Feature Retrieval Cost and on-line/off-line complexity in clefts

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Theoretical background: retrieving the correct item in Object Clefts
Resolving the dependency between the head ("the banker", (1.a)) and the lexical verb ("avoided", (1.a)) is crucial to comprehend correctly an Object Clefts (OCs, e.g. (1)). This kind of dependency has been deeply studied both from the theoretical/competence perspective (Friedmann et al 2009, Belletti & Rizzi 2012 a.o.) and from the psycholinguistic/performance one (Gordon et al 2001, 2004, a.o.), especially when an intervention "similar" DP (the subject of the cleft: "the lawyer" in (1.a) vs. "Dan" or "we" in (1.b)) is processed between the head and the lexical verb (Warren & Gibson 2005):

1. a. it was [the banker], that [the lawyer] avoided _ at the party
   b. it was [the banker]/[Pat]/[you], [that the lawyer/Dan/we] avoided _ at the party

Research questions

1. Evaluating a feature-based "complexity metrics" for predicting processing asymmetries in precise and graded way (possibly reconciling formal/theory of competence and psycholinguistic performance)
2. Testing the role of person features (third (default) vs. second person as in (1.c)) when the "lexical restriction" (i.e. a full noun, Belletti & Rizzi 2012) is present:
   (1) c. it was [the/you] banker, that [the/you] lawyer avoided _...

Core proposal: FRC function

Feature Retrieval Cost (FRC) provides a numeric measure of the complexity on a specific segment triggering retrieval (e.g. the verb segment x) that is inversely proportional to the number of features unambiguously cued by the segment morphology (df) and proportional to the number of features to be retrieved (nF) that are shared by other items in working memory (m).

FRC(x) = \prod_{i=1}^{n} \left(1 + \frac{dF_i}{1 + df_i}\right)

Materials:
2x2 design: restriction (determiner (the) vs. pronominally restricted (you) NPs) x position (head vs subject cleft) (8 items per condition)

Off-line (grammaticality judgment = 7 points Likert) on the very same materials selected.

Eye-tracking experiment accuracy:

Off-line (grammaticality judgment = 7 points Likert)

Sentence Region

<table>
<thead>
<tr>
<th>Sentence Region</th>
<th>DP1</th>
<th>DP2</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>art art</td>
<td>83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>art pro</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pro pro</td>
<td>77%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pro art</td>
<td>82%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Eye-Tracking experiment accuracy:

On-line (eye-tracking – Eyelink 1000)
Participants: 33 subjects (age range = 19-35; 18 female; centre-Northern Italian native speakers)
Procedure: On-screen sentence reading + comprehension question. After the task, Verbal Working Memory Capacity (VWM, Lewandowsky, Oberauer, Yang & Ecker, 2010)

Results:

Accuracy and acceptability as well as the major asymmetries in fixation times/regressions revealed are predicted by the FRC function (Chesi 2015). Pronouns (unlike articles) bear on the [simpler/more acceptable] vs. [harder/less acceptable]

Selected references

Friedmann et al (2009), Lingu. 119:67-88,
Gibson (1998) Cognition 68, 1-76,
Sigurdsson (2004) Italian J. of Ling. 16, 11,

Previous on-line evidence supporting FRC


Reading time at verb segment reported in the table below:

<table>
<thead>
<tr>
<th>Condition</th>
<th>D-D</th>
<th>D-N</th>
<th>N-D</th>
<th>N-P</th>
<th>P-D</th>
<th>P-N</th>
<th>P-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read time</td>
<td>365</td>
<td>306</td>
<td>348</td>
<td>348</td>
<td>291</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(SE) ms</td>
<td>12</td>
<td>14</td>
<td>18</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Predictions are obtained by applying FRC to these features:

FRC (avoided) = 1
FRC (we) = 1
FRC (the) = 1
FRC (you) = 1
FRC (you) = 1
FRC (we) = 1

Methods

Core/previous on-line/off-line complexity in clefts

Participants:
Other 48 subjects (age range: 20-64; 25 females; Centre-speakers)
Procedure: Verbal Working Memory Capacity (VWM, Lewandowsky, Oberauer, Yang & Ecker, 2010) evaluate sentences on a 7-points Likert-scale) on the very same materials

Eye-Tracking experiment accuracy:

Results summary

On-line
First fixation on verb segment:
Second Pass on verb segment:
Door = DP1 x WM DP1 is pro and DP2 is art: in pro art, low WM art pro = art art < pro art = pro pro

Off-line
Accuracy in comprehension questions:
art pro > art art > pro art > pro pro
Grammaticality Judgment test:
art pro > art art > pro art > pro pro

FRC:
art pro < art art = pro art < pro pro

Revealed overall
[simpler/more acceptable] art pro < art art < pro art < pro pro [harder/less acceptable]