Syntactic and semantic contributions of pitch accents during sentence comprehension

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Introduction

- Pitch accents, by means of focus-marking, can disambiguate sentence structure [1,2]
- Can pitch accents establish syntactic and semantic predictions by marking syntactic (case-marking of determiners) and semantic (thematic role typicality of nouns) information in a sentence (Fig 1A, baseline sentences 1&2)?
- Investigation of these predictions in two experiments:
  - Violations between focused syntactic or semantic information in main clause and at ellipsis site (Experiment 1)
  - Syntactic or semantic decision-making depending on focus-marking (Experiment 2)

Experiment 1

1A Experiment 1: design

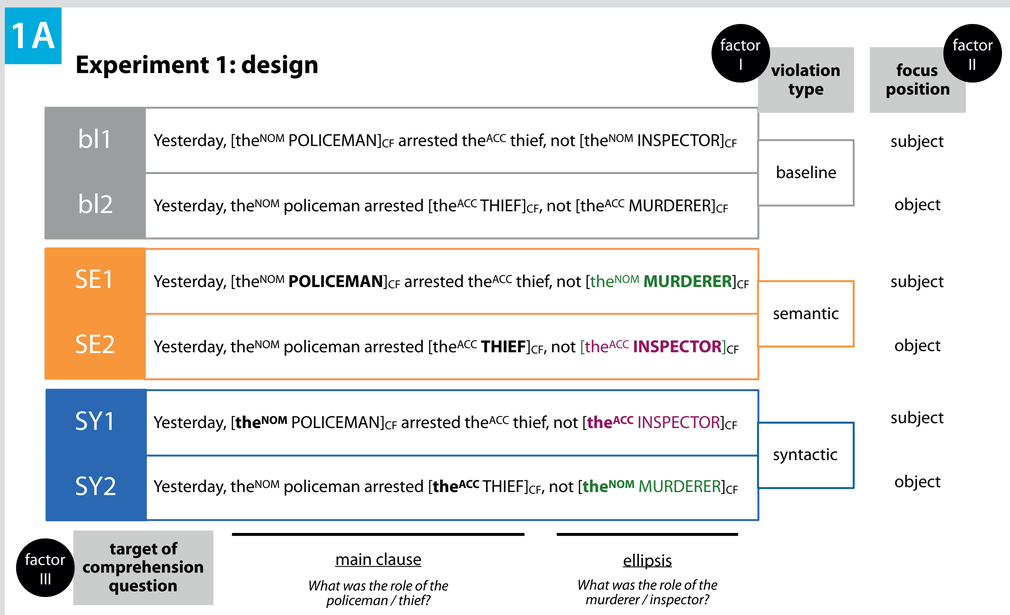

Fig 1A: Overview of experimental conditions (spoken sentences; translated from German). Pitch accented words indicated by capital letters. Words forming violations in bold typeface. Sentence-final article-noun combinations color-coded separately (see Figure 1D). bl=baseline. SE=semantic. SY=syntactic.

METHODS

- N=36
- Sentence comprehension paradigm
- 3x2x2 factorial (Violation type x Focus Position x Comprehension question)
- Analysis: linear mixed models (fixed effects: three-way interaction; random effects: interaction within subject and item)
- Statistics: likelihood ratio tests (full vs. reduced model); follow-up comparisons between conditions (Bonferroni-Holm corrected)

1B Experiment 1: example trial

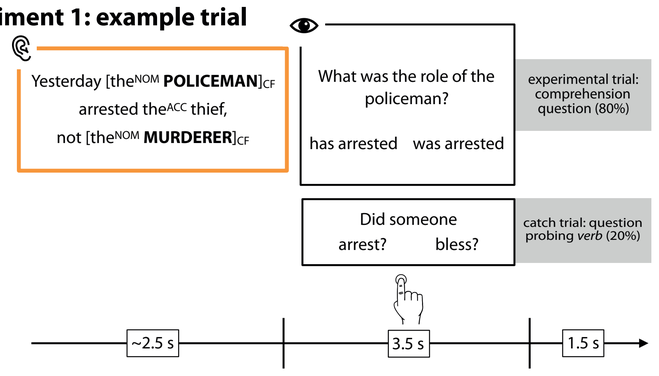

Fig 1B: Example trial (materials translated from German)

RESULTS

- Three-way interaction in reaction times ($\chi^2(2)=18.55$, $p<.0001$) and accuracy ($\chi^2(2)=12.31$, $p=.001$).

1C

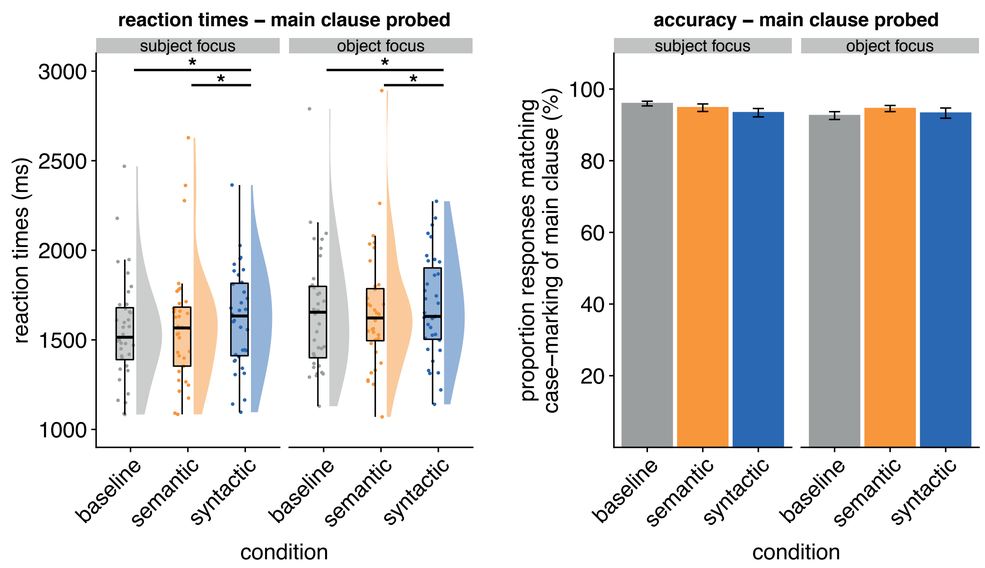

Fig 1C: Responses to comprehension questions probing the main clause of the stimulus. Pair-wise comparisons $p<.05$ marked by asterisk.

- Violation of syntactic predictions leads to delayed responses when probing the main clause (congruent information) (Fig 1C, reaction times).

1D

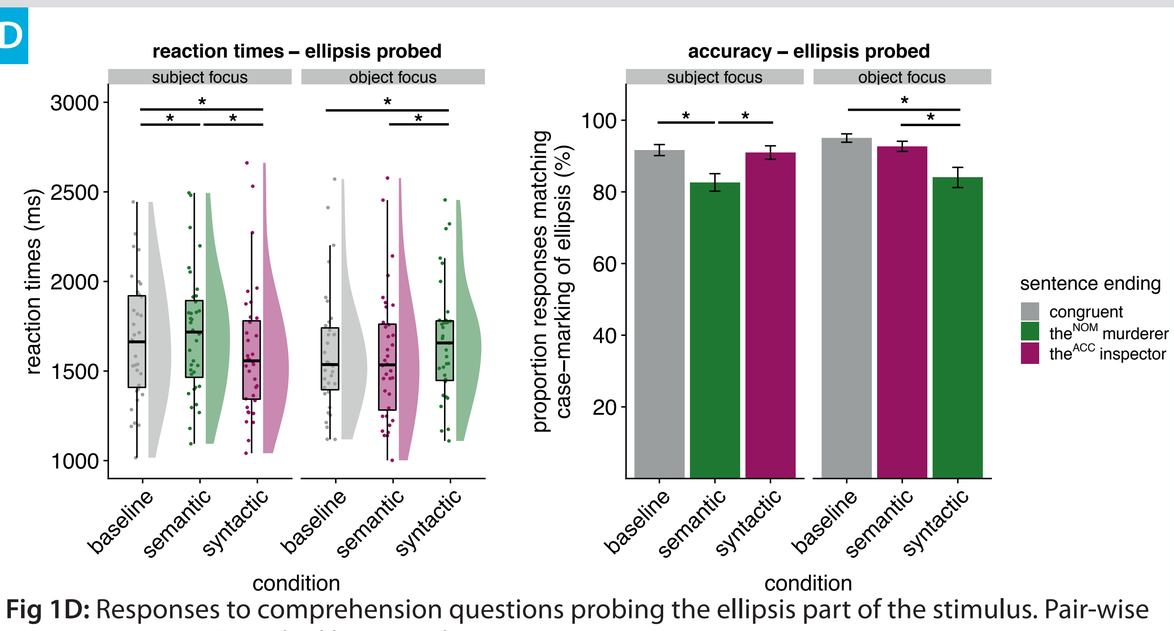

Fig 1D: Responses to comprehension questions probing the ellipsis part of the stimulus. Pair-wise comparisons $p<.05$ marked by asterisk.

- Interpretation of ellipsis structure depends on (in)congruency between article (case-marking) and noun (typical thematic role) (Fig 1D, accuracy).
- No clear evidence for semantic predictions.

Experiment 2

METHODS

- N=30 (preliminary)
- Sentence completion paradigm
- 2x2 factorial (Decision x Focus Position)

2A Experiment 2: design & trial

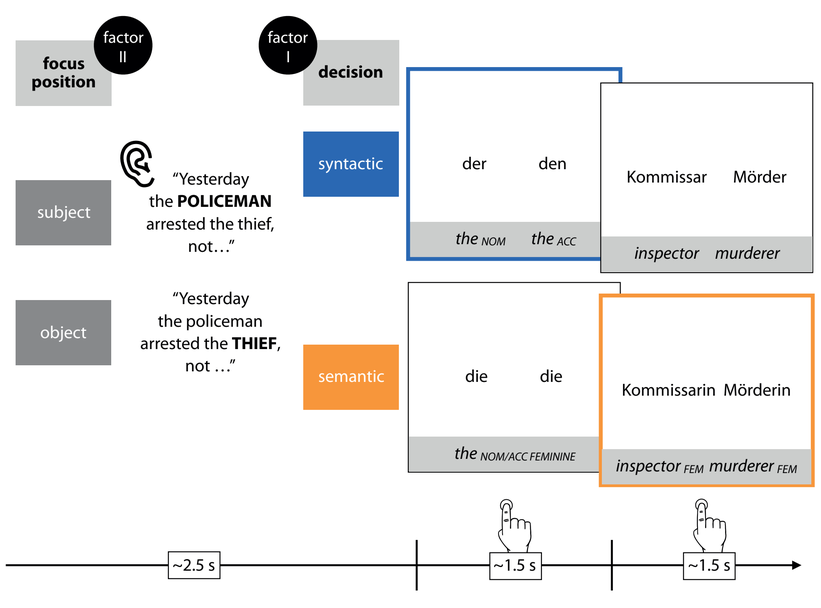

Fig 2A: Participants completed sentences (translated from German) by sequentially choosing an article and noun. The disambiguating decision per condition is colored.

RESULTS

- Two-way interaction in reaction times ($\chi^2(1)=12.68$, $p<.01$) and accuracy ($\chi^2(1)=5.83$, $p<.05$).

2B

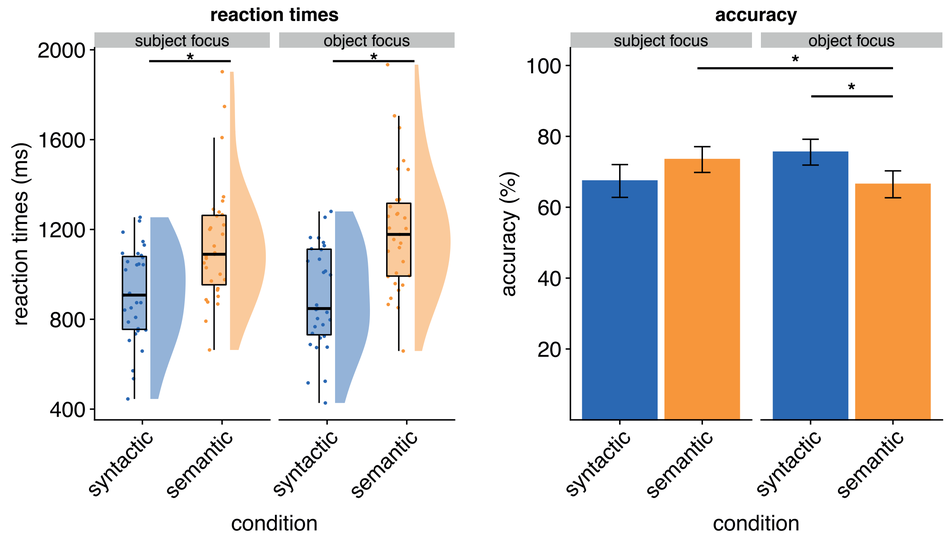

Fig 2B: Pair-wise comparisons $p<.05$ marked by asterisk.

- Focus-marking established both syntactic and semantic predictions (Fig 2B: accuracy above chance).
- Bias for accusative article-responses and agent noun-responses (Fig 2B: decreased accuracy in syntactic decisions after subject-focus and in semantic decisions after object-focus.).

Conclusion

- The experiments provide further evidence for the use of predictions during language processing [3,4].
- Focus, marked prosodically by pitch accents, established syntactic and semantic predictions about the continuation of a sentence (Fig 2B).
- Only the violation of syntactic predictions was strong enough to interfere with sentence comprehension (Fig 1C).

References

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