceless stops
2.1 What is Voice Onset Time (VOT)?

Time span between the burst of a stop consonant and onset of voicing

(Lisker/Abramson 1964)

<table>
<thead>
<tr>
<th></th>
<th>pre-voicing</th>
<th>short lag</th>
<th>long lag</th>
</tr>
</thead>
<tbody>
<tr>
<td>French, Russian</td>
<td>[b d g]</td>
<td>[p t k]</td>
<td>[p t k]</td>
</tr>
<tr>
<td>Turkish</td>
<td>[b d g]</td>
<td>[p t k]</td>
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<tr>
<td>German, English</td>
<td>[b d g]</td>
<td>[p t k]</td>
<td>[p t k]</td>
</tr>
</tbody>
</table>

Our languages: different phonetic realization of [±voiced] contrast

long lag (voiceless, aspirated)

short lag (voiceless, non-aspirated)

pre-voicing (voiced)
2.2 Hypotheses

**H1** German VOT values are lower for Russian/German and Turkish/German bilinguals as compared to German monolinguals.

**H2** Russian/German and Turkish/German learners of FL English produce /p t k/ less target-like than monolingual German learners do.

**H3** Russian/German and Turkish/German learners of FL French produce /p t k/ more target-like than monolingual German learners do.

**H4** Monolingual German learners of Russian produce /p t k/ less target-like than Russian/German bilinguals attending Russian courses and German/Russian speakers do.
2.3 Methods and data

Data collection
- Germany (different federal states), May – Nov 2016
- Picture naming task

Test items: /p t k/ + /a i u/

<table>
<thead>
<tr>
<th>Language</th>
<th>Test Items</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>German</td>
<td>Park [park], Tisch [tɪʃ], Kuchen [ˈkuχn] ...</td>
<td>11</td>
</tr>
<tr>
<td>English</td>
<td>pumpkin [ˈpʌmpkin], tea [tiː], cooker [ˈkʊkə] ...</td>
<td>9</td>
</tr>
<tr>
<td>French</td>
<td>parc [paʁk], tigre [tɪɡʁə], cou [ku] ...</td>
<td>10</td>
</tr>
<tr>
<td>Turkish</td>
<td>park [park], pil [pil], kuş [kuʃ] ...</td>
<td>9</td>
</tr>
<tr>
<td>Russian</td>
<td>палец [pɐˈlʲits], тюфли [ˈtʏfʲi] ...</td>
<td>7</td>
</tr>
</tbody>
</table>
2.3 Methods and data

Participants (ages: 15–16, two subjects: 17)

<table>
<thead>
<tr>
<th>Learner groups</th>
<th>English (first FL), French (second FL)</th>
<th>English (first FL), Russian (second FL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>monolingual</td>
<td>10 (recorded in German, English and French)</td>
<td>9 (recorded in German, English and Russian)</td>
</tr>
<tr>
<td>German</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bilingual</td>
<td>10 (recorded in German, Russian, English and French)</td>
<td>10 (recorded in German, Russian and English)</td>
</tr>
<tr>
<td>Russian/German</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bilingual</td>
<td>10 (recorded in German, Turkish, English and French)</td>
<td></td>
</tr>
<tr>
<td>Turkish/German</td>
<td></td>
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</tr>
</tbody>
</table>
2.3 Methods and data

VOT measurements using Praat (Boersma/Weenink 2011)
2.4 Results: German

Fig. 1 VOT values for German /p t k/ (median) in four groups of speakers: German, Russ/Ger with and without formal instruction in Russian, Turkish/German.

Bilinguals produce German stops with lower VOTs → H1 confirmed
2.4 Results: German

Fig. 2 VOT values for German /p/ in four groups of speakers: German, Russian/German with and without formal instruction in Russian, Turkish/German. The difference between the groups is highly significant for /p/ \((p_{/p/}=0.000)\). Results for /k/ show a similar tendency \((p_{/k/}=0.010)\) and are nearly significant for /t/ \((p_{/t/}=0.055)\).
2.4 Results: FL English

Fig. 3 VOT values for FL English /p t k/ (median) in four groups of speakers: German, Russian/German with and without formal instruction in Russian, Turkish/German. Russ/Ger+Russ and Tur/Ger learners show lower VOTs → H2 partially confirmed
2.4 Results: FL English

Fig. 4 VOT values for FL English /p/ in four groups of speakers: German, Russian/German and without formal instruction in Russian, Turkish/German. The difference between the groups is highly significant for /p/ (p_{p} = 0.000). Results for /t k/ show a similar tendency (p_{t} = 0.045, p_{k} = 0.003).
2.4 Results: FL French

Fig. 5 VOT values FL French /p t k/ (median) in four groups of speakers: German, Russian/German, Turkish/German.

All learner data exceed the target values, only a slight advantage for the bilinguals → H3 partially confirmed
2.4 Results: FL French

Fig. 6 VOT values for FL French /p/ in three groups of speakers: German, Russian/German, Turkish/German. The difference between the groups is highly significant for /p/ ($p_{/p/} = 0.002$). Results for /t k/ show no significant differences ($p_{/t/} = 0.123$ and $p_{/k/} = 0.776$).
2.4 Results: FL/HL Russian

Fig. 7 VOT values for **Russian /p t k/** (median) in three groups of speakers: German, Russian/German with and without formal instruction in Russian.

**Monolingual Ger learners produce less target-like VOTs.** → H4 confirmed. **But: Difference between Rus/Ger with and without formal instruction.**
2.4 Results: FL/HL Russian

**Fig. 8** VOT values for Russian /p/ in three groups of speakers: German, Russian/German with and without formal instruction in Russian. The difference between the groups is highly significant for /p/ ($p_{/p/} = 0.001$). Results for /t k/ show a similar tendency ($p_{/t/} = 0.001$ and $p_{/k/} = 0.003$).
2.4 Results: HL Turkish

Fig. 9 VOT values for /p t k/ produced by Turkish/German bilinguals (red) and Turkish monolinguals (blue).

Turkish/German bilinguals produce longer VOTs than Turkish monolinguals.
2.5 Discussion

- Speech Learning Model (Flege 1995): phonetically different realizations of the two-way phonological contrast ([±voiced])
  - similar sounds
  - challenge for learners, source of negative transfer convergence of categories in heritage speakers

- Differences between /p t k/ are quite stable across all languages.

- Heritage languages: Both Russian/German and Turkish/German bilinguals produce longer VOT values than monolingual Russian and monolingual Turkish speakers do, presumably under the influence of German.

- FL/HL Russian: Russian/German bilinguals who receive formal instruction in Russian produce VOT values closer to the L1 Russian reference values than Russian/German bilinguals without formal instruction in Russian do.
2.5 Discussion

- **FL French**: Positive transfer from HL Russian and HL Turkish is less than expected: L2 status (influence from English, see Llama et al. 2010, Wrembel 2014)?
  → Effect of the **German influence** on the heritage languages (intermediate values: Russian/Turkish ~ German).

- **FL English**: The lower VOT values produced by the Russian/German learners with formal instruction in Russian and the Turkish/German learners does not constitute a disadvantage for the bilinguals, their English VOT values still being in the target range.

- Results speak in favor of a **slight multilingual advantage** (more target-like values in FL French, produced by Russian/German and Turkish/German learners).

- Results speak in favor of a **positive effect of formal language instruction**: More “Russian” VOT values in the Russian/German+Russian group (for French: see Gabriel et al. 2016).
Our next steps

- include voiced stops /b d g/
- run statistical tests: correlations with \textit{quantitative extra-linguistic data and other linguistic data}
  (e.g. to check our findings for the two different groups of Russian/German bilinguals against the backdrop of other factors, such as language use, proficiency on other linguistic levels)
- interdependencies between speech data and \textit{qualitative extra-linguistic data}
  - phonological awareness test (Osburne 2003)
  - semi-guided interviews (→)
  (to determine the factors that \textbf{might favor positive transfer from the heritage languages}; see Gabriel et al. 2015)
3 Extra-linguistic data: example from a semi-guided interview

1400459124 (♂), 2L1 Russian/German, no formal instruction in Russian, high VOT values in Russian, near target-like production in English

P: Ähm, meine Eltern sprechen zwar sehr viel Russisch (.) auch zu Hause, (--) aber (--) eigentlich seit Kind auf mag ich diese Sprache überhaupt nicht. 00:04:55

I: [Warum?

P: Also], es reizt mich überhaupt nicht, Russisch zu können (-) oder zu sprechen, (--) und habe ich diese so weit wie möglich vom Kopf weggemalt 00:05:03-9

I: Naja, wenn du jetzt (vor der Wahl gestellt wirst) (---) und dich für eine einzige Sprache entscheiden musst? ((blättert oder beseitigt die Papiere)) 00:06:02-7

P: (6s) Ich glaub, das wäre Englisch. Ich würd Englisch nehmen. 00:06:11-0

I: Okay, warum würdest du dann Englisch nehmen? 00:06:12-6

P: (---) Weil (--) ich mit Englisch einfach viel mehr erreichen kann, als mit Deutsch. (--) Ich kann reisen. (--) Und Englisch ist auch unglaublich [ein lautes Knacken] wichtig für das, was ich später mal machen will. 00:06:27-5
3 Outlook and concluding remarks

Our next steps

- run **perception tests** with native listeners and non-native listeners (foreign language instructors from the German school system)
- analyze **further phonological aspects** (e.g. intonation, speech rhythm)
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References


Thank you very much!

Merci de votre attention !

İlginiz için teşekkür ederiz!

Сердечное спасибо!

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Dziękujemy za uwagę!