1. Why do readers make long-range regressions?

- By-product of syntactic operations (Garden Path theory [1])
- Regressions governed by non-linguistic spatial properties (Time Out hypothesis [2])
- Neither theory requires word recognition to recur during rereading.
- Alternate hypothesis: People reread to gain more visual input when confidence about the identity of a previous word falls.
- Implication: Rereading involves redoing (at least parts of) the word recognition process.

2. Methods

Manipulate readers’ confidence about previously seen input by using downstream context to decrease the probability of an upstream target word (e.g. trail) relative to an orthographic neighbor (e.g. trial)

- Materials:
  a) I heard about the (trail) from a very passionate (lawyer) who was also an avid jogger in her spare time.
  b) I heard about the (track) from a very passionate (lawyer) who was also an avid jogger in her spare time.
  c) I heard about the (trial) from a very passionate (lawyer) who was also an avid reader in her spare time.

- Design:
  - Target C: higher frequency neighbor of target A
  - Target B: control word matched with target A for length, frequency, conditional (trigram) probability, sentence prefix plausibility (through boggle region), and whole sentence plausibility
  - Methodology: Eye tracking, 54 experimental items, 85 fillers, 42 subjects

5. Second pass results

- More second pass reading of target A than B:

- Effect is stable throughout the experiment:

- This is evidence of a learning effect

6. What is being learned?

- Targets A and B are matched for most factors known to affect reading time, but:
- Targets in condition A have significantly more orthographic neighbors than B
- We test whether subjects learned to pay extra attention to words with larger neighborhoods by looking at nouns in our filler items
- We use linear mixed-effects modeling to look for an interaction between neighborhood size and trial order on first pass reading times:

\[
\text{rt} = \text{cond} + \text{order} + \text{neighb} + \text{order}\times\text{neighb} + (1|\text{subj}) + (1|\text{item})
\]

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Coeff. estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>cond (filler manipulation condition)</td>
<td>49.06</td>
</tr>
<tr>
<td>order (trial order within experiment)</td>
<td>-0.25</td>
</tr>
<tr>
<td>neighb (neighborhood size)</td>
<td>-6.24</td>
</tr>
<tr>
<td>order\timesneighb (learning effect)</td>
<td>0.19</td>
</tr>
</tbody>
</table>

All significant, \( t > 2.0 \)

- A significant positive order \( \times \) neighb interaction means words with more neighbors are read increasingly slowly over the course of the experiment

3. Predictions

- Our hypothesis predicts more second pass reading of target A than B. At the boggle region, confidence should fall more for A than for B because only A has a relevant neighbor, leading to more rereading of A than B.
- Theories that do not assume word recognition during rereading do not make this prediction.

4. First pass results

- We predicted no difference between targets A and B in first pass reading
- First half of the experiment is as predicted
- In the second half, we find an unexpected difference between targets A and B:

- This is evidence of a learning effect

7. Conclusions

- Word re-recognition occurs during second pass reading, as demonstrated by longer second pass reading times for target A than B
- Subjects learn to pay extra attention to words with more orthographic neighbors, as demonstrated by significant order-by-neighborhood size interaction
- Future directions:
  - When does learning occur? Is second pass reading necessary for learning?
  - How much uncertainty do readers maintain about their input after first pass reading?