Examining Memory Span and Implicit Rule Knowledge across Language and Music Abilities in Children

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Introduction

Implicit Learning
- Implicit learning system supports language development by tracking regularities in word boundaries and grammar (Gomes, 2002; Saffran, Aslin, & Newport, 1996)
- Patterns in music, such as key membership and harmonic structure, are learned implicitly through exposure (e.g., Trainor & Corrigall, 2010; Schellenberg, Bigand, Paulin-Charronnat, Garnier, & Stevens, 2005)
- Children with language impairment less likely to detect grammar violations than peers (Redmond & Rice, 2001)
- Preschoolers can identify deviations from typical chord progressions (Corrigall & Trainor, 2010), but children with language impairment less likely to notice (Jentschke, Koelsch, Sallat, & Friederici, 2008)

Pattern Violations
- Children with language impairment less likely to detect grammar violations than peers (Redmond & Rice, 2001)
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Short Term Memory across Domains
- Articulatory suppression interferes with reproduction of rhythms in adults (Saito & Ishio, 1998)
- Digit recall correlates with rhythm imitation in adults (Saito, 2001)

Methods

Participants: n=17; ages 5;2 (4;1–7;1)
Procedures: All participants completed all tasks with either parent or RA assistance
Parents completed a survey on literacy and music exposure in the home

Language Tasks
- Memory Span
  - Digit Recall
    - Repeat lists of 2 to 6 digits
    - 15 trials, increasing list length
  - Rhythm Recall
    - Repeat rhythms of 2 to 6 beats
    - Rhythms comprised of quarter notes and pairs of eighth notes
    - 16 trials, increasing length

Music Tasks
- Grammaticality Judgment
  - 13 sentences embedded in a story
  - 18 trials containing violations of 3rd person-s, copula, -ing, subject-verb agreement
- Music Judgment
  - 16 musical phrases, 7 beats long
  - 11 trials contained violations of key, harmony, or both

Results

<table>
<thead>
<tr>
<th>Task</th>
<th>M</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>Digit Recall (215)</td>
<td>7.53</td>
<td>2.85</td>
</tr>
<tr>
<td>Grammaticality Judgment (18)</td>
<td>13.94</td>
<td>4.91</td>
</tr>
<tr>
<td>Rhythm Recall (26)</td>
<td>8.65</td>
<td>4.11</td>
</tr>
<tr>
<td>Music Judgment (16)</td>
<td>8.59</td>
<td>1.81</td>
</tr>
</tbody>
</table>

Conclusions
- Strong correlations between recall tasks replicates findings from adults (Saito, 2001) and suggests that musical memory taps phonological memory
- Rhythm Recall correlated with and explained most variance in both judgment tasks
- Possible floor effects on Music Judgment task may have limited correlation

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