I. Background: The two cues
   a. The Frequency Cue (aka “distributional learning”): Language learners attend to frequential distributions and can infer categories based on the number of peaks (see Maye et al, 2000, 2002)
   b. The Lexical Cue: If sounds occur in similar-sounding lexical items, these sounds belong to a single category (see Feldman et al, 2009, 2013; Swingley, 2009)

II. Experiment design

<table>
<thead>
<tr>
<th>Stimuli</th>
<th>Duration of experiment</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency cue support</td>
<td>Consonants ([d] vs. [t]) (Maye et al, 2000, 2002)</td>
<td>One session</td>
</tr>
<tr>
<td></td>
<td>Vowels ([a] vs. [α]) (Escudero et al, 2011)</td>
<td></td>
</tr>
<tr>
<td>Lexical cue support</td>
<td>Vowels ([a] vs. [α]) (Feldman et al, 2009, 2011, 2013)</td>
<td>One session</td>
</tr>
<tr>
<td>Present study</td>
<td>Consonants ([t] vs. [th])</td>
<td>3 sessions spread out over 3 days</td>
</tr>
<tr>
<td></td>
<td>Vowels ([a] vs. [α])</td>
<td></td>
</tr>
</tbody>
</table>

a. Participants: Total of 115 analyzed for Day 1, 61 made it all the way to Day 3; all recruited from Mechanical Turk (an online participant pool)
b. 3 day experiment: each day consisted of a Familiarization phase followed by a Test phase
c. Stimuli:
   i. Consonants (T): 8-point continuum between [t/th], embedded within lexical environment
   ii. Vowels (A): 8-point continuum between [a/α], embedded within lexical environment
d. Two groups:
   i. FREQUENCY2, LEXICAL1 group: Frequency cue tells participants there are two categories (bimodal distribution); lexical cue tells participants there is one category (all points of 8-point continuum are heard in the same lexical environments)
   ii. FREQUENCY1, LEXICAL2 group: Frequency cue tells participants there is one category (monomodal distribution); lexical cue tells participants there are two categories (points 1-4 in continuum are never heard in the same lexical environment as points 5-8)

e. Familiarization phase: listen to 96 test words + 33 fillers
f. Test phase: “Are [T2/T7; T3/T6; A2/A7; A3/A8] the same or different words?”
III. Research questions, results, and further research:
When the lexical cue and the frequency cue give the language learner conflicting information…

a. **Research Question A:** Which cue is treated as the primary cue?

i. **Results**

   ![Graph: Are A2 and A7 the same or different words?](image1)

   ![Graph: Are A3 and A6 the same or different words?](image2)

   "Are A2 and A7 the same or different words?"

   "Are A3 and A6 the same or different words?"

   - **Freq1Lexical2**
   - **Freq2Lexical1**

   ii. **Tentative conclusion** (not statistically significant): For vowels, the FREQUENCY1LEXICAL2 group answers “different” more often than the FREQUENCY2LEXICAL1 group, and this trend stays consistent across all three days. **Therefore it is tentatively concluded that the Lexical cue is stronger than the Frequency cue**

   iii. **Further research:** Results were not statistically significant. A second experiment involving more participants is suggested.
b. **Research Question B:** Do language learners rely on different cues when determining vowel vs. consonant categories?

   i. **Results:**

   ![Graph showing vowel vs. consonant behavior](image)

   Vowels show consistent behavior, consonants do not

<table>
<thead>
<tr>
<th>Test Stimuli</th>
<th>Frequency2Lexical1</th>
<th>Frequency1Lexical2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A2 vs. A7</td>
<td>p=.300</td>
<td></td>
</tr>
<tr>
<td>A3 vs. A6</td>
<td>p=.098</td>
<td></td>
</tr>
<tr>
<td>T2 vs. T7</td>
<td>p=.931</td>
<td></td>
</tr>
<tr>
<td>T3 vs. T6</td>
<td>p=.421</td>
<td></td>
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</tbody>
</table>

   ii. **Tentative conclusion** (not statistically significant): Vowels show consistent behavior (FREQUENCY2LEXICAL1 answers “different” less often than FREQUENCY1LEXICAL2), but consonants do not. From this it seems that consonants and vowels are not being treated the same way.

   *Note: My interpretation of the CV Hypothesis (Nespor et al, 2003; Bonatti et al, 2005; Toro et al, 2008) predicts that consonants and vowels should behave differently from one another, **BUT** that this difference should look different from these results (it is predicted that consonants will show a stronger Lexical Cue)*

   iii. **Further research:** Only one pair of vowels and one pair of consonants were tested, and [a/ɔ] and [t/tʰ] differ from one another in many other respects. In addition, there may be a floor effect occurring with the T₃ vs. T₅ stimuli.

c. **Research Question C:** Do language learners rely on one cue early on and the other later?

   i. **Results:** No evidence was found that the Day 1 participants relied on either cue more or less than the Day 3 participants. The only trend found was that participants overall answered “different” more often over time.

   ii. **Tentative conclusion:** The relative weights of the Frequency Cue and the Lexical Cue do not change as lexical entries become stronger across days.

   iii. **Further research:** It may be the case that Day 1 does not count as “early,” and/or that Day 3 does not count as “late,” and that this experiment needs to be conducted over more days.

IV. **Selected references**