The Hybrid System of Voice Onset Time in French/English Bilinguals

Claire Gurski
University of Western Ontario
The Hybrid System of Voice Onset Time in French/English Bilinguals

Claire Gurski
University of Western Ontario
London, ON
Introduction

Given the differences in the systems of Voice Onset Time between French and English, does a speaker acquire a native-like Voice Onset Time in their second language or does their first language have an influence?
Methodology

- Eight bilingual speakers – 4 Native French and 4 Native English
- 2 paragraphs – one beginning in English and ending in French and one beginning in French and ending in English
- Each paragraph read 4 times
- Participants did not have the influence of other languages.
## Participants

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Gender</th>
<th>First Language</th>
<th>Second Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female</td>
<td>French</td>
<td>English</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>French</td>
<td>English</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>English</td>
<td>French</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>English</td>
<td>French</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>French</td>
<td>English</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>French</td>
<td>English</td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>English</td>
<td>French</td>
</tr>
<tr>
<td>8</td>
<td>Male</td>
<td>English</td>
<td>French</td>
</tr>
</tbody>
</table>
Recordings

- Controlled Environment
- Sony MiniDisk Walkman
- Sony ECM-MS907 Microphone
- Sound Booth
- Analysed using Praat
Voice Onset Time (VOT): ‘The interval between the release of a stop consonant occlusion and the onset of the vocal-fold vibration’ and is measured ‘from acoustic displays as the time between the release burst and the first quasi-periodicity in the acoustic signal’. (Keating, 1984)
Voice Onset Time

Zero VOT

Positive VOT

Negative VOT

Plosive release

Time
VOT – Language Specific

- The VOT of stop consonants [p b t d k g] differs between languages.
- ‘Plus/minus values of the voicing feature will have different quantitative VOT values in different languages.’ (Keating, 1984)
- Eg. [p] in French has a VOT similar to a [b] in English

<table>
<thead>
<tr>
<th>Language</th>
<th>Voiceless Plosives</th>
<th>Voiced Plosives</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Positive VOT</td>
<td>Zero VOT</td>
</tr>
<tr>
<td>French</td>
<td>Zero VOT</td>
<td>Negative VOT</td>
</tr>
</tbody>
</table>
VOT and Language Learning

- Does a person who learns a second language acquire a native-like VOT in their second language or does their native language have an influence?
- Does a person have a consistent VOT across languages regardless of differences between the two languages?
Analysis

- Only intervocalic stops were analysed to eliminate the differences due to aspirated or unreleased stops.
- We found minimal variation between the languages in each of the paragraphs i.e. English of the first paragraph and English of the second paragraph.
- Mean and standard deviation calculated based on the language of use rather than its position in relation to the other language.
Paragraphs

Paragraph A

Once upon a time there was a student named Apolline. As always, she had to do her homework before watching tv. However, this was an era before computers and she was not a star in school. Apolline had to buy lots of paper in order to do her homework in math. But the majority of this paper ended up in the garbage can.
Paragraph B

Students of French want ways to attain fluency in spoken language. Repetition is necessary to strengthen the elaborate facial muscles necessary to form the individual sounds of the language. Aussi, comme d’habitude, les étudiants doivent beaucoup écouter la radio et regarder les épisodes en français. Si on répète des choses comme des idiommes, on apprendra plus de vocabulaire. Il est aussi nécessaire d’habiter dans un environnement français. Si les étudiants écouterent ces conseils, ils dépasseront leurs attentes.

Translation of French section

Also, as always, students have to listen to the radio a lot and watch programs in French. If one repeats things like idioms, one will learn more vocabulary. It is also necessary to live in a French environment. If students listen to this advice, they will exceed their expectations.
Combined Participant VOT

![Graph showing the VOT distribution for different consonants in French and English. The graph plots the time in seconds on the y-axis and the consonants (p, t, k, b, d, g) on the x-axis. Different symbols and colors represent participants from languages 1 to 8.]
Pattern of positive VOT for voiceless stops and negative VOT for voiced stops eg. Participant 1

Participant 3 was the only one to diverge from this pattern with a positive VOT for almost all occurrences
Hybrid System

- The voiced plosives of Participant 3 lie outside the range for the other 7 participants.
- For 7 out of 8 of the speakers, their VOT does not pattern with either the French or the English systems.
- Hybrid system created.
- Participants reacted similarly regardless of native language.

<table>
<thead>
<tr>
<th></th>
<th>Voiceless Plosives</th>
<th>Voiced Plosives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid System</td>
<td>Positive VOT</td>
<td>Negative VOT</td>
</tr>
</tbody>
</table>
Areas of Further Research

- Age of language learning
- Level of fluency
- Multilingual or bilingual in other languages
- Speaker Identification
- VOT mean and deviation may be useful for identification purposes?
- Effects of nervousness
- Reading vs. Spontaneous speech
- Effects of the telephone
- Canadian French affrication
- Larger number of participants with similar voice qualities
Conclusions

- VOT does not vary considerably between languages or between participants
- Use of Hybrid system regardless of native language

<table>
<thead>
<tr>
<th>Language</th>
<th>Voiceless plosives</th>
<th>Voices plosives</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Positive VOT</td>
<td>Zero VOT</td>
</tr>
<tr>
<td>French</td>
<td>Zero VOT</td>
<td>Negative VOT</td>
</tr>
<tr>
<td>Hybrid</td>
<td>Positive VOT</td>
<td>Negative VOT</td>
</tr>
</tbody>
</table>
Conclusions

DEV positif

DEV zéro

DEV négatif

bilingues

français

anglais

non voisées

voisées

DEV positif

DEV zéro

DEV négatif

bilingues

français

anglais

non voisées

voisées

DEV positif

DEV zéro

DEV négatif

bilingues

français

anglais

non voisées

voisées

DEV positif

DEV zéro

DEV négatif

bilingues

français

anglais

non voisées

voisées

DEV positif

DEV zéro

DEV négatif

bilingues

français

anglais

non voisées

voisées
Questions or comments are welcomed