

Agrammatic comprehension of (non-)canonical structures in CP and DP: data-mining the nominal syntax domain in neurolinguistics

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1 Abstract

In this study, we set out to exploit and assess a particularly strong case of syntax-theoretical reductionism from a neurolinguistic point of view: the structural unification of sentences and noun phrases (the CP/DP-parallelism – e.g. Abney, 1987; Grimshaw, 1991). We did so by testing German agrammatic speakers' ability to comprehend canonical (agent-patient) and non-canonical (patient-agent) structures within each domain (verbal actives and passives and their nominal counterparts). We further included head-final subject and object relative clauses, which involve both domains at once. Results largely follow the predictions made by the syntactic CP/DP-parallelism and at the same time pose new challenges for existing theories of the agrammatic deficit.

2 Background

Theoretical considerations suggest that the syntactic structure projected by nouns (the structurally highest functional projection being the determiner phrase/DP) is largely parallel to the one found within the verbal sentence domain (the complementizer phrase/CP). It is also assumed that the central syntactic processes of head and XP-movement operate within both domains (for a recent overview s. Alexiadou et al., 2007). Thus, Chomsky (1970) observed that the DP-internal base order of subject-object can be reversed (cf. (1a) vs. (1b)) by a movement operation reminiscent of the one deriving verbal passives in full sentences:

- a. [DP the enemy'_{S_{Agent}} destruction_N of the city_{Patient}]
- b. [DP the city'_{S_{Patient}} destruction_N by the enemy_{Agent}]

These examples illustrate that the agent/patient sequence can be canonical or non-canonical within the nominal DP-domain (as in verbal actives and passives) and Lindauer (1998) argues that the corresponding non-canonical constructions in German are movement-derived. There are also important differences, however: unlike verbal passives, the construction illustrated in (1b) lacks any passive morphology triggering the operation.

The paradigm exemplified in (1) is not only interesting from a purely syntax-theoretical point of view, but also from a neurolinguistic one: agrammatism, for example, is an aphasic symptom in which morpho-syntactic processes are prominently affected. Agrammatic language production is characterised by simplified sentence structure, the omission of function words (determiners, prepositions, complementisers etc.) and bound inflectional morphemes as well as word-order errors, resulting in telegraphic speech. This particular production deficit is often accompanied by an impairment on the receptive side, which mainly surfaces when agrammatic patients have to interpret the non-canonical counterparts of semantically reversible, canonical sentences (as in passives and object relative clauses).

One widely discussed theory of the agrammatic comprehension deficit, the Trace Deletion Hypothesis (TDH – cf. Grodzinsky, 2006), states that these comprehension problems reflect the deletion of syntactic traces left behind by moved arguments and the interaction of this trace deletion with a specific default strategy applied by the agrammatic patients. Despite the substantial theoretical parallelisms between CPs and DPs, so far no study has been conducted on agrammatic speakers' interpretation of thematic relationships within DPs only.

If the theoretical CP/DP-parallelism is a psychologically valid construct, the specific patterns of agrammatic comprehension observed in the verbal sentence domain should also surface within DPs. Further, the DP-hypothesis can be used to assess predictions made by existing theories about agrammatism (such as the TDH). Studying the nominal domain thus gives insight into a number of crucial questions about the nature of the agrammatic comprehension deficit. These include the influence of nominal vs. verbal features, the role of morphology, the locality of syntactic (movement) operations and the scope of the underlying syntactic impairment.

3 Material, method and participants

We designed a sentence comprehension test comprising 7 conditions: German verbal actives (canonical) and passives (non-canonical), nominal 'actives' (canonical) and two different types of nominal 'passives' (non-canonical) as well as canonical subject and non-canonical object relative clauses (22 items/condition, total 154 items). The method applied was sentence/picture matching. By using semantically

reversible transitive verbs with a corresponding event nominalization, we were able to hold thematic relationships constant across domains. The relative clauses and the DP-structures were embedded in direct object position of a question for the correct picture. To be able to assess any detrimental influence of the nominalization process itself, we included two lexical distractor pictures (showing a different action with either the correct or reversed thematic relationship) in addition to the correct target picture and the purely syntactic role-reversal foil. Participants thus had to choose the correct picture from an array of four after having listened to the respective sentence.

So far, we have tested a group of 13 German agrammatic participants and an equal number of neurologically unimpaired control subjects.

Results and discussion

Planned pairwise comparisons within the group of agrammatic participants are based on the arcsin-transformed proportions of correct vs. role-reversal responses. Agrammatic participants correctly interpreted 88.6% of the verbal actives and 66.4% of the verbal passives. A paired t-test reveals a highly significant difference ($p < 0.001$) between these conditions. Within DPs, the agrammatic group comprehended canonical ‚actives’ better than the two corresponding non-canonical ‚passive’ counterparts (76.6% vs. 66.6% and 69.9% correct, respectively). None of the pairwise comparisons was statistically significant, however. Finally, performance on canonical subject relatives (66.5%) was better than on non-canonical object relatives (59%). This difference was statistically not significant ($p = 0.312$). The patterns of the single participants in terms of above/at chance level performance (two-tailed binomial) show that the canonical/non-canonical distinction largely cuts across the CP and DP domain, even if in a less pronounced form within DPs. The canonical/non-canonical dichotomy frequently disappeared in the case of relative clauses, however.

The current results indicate that the agrammatic comprehension deficit spans across the verbal and nominal syntax domain and thus help to determine its ultimate scope. The impaired performance on nominal ‚passives’ also demonstrates that passive morphology is not a necessary trigger for the deficit, in line with Grodzinsky’s TDH (2006). The specific patterns found, however, also pose new challenges to existing theories of receptive agrammatism: thus, the TDH predicts a difference between the two nominal passive types, which is not confirmed by our data. Neither can it explain the lack of a difference between subject and object relative clauses.

While the findings might be taken to suggest that the theoretical CP/DP-parallelism is reflected at a neurolinguistic level to a certain degree, theories of agrammatism formulated exclusively over linguistic representations fail to exhaustively explain them. We discuss the results with respect to further possible contributing factors.

References

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