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Could grammatical encoding and grammatical decoding be subserved by the same processing module?

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Abstract: Grodzinsky interprets linguistic differences between agrammatic comprehension and production symptoms as supporting the hypothesis that the mechanisms underlying grammatical encoding (sentence formulation) and grammatical decoding (syntactic parsing) are at least partially distinct. This inference is shown to be premature. A range of experimentally established similarities between the encoding and decoding processes is highlighted, testifying to the viability of the hypothesis that receptive and productive syntactic tasks are performed by the same syntactic processor.

One of the issues addressed in the target article concerns the cognitive architecture of human syntactic processing. Grodzinsky argues that the sentence production deficit in agrammatic patients should be characterized in different linguistic terms than their sentence comprehension deficit: Tree Pruning versus Trace Deletion.

From this, he infers that "mechanisms for the planning and construction of sentences must diverge at some point from those dedicated to the analysis of incoming strings" (sect. 2.7.4). In other words, he interprets linguistic differences between agrammatic comprehension and production symptoms as support for the hypothesis that the modules underlying grammatical encoding (sentence construction) and grammatical decoding (parsing) "are at least partially distinct" (sect. 4). In this commentary, I do not wish to take issue with Grodzinsky's characterizations of the basic disorder in the two grammatical processing modalities, or with the assumption that these modalities share "one grammatical resource" (sect. 2.7.4). My aim is to show that the inference from differential symptomatology to distinct processing modules is premature.

To prevent misunderstandings, I assume that the mechanisms "for the planning and construction of sentences" and for "the analysis of incoming strings" in the above quotations refer to *syntactic* processors and do not include other mechanisms involved in language production (e.g., planning of the conceptual content or the phonological and phonetic shape of utterances) and language comprehension (such as auditory or visual word recognition or semantic interpretation). Otherwise, the assertion of (partially) distinct mechanisms underlying language production and comprehension would be trivially true.

The problem inherent in the above-mentioned questionable inference is that the *ceteris paribus* condition has been overlooked. Suppose that, contrary to what Grodzinsky is arguing, our cognitive system has a single processing mechanism for syntax assembly that is used for *constructing* syntactic structures (grammatical

encoding in sentence production), as well as for *reconstructing* syntactic structures (parsing, grammatical decoding in sentence comprehension). When functioning as encoder, this processor operates on the basis of lexico-syntactic information associated with conceptual structures ("messages"). When in decoding mode, such information derives from word strings recognized in the input. These and possibly further differences between the two modalities of syntactic processing may be said to constitute different processing contexts. The differential linguistic symptomatology Grodzinsky observed in the two modalities thus may be a consequence of differences between the processing contexts in which the single syntactic processor is deployed. Therefore, the conclusion that "mechanisms that underlie language production are at least partially distinct from the comprehension device" (sect. 4) does not necessarily follow.

One could object that this line of reasoning has no practical consequences because the single-processor assumption for grammatical encoding and decoding is highly unlikely *a priori* and at variance with empirical data. A popular argument in support of this view is based on the phenomenon of self-monitoring of overt or covert speech, which seems to involve the simultaneous operation of grammatical encoder and decoder, that is, of two syntactic processors. However, a single syntactic processor can accomplish self-monitoring by switching between encoding and decoding modes ("timesharing"). Various additional empirical and theoretical arguments have been advanced in favor of dual-processor architectures for syntactic processing but they are dubitable at best (Kempen 1999).

More important, a comparison of empirical data on grammatical encoding (formulating) and decoding (parsing) suggests that these processes operate on very similar principles. Consider the following commonalities (for details and references, see Kempen 1999):

1. Sensitivity to conceptual factors. The formulator takes conceptual structures as input. The syntactic parser interacts with the conceptual interpretation process concerning the plausibility of the conceptual message implied by the current parse tree.

2. Direct mapping between conceptual (thematic) and syntactic relations. The formulator assigns conceptual-to-syntactic relationships directly, without intermediate steps that reshuffle the mappings, such as active-to-passive transformations. Similarly, the parser maps syntactic-to-thematic relationships in one step.

3. Incremental processing. Syntactic trees grow from left to right, in tandem with the unfolding of a conceptual message (in formulating) or a string of words (in parsing).

4. Determinism. When analyzing a sentence, the parser comes up with one analysis; likewise, the formulator delivers one sentence expressing a given conceptual message.

5. Similar empirical profiles. Parsing and formulating have been found to react similarly to experimental manipulations such as the following:

a. Lexical frame preferences. Words often have more than one lexical frame (subcategorization frame) associated with them; for example, many verbs can be used transitively or intransitively. In such cases speakers may prefer one frame to another. Lexical frame preferences have been shown to affect sentence production and sentence comprehension in similar ways.

b. Syntactic priming. Speakers tend to repeat a syntactic

construction in consecutive utterances when the conceptual message and the lexical material afford them the opportunity. Structural similarity of consecutive sentences also facilitates comprehension.
c. Agreement errors. Speakers sometimes violate rules of grammatical agreement, for example, number agreement between subject and verb of finite clauses. The factors controlling the incidence of such errors have been studied in much detail. Sentence comprehension appears to include an agreementchecking component that is sensitive to the same factors.
d. Structural complexity effects. Structurally more complex sentences are harder to understand and, all other things being equal, occur less frequently in spoken or written text corpora.

This list of similarities testifies to the viability of the hypothesis that in human language users receptive and productive syntactic tasks are performed by the same syntactic processor. In conjunction with the foregoing this implies that the differential linguistic symptomatology Grodzinsky observed in agrammatic sentence production and sentence comprehension does not undermine the position that in human language users grammatical encoding and grammatical decoding are subserved by the same processing mechanism. In Kempen (1999), I propose an account of the differential symptomatology within a single-processor framework.

References

Kempen, G. (1999). Human grammatical coding. Book manuscript, Leiden University