Introduction

Background
Classic statistical learning (SL) paradigms have shown robust learning in both linguistic and non-linguistic domains\(^1,2\), however recent findings have indicated that individuals vary in their sensitivity to statistical information across domains\(^3\). Additionally, SL in a naturalistic environment frequently encounters interruptions by random noise. Research Questions
1. Can adults learn visual statistical information embedded in a noisy environment?
2. Do adults learn better when the statistical information and interrupting random noise are different types (letter vs. image) or the same type?
3. Is individuals’ statistical learning performance related to their vocabulary?

Materials and Methods

Participants

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Sex (M:F) Vocab. Score</th>
<th>Structured</th>
<th>Random</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same</td>
<td>27</td>
<td>19.96</td>
<td>Image</td>
<td>Image</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.25</td>
<td>Letter</td>
<td>Letter</td>
</tr>
<tr>
<td>Different</td>
<td>28</td>
<td>20.04</td>
<td>Image</td>
<td>Letter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.20</td>
<td>Letter</td>
<td>Image</td>
</tr>
</tbody>
</table>

Groups are matched for age, sex, and vocabulary.

Stimuli

- Familiarization
  - Use letter sequences (L1, L2).
  - Letter: 200 ms.
  - Image: 800 ms.
- Test
  - Same Group: Letter/Structured or Image/Random
  - Different Group: Letter/Random or Image/Structured

Procedure

- We examine visual SL in interleaved structured and random sequences. The **structured** stream was made of four triplets repeated 24 times each. The **random** stream contained 12 randomly-ordered stimuli.
- Each stream was spliced into 6 blocks, which were interspersed to form a continuous stream.
- Participants performed a target detection cover task.
- NIH toolbox Picture Vocabulary task after the SL tasks.

Results

- In the **Structured** condition, random RT acceleration (more negative RT slope) in the Image task than the Letter task: 
  \[ F(1,42) = 4.52, p = 0.04 \]
- Greater RT acceleration (more negative RT slope) in the Image task than the Letter task: 
  \[ F(1,42) = 4.52, p = 0.04 \]
- Greater difference between Structured and Random conditions in the Image task than the Letter task: 
  \[ F(1,42) = 6.17, p = 0.02 \]
- Marginal group differences on accuracy between Same and Different Group performed marginally better than Same Group: 
  \[ F(1,51)=3.37, p=0.072 \]
- Different Group performed marginally better than Same Group in the different task: 
  \[ p<0.05 \]
- Similar results in offline learning, hinting at linguistic-specific constraints on vocabulary learning.

Conclusion

1. Adults are capable of learning statistical information scattered in a noisy environment.
2. Results indicate potentially different cognitive resources supporting the statistical learning of images and letters.
   - Marginal group differences on accuracy in the same and different conditions indicate different performance.
   - Letter SL explains more variability in vocabulary than image SL, hinting at linguistic-specific constraints on vocabulary learning.

References