Prosodic Alignments in Shadowed Singing of Familiar and Novel Music

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Vocal convergence

Increase in vocal similarity between interlocutors with respect to some phonetic features while interacting

• Instantiation of the communication accommodation theory (CAT)

• Was found empirically in various phonetic features in human-human interaction

• Speech and music are described by similar rhetorical aspects, like melody, pitch, timbre, rhythm, and tempo
  Singing is produced using the same organs as speech, making them even more similar

→ Can vocal accommodation effect be found in sung music as well?
Materials

• “Yakinton” lullaby (known) – a famous cradle song
  13 bars with $\frac{2}{4}$ signature

• Universal lullaby (novel) – composed for our experimental purposes
  16 bars with $\frac{6}{8}$ signature

• Both songs were pre-recorded a cappella by a trained singer with the syllable [na] instead of the lyrics
Experiment

- **Participants** – six mothers to recently born babies (age 35 ±3.25 years)

- **Procedure**
  - Yakinton – two *performances*, before (*baseline*) and after (*shadowing*) listening to the *pre-recorded* version
  - Universal lullaby – single performance, after listening to the pre-recorded version

- **Analysis**
  - Yakinton – *Interval deviation*, tempo (BPM), and *key* (tonality)
  - Universal lullaby – *Interval deviation* and *rhythmic patterns*

\[
frequency(\text{QT}_n) = 440 \cdot \frac{24}{\pi}\sqrt{2^n}
\]

\[
BPM = \frac{\text{#beats} + \text{#added_beats}}{\text{total duration}} \cdot 60
\]
Results

Tonal deviation 🎶

- After initial adjustment, lesser degree of variation in the shadowing performance
- Participants needed several notes to “tune-in” after listening to the pre-recorded version

Key 🎶 & tempo 🕒

- The BPM became closer to the pre-recorded version in the shadowing performance (except for one case)
- Participants showed almost no change in their singing key between baseline and shadowing performances

<table>
<thead>
<tr>
<th>Participant</th>
<th>Key</th>
<th>BPM</th>
<th>BPMΔ</th>
</tr>
</thead>
<tbody>
<tr>
<td>RITRAF85</td>
<td>F♯F♯</td>
<td>76</td>
<td>70</td>
</tr>
<tr>
<td>TALHAR82</td>
<td>B♭B♭</td>
<td>57</td>
<td>63</td>
</tr>
<tr>
<td>RANV188</td>
<td>A♭A</td>
<td>59</td>
<td>63</td>
</tr>
<tr>
<td>ONKASH82</td>
<td>F♯F♯</td>
<td>76</td>
<td>69</td>
</tr>
<tr>
<td>LIIT82</td>
<td>F♯F♯</td>
<td>59</td>
<td>66</td>
</tr>
<tr>
<td>DIHAR83</td>
<td>F♯F♯</td>
<td>62</td>
<td>61</td>
</tr>
<tr>
<td>recording</td>
<td>B♭(B)</td>
<td>61</td>
<td>(61)</td>
</tr>
</tbody>
</table>
Results – cont.

Rhythmic patterns

- Participants were able to recall all rhythmic patterns, but not always in the correct order.
- The rhythmic pattern at the beginning (R1) and the end (R4) of the song were recalled more accurately.

Percentages of rhythmic pattern occurrences

<table>
<thead>
<tr>
<th></th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
</tr>
</thead>
<tbody>
<tr>
<td>original part A</td>
<td>50</td>
<td>12.5</td>
<td>12.5</td>
<td>25</td>
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<tr>
<td>replications A</td>
<td>54</td>
<td>18</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>original part B</td>
<td>25</td>
<td>37.5</td>
<td>12.5</td>
<td>25</td>
</tr>
<tr>
<td>replications B</td>
<td>25</td>
<td>42</td>
<td>8</td>
<td>25</td>
</tr>
</tbody>
</table>

Write us if you have any questions!

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