Grammaticality illusions in German, English, and Dutch center embeddings (readings 06-08)

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Introduction

- I will first introduce readings 06, 07
- Then I'll discuss reading 08

Triple center embeddings in German

Und ich erhielt so einen Platz am Tische, den sie mir um so lieber einräumten, als ihnen meine mannigfaltigen Kenntnisse, die ich, täglich mehr eindringend in all die Zweige der Wissenschaft, die mir bisher unbekannt bleiben mussten, erweiterte, zusagten.

E.T.A. Hoffmann: Elixiere des Teufels. DTV Taschenbuch, S. 118

Complex center embeddings in English

Your report today that any Tory constituency party failing to deselect its MP, should he not vote in disobedience with a prime ministerial diktat, might itself be disbanded, shows with certainty that ... an 'elective dictatorship' is now with us.

The missing VP-effect: sentences which are both complex and ungrammatical are perceived to be as good or better than their grammatical counterparts

Example of difficult-to-process double center embedding:

The reporter who everyone that the senator met trusts said the president won't resign yet.

Compare this with:

The reporter who everyone that I met trusts said the president won't resign yet.

The second sentence seems better even though it has exactly the same structure. Why?

The missing VP effect

Compare these two sentences:

The patient the nurse the clinic had hired admitted met Jack.

The patient the nurse the clinic had hired met Jack.

The second sentence seems better than the first. Why?

The High Memory Cost Pruning Hypothesis (Gibson and Thomas, 1999, p. 231)

"At points of high memory complexity, forget the syntactic prediction(s) associated with the most memory load."

Claim by Häussler and Bader

From the abstract:

"We propose that the missing-VP effect in particular, and processing difficulties with multiply center-embedded clauses more generally, are best understood as resulting from interference during cue-based retrieval. When processing a sentence with double center-embedding, a retrieval error due to interference can cause the verb of an embedded clause to be erroneously attached into a higher clause. This can lead to an illusion of grammaticality in the case of missing-VP sentences and to processing complexity in the case of complete sentences with double center-embedding."

Keep in mind here that the illusion requires forgetting that one more verb slot is present. What is the process that causes this forgetting?

Claim by Häussler and Bader

[$_{S1}$ [The reporter] [$_{S2}$ who [everyone] [$_{S3}$ that I [$_{V3}$ met]] [$_{V2}$ trusts] . . .

- At V3, the local clause S3 is found correctly because it is in focus of attention
- At V2, confusion arises due to inability to decide between S1 and S2, leading to interference and difficulty in *both* the grammatical and ungrammatical sentences

The claim by Häussler and Bader

- In the grammatical sentence, after V2 is processed, there should be only one S site available.
- Therefore, no extra difficulty should be experienced in the grammatical condition compared to the ungrammatical.
- This can explain why the ungrammatical sentence is no harder than the grammatical, but can't explain why the ungrammatical one is *easier*.

The claim by Häussler and Bader

To explain the difference between grammatical and ungrammatical sentences, they argue that the missing VP goes unnoticed only when processing load is high.

As evidence, consider that the ungrammaticality here is easy to detect:

[$_{S1}$ A page was missing in the ancient manuscript [$_{S2}$ that the graduate student [$_{S3}$ who the new card catalog had confused a great deal]]]

This is a low processing load situation, with the RC extraposed.

The claim by Häussler and Bader

- Fact: A missing VP1 or missing VP3 is easier to detect (Gibson and Thomas).
- Explanation: Primacy and recency effects from memory research.
- Bader 2003 (unpublished) also found in a speeded grammaticality judgement study that Germans also experience the illusion in German sentences
- In Vasishth et al 2010, we found using self-paced reading and eye-tracking that English and German behave differently.
- HB report a non-speeded judgement study next, to see if Bader's speeded judgement task results can be replicated.

Expt 1

Clause type (main or embedded) x VP1 or VP2 missing or nothing missing

Assumptions:

- ▶ In main clause, primacy of S1 implies that it is not forgotten.
- ▶ In embedded clause, S1 may be more easily forgotten.

Prediction: illusion larger in embedded clause.

Their predictions are very hard to understand, largely because of the lack of an algorithm.

Results

- Illusion is larger in embedded clauses. See their Tables 1 and 2.
- Illusion seen in VP2 missing case.
- Illusion in VP2 missing is independent of clause type (note: this statement is not statistically valid, based on null result; they should have said, we found no evidence that. . .)
- Illusion in VP1 missing case larger in embedded clauses.
- One question is: why isn't accuracy lower for grammatical sentences in embedded clauses?

Experiment 2: Prediction

They hypothesized that embedding a relative clause sentence medially rather than sentence initially might cause an illusion in German.

Experiment 2: Prediction

- There is no problem in integrating V3 (because the current clause is in the focus of attention)
- At V2, it becomes difficult to choose between S1 and S2.
    - If S1 is incorrectly chosen, then this causes difficulty in integrating V1 -> slowdown in grammatical conditions
    - If S2 is correctly chosen, then no difficulty occurs at V1
- On average, there would be a slowdown due to some trials having incorrect retrievals of S1 at V2.

Discussion

- The current experiment's results differ radically from Vasishth et al's.
- Explanation: the missing VP effect is weaker when the RCs modify an NP in sentence initial position (as in Vasishth et al)
- But note that the effect is not "weaker" in Vasishth et al—it has the opposite direction.
- A within subjects comparison of RC modification types would have been more convincing.

Bader 2015: Complex center embedding in German — The effect of sentence position

In fact, Bader did do a speeded grammaticality judgement study in a within subjects design to investigate whether position matters.

This was a 2x3 design:

- Grammatical/Ungrammatical
- Position: Prefield-main clause; Middle field-main clause; Middle field-embedded clause

Results

See his Table 4.

	Pre	MF-M	MF-Emb
Grammatical	88	64	76
Ungrammatical	30	48	44

In grammatical sentences, there is a lower proportion of acceptable judgements Middle Field conditions (due to high working memory load).

In ungrammatical sentences, there is a higher proportion of acceptable judgements in Middle Field conditions (due to high working memory load).

Bader's explanation

"the Discrimination Hypothesis advances two claims.

- ▶ First, when the final verb in such sentences is processed, two verbs are still needed, the verb of the higher relative clause and the verb of the superordinate clause. In many cases, the final verb is attached to the verb slot of the superordinate clause, effectively skipping the verb slot of the higher relative clause."

The reason for this is similarity-based interference.

SBI will be lower in prefield sentences because the verbs are more discriminable (see Fig 22-23)

Bader's explanation

- "Second, the parser often fails to detect that the higher relative clause remains incomplete because it is missing a verb (phrase). The net result is an illusion of grammat- icality."

The second point just seems like a stipulation to me.

Concluding remarks

- The proposal seems to be that the position of the embedding determines whether the missing VP effect occurs in German or not
- When the embedding is in the prefield, no missing VP effect occurs
- When the embedding is in the middle field, a missing VP effect occurs
- A computational implementation with more detailed commitments (probability of correct attachment) would help a lot in unpacking this story.