**Sentence congruency constraints on letter identification**

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**BACKGROUND**

**How do readers identify letters in words?**

PETAL  \[\text{petal} \rightarrow \text{petal}\]

Require **flexibility** to overcome feature variation across case, font etc., whilst maintaining **specificity** to avoid identification errors with letters with similar feature combinations.

- **Word Superiority Effect**
  - Reicher (1967)
  - [bloom > blorm]

Readers are more accurate at identifying letters in words compared to non-words.

- **Sentence Superiority Effect**
  - Snell & Grainger (2017)
  - [the cow jumped over the moon] [the cow jumped the ________ ]

Readers are also more accurate at identifying words in sentence compared to a jumbled word combination.

**Research aim:** to investigate whether readers integrate higher-level sentence cues during letter identification, and whether cues are hierarchically integrated based on available context.

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**SINGLE WORD CUES**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Target</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word</td>
<td>plate</td>
<td>plite</td>
<td>plite</td>
</tr>
<tr>
<td>Pseudo-Word</td>
<td>plave</td>
<td>plave</td>
<td>plave</td>
</tr>
</tbody>
</table>

Target exposure duration was thresholded to each participant using a preliminary task.

**Prediction:** letter identification will be more accurate in semantically congruent targets compared to incongruent targets.

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**ONLINE SENTENCE CLOZE TASK (PREDICTABLE)**

42 participants predicted the final word of 90 predictable sentence frames.

- The calm pilot landed the faulty ________ .

Sentence frames had an average cloze probability of 76%. The congruent target was the most frequent response in 82% of sentence frames. The incongruent target was never predicted.

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**PREDICTABLE SENTENCE CUES**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Predictable Sentence frame</th>
<th>Target</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent</td>
<td>the calm pilot landed the faulty plane</td>
<td>plite</td>
<td>plite</td>
<td></td>
</tr>
<tr>
<td>Incongruent</td>
<td>the calm pilot landed the faulty plate</td>
<td>plite</td>
<td>plite</td>
<td></td>
</tr>
<tr>
<td>Pseudo-Word</td>
<td>the calm pilot landed the faulty plave</td>
<td>plave</td>
<td>plave</td>
<td></td>
</tr>
</tbody>
</table>


**Feedback**

**Sentence level semantic cues constrain letter identification,** eliminating the word superiority effect for incongruent words.

**WITH FEEDBACK**

**DISRUPTED WORD ORDER**

Sentence level semantic cues constrain letter identification – even when feedback suggests these cues are unreliable.

Sentence level semantic cues constrain letter identification – even when sentence word order is disrupted.
Sentence congruency constraints on letter identification

(continued)

Unpredictable targets
We re-assigned predictable sentence frames to different targets so that both word targets were unlikely.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Predictable Sentence frame</th>
<th>Target Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incongruent 1</td>
<td>the dog ran from the venomous</td>
<td>plane</td>
<td>plate</td>
</tr>
<tr>
<td>Incongruent 2</td>
<td></td>
<td>plate</td>
<td>plane</td>
</tr>
<tr>
<td>Pseudo-Word</td>
<td></td>
<td>plave</td>
<td>plave</td>
</tr>
</tbody>
</table>

RSVP Reicher-Wheeler paradigm (as used in previous tasks).

**Prediction:** the reader will revert to prioritising lexical cues when a congruent candidate is unavailable (word superiority effect).

The word superiority effect is **eradicated** when neither of the word targets fit the sentence context.

Predictable targets
We used neutral sentence frames so that both word targets were likely.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Neutral Sentence frame</th>
<th>Target Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent 1</td>
<td>The boy admired the smooth white</td>
<td>plane</td>
<td>plate</td>
</tr>
<tr>
<td>Congruent 2</td>
<td></td>
<td>plate</td>
<td>plane</td>
</tr>
<tr>
<td>Pseudo-Word</td>
<td></td>
<td>plave</td>
<td>plave</td>
</tr>
</tbody>
</table>

RSVP Reicher-Wheeler paradigm (as used in previous tasks).

**Prediction:** the reader will revert to prioritising lexical cues when a congruent candidate is unavailable (word superiority effect).

The word superiority effect is **restored** when both word targets fit the sentence context.

ONLINE SENTENCE CLOZE TASK (NEUTRAL)

42 participants predicted the final word of 90 neutral sentence frames.

The boy admired the smooth white _______.

Sentence frames had an average cloze probability of **12%**. Target 1 (previously congruent) was the most frequent response in **0.3%** of sentence frames. Target 2 (previously incongruent) was the most frequent response in **0.4%** of sentence frames.

CONCLUSIONS

Higher level sentence cues inform letter identification, and priority assigned to cues is modulated by orthographic context.

REFERENCES


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