Linguistic and musical syntactic processing in Aphasia: is there a relationship?

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**Language and Music**

- Both rely on hierarchical structure
- Rule-based combinations of discrete elements yield complex structures.
- Linguistic and musical syntax may rely on shared cognitive/neural processes.
  - Manipulations of linguistic and musical syntax lead to behavioral and neural interactive effects (e.g., Slevc et al., 2009).
- Musical syntactic processing recruits “language areas” of the brain (especially LIFG; e.g., Tillmann et al., 2006).
- But other findings suggest no relationship:
  - evidence for non-overlapping neural responses to language and music (e.g., Razali et al., 2011).
  - dissociations between aphasia and amusia (e.g., Luria et al., 1965).
- The little work investigating musical syntactic processing in agrammatic aphasia has yielded equivocal results (Patel et al., 2006).

- This study measured both “off-line” and “on-line” sensitivity to linguistic and musical syntax in persons with left hemisphere damage.

**Participants**

- Twelve persons with Aphasia (PWA) and twelve age-matched control participants (mean age = 55.3)

<table>
<thead>
<tr>
<th>Age</th>
<th>Aphasia Quotient</th>
<th>Aphasia Profile</th>
<th>Musical (self) Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>aph1</td>
<td>54</td>
<td>57.7</td>
<td>Broca’s music-loving non-musician</td>
</tr>
<tr>
<td>aph2</td>
<td>63</td>
<td>33.6</td>
<td>Broca’s professional musician</td>
</tr>
<tr>
<td>aph3</td>
<td>67</td>
<td>30.3</td>
<td>Broca’s music-loving non-musician</td>
</tr>
<tr>
<td>aph4</td>
<td>55</td>
<td>100</td>
<td>Mild Anomic professional musician</td>
</tr>
<tr>
<td>aph5</td>
<td>54</td>
<td>97</td>
<td>Anomic non-musician</td>
</tr>
<tr>
<td>aph6</td>
<td>46</td>
<td>85.1</td>
<td>Anomic amateur musician</td>
</tr>
<tr>
<td>aph7</td>
<td>57</td>
<td>75.3</td>
<td>Conduction non-musician</td>
</tr>
<tr>
<td>aph8</td>
<td>54</td>
<td>50.7</td>
<td>Wernicke’s non-musician</td>
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<tr>
<td>aph9</td>
<td>53</td>
<td>74</td>
<td>Anomic non-musician</td>
</tr>
<tr>
<td>aph10</td>
<td>48</td>
<td>100</td>
<td>Mild Anomic music-loving non-musician</td>
</tr>
</tbody>
</table>

* From the Western Aphasia Battery (Bartczak, 1962)

- Results: “off-line” acceptability judgment tasks
  - Linguistic acceptability judgments of sentences with and without morphosyntactic violations (sentence stimuli from Faroqi-Shah & Dickey, 2009).
  - Musical acceptability judgments of chord progressions with and without a chord from a foreign musical key (chord sequences from Patel et al., 1998).
- Results: “on-line” acceptability judgment tasks
  - Word monitoring in grammatical or ungrammatical contexts (morphological, thematic, and word-class violations).
  - Harmonic priming: classify timbre of final chord, either when harmonically expected (tonic) or less expected (subdominant).

- Conclusions
  - PWA impaired on off-line linguistic acceptability judgments, but not impaired on an “on-line” linguistic task. PWA did as well as controls on both off-line and on-line musical syntactic tasks.
  - Little relationship between domains, lending no support to a strong neuroanatomical association between linguistic and musical syntax following left hemisphere damage.

**References**