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Predictive pressures do not override the effects of verb bias in syntactic parsing

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INTRODUCTION

Syntactic parsing is sensitive to
• predictive pressures (e.g., to complete an open dependency) [1]
• subcategory frequency information (e.g., how often a given verb takes a direct object vs. a sentential complement, aka verb bias) [2]

Reinterpretation of Past Findings [3-4]

Garden path effects in sentences like (1) were taken to show reanalysis is the parsers’ last resort [5]
1) “The government officials who accepted (that) the expensive gift had caused a scandal were quick to turn it away.”

But these results may also be taken to show comprehenders face predictive pressures to complete an open dependency asap (by interpreting “had caused a scandal” as the main clause predicate).

THE PRESENT STUDY

Question: Can the predictive pressure to complete an open S-V dependency override the effects of verb bias?

Past findings suggested it cannot [6], but participants may not have pursued a DO reading in SC-biased materials for independent reasons (e.g., implausibility of DO readings).

METHODS

We examined the effects of verb bias x ambiguity in sentences with low vs. high predictive pressures.

Low predictive pressure (Experiment 1A):
DO-bias: The policeman saw (that) the protesters/ had entered/ the plaza/ and was keeping a watchful eye on the situation.
SC-bias: The judge doubted (that) the witnesses/ could resist/ bribery/ and was calling for an investigation.

High predictive pressure (Experiment 1B):
DO-bias: The policeman who saw (that) the protesters/ had entered/ the plaza/ was keeping/ a watchful eye on the situation.
SC-bias: The judge who doubted (that) the witnesses/ could resist/ bribery/ was calling/ for an investigation.

• Experiments 1A & 1B were run in a single session with the same set of participants (n=22; 48 items).
• We quantify verb bias using a SC-DO ratio [8]
  • 12 DO-biased verbs (<0.5), e.g., accept, hear, establish, read
  • 12 SC-biased verbs (>2), e.g., argue, decide, realize, conclude
• The materials were normed to ensure that all readings (SC, DO, high and low attachments) are plausible.

RESULTS

Experiment 1A (Low predictive pressure):

<table>
<thead>
<tr>
<th>Regression Path Time</th>
<th>Critical region (“had entered”)</th>
<th>0</th>
<th>400</th>
<th>800</th>
<th>1200</th>
<th>1600</th>
<th>2000</th>
<th>2400</th>
<th>2800</th>
<th>3200</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO-bias</td>
<td></td>
<td>0</td>
<td>400</td>
<td>800</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
<td>2400</td>
<td>2800</td>
<td>3200</td>
</tr>
<tr>
<td>SC-bias</td>
<td></td>
<td>0</td>
<td>400</td>
<td>800</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
<td>2400</td>
<td>2800</td>
<td>3200</td>
</tr>
</tbody>
</table>

Experiment 1B (High predictive pressure):

<table>
<thead>
<tr>
<th>Regression Path Time</th>
<th>Critical region (“was keeping”)</th>
<th>0</th>
<th>400</th>
<th>800</th>
<th>1200</th>
<th>1600</th>
<th>2000</th>
<th>2400</th>
<th>2800</th>
<th>3200</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO-bias</td>
<td></td>
<td>0</td>
<td>400</td>
<td>800</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
<td>2400</td>
<td>2800</td>
<td>3200</td>
</tr>
<tr>
<td>SC-bias</td>
<td></td>
<td>0</td>
<td>400</td>
<td>800</td>
<td>1200</td>
<td>1600</td>
<td>2000</td>
<td>2400</td>
<td>2800</td>
<td>3200</td>
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</tbody>
</table>

DISCUSSION

• We replicated Garnsey et al.’s classic findings in eye-tracking in Experiment 1A, which validated our verb bias manipulation.
• The reduced garden-path effect in the SC bias condition in Experiment 1B suggests that comprehenders pursued an SC analysis even when i. the DO reading is highly plausible, and ii. pursuing a DO analysis would allow them to complete the main clause S-V dependency sooner.
• These results add to recent findings on the limits of predictive processing.[7]

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REFERENCES