Using grammatical features to forecast incoming structure: The processing of Across-the-board extraction

Citation for published version:
Sturt, P & Martin, AE 2016, 'Using grammatical features to forecast incoming structure: The processing of Across-the-board extraction' 29th CUNY Human Sentence Processing Conference, Gainesville, Florida, United States, 3/03/16.

Link:
Link to publication record in Edinburgh Research Explorer

General rights
Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.
Background: Across the board (ATB) extraction

- A filler (e.g., wh-phrase) is linked to multiple gaps, each in a different conjunct.
- ATB extraction is degraded when two gaps have different syntactic functions (Williams, 1978; LI).

(a) Parallel syntactic functions (good)
The surgeon who James tricked G1 and Richard annoyed G2 scrubbed up for surgery
(b) Non-parallel syntactic functions (bad)
* The surgeon who G1 tricked James and Richard annoyed G2 scrubbed up for surgery

Is this contrast due to a grammatical constraint?
- e.g., (b) is ungrammatical because the operator who is not allowed to be linked to nominative and accusative case simultaneously
- Or is it due to processing differences?
- Parallelism preference (Frazier et al., 2000, JPR):
  - 2nd conjunct in (b) is hard because its internal structure differs from 1st conjunct

Experiment 1 design

(a) Parallel: ATB
The surgeon who James tricked G1, and Richard annoyed G2, scrubbed up for surgery
(b) Non-Parallel: ATB
The surgeon who G1 tricked James, and who Richard annoyed G2, scrubbed up for surgery
(c) Parallel: Non-ATB
The surgeon who James tricked G1, and who Richard annoyed G2, scrubbed up for surgery
(d) Non-Parallel: Non-ATB
The surgeon who G1 tricked James, and who Richard annoyed G2, scrubbed up for surgery

Non-ATB conditions included as a control:
- Non-ATB conditions include operator for each conjunct
- If (a) vs. (b) contrast is due to grammatical constraint, there should be no comparable contrast (c) vs. (d), since each who is linked to just one gap (so no case clash)
- However, parallelism effects should be similar whether ATB or not

Experiment 2 design

- Same conditions as Exp1, but with extra embedding
- Each relative clause was 2 clauses deep
- Gap inside the most deeply embedded clause

(a) Parallel: ATB
The surgeon who I think James tricked G1, and you think Richard annoyed G2, scrubbed up for surgery

- Previous work (e.g., Williams, 1978, LI) claims that ATB acceptability contrast (a) vs. (b) disappears in embedding contexts

Experimental set-up (both Exp1 and Exp2)

- 40 participants
- Eye-tracking during reading (Eyelink 1000)
- 30 sentences

Critical Region

The surgeon who James tricked and Richard annoyed scrubbed up for surgery

Analysis measures

Go-Past time
The time taken to “go past” a region: sum of fixation durations from the first entry into the region from the left, to the first exit to the right

Proportion of First-pass regressions
Proportion of trials where the first exit from the region is a regression.

Total Time
Summed durations of all fixations in the region.

Experiment 1: Results (critical region)

- Main effect of parallelism in all measures (all p’s < .01): Reading times shorter, and fewer regressions, in Parallel relative to non-parallel
- Interaction of Parallelism × ATB in Total time (p’s < .05), and marginal in Go-Past (p1 < .06; p2 < .05):
  - Larger parallelism effect in ATB than in non-ATB

Experiment 2: Results (critical region)

- Parallelism effect in regressions out (fewer regressions for parallel than non-parallel): p’s < .05
- No parallelism effects or interactions in other measures
- Parallelism effect significantly attenuated in Exp2 compared with Exp3 (Go-past, Total-time; Experiment × parallelism interaction)

Summary

- Parallelism clearly plays a role in subject vs. object relative clause extraction.
- Some evidence for the grammatical account (extra parallelism effect in Exp1, over and above baseline parallelism effect) leads to interaction
- However, no evidence of the interaction in Exp2, and Parallelism also significantly reduced.
- If the contrast in (a) vs. (b) is related to passing of case features, then structural distance introduced by embedding may have degraded this process.
- Extra embedding also reduces parallelism